

Project Period: July 1, 2014-June 30, 2019

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## 1. List of Abbreviations

ACES College of Agriculture, Consumer and Environmental Sciences (UIUC)	Illinois ERC Occupational and Environmental Health and Safety Education and Research Center at the University of Illinois at Chicago
ACGME Accreditation Council for Graduate Medical Education	ILO International Labor Organization
ASHP Agricultural Safety and Health Program	MinOSH Mining Occupational Safety and Health
AIHA American Industrial Hygiene Association	MPH Master of Public Health
AIHCE American Industrial Hygiene Conference and Expo	MS Master of Science NAA Neutron Activation Analysis
AMA American Medical Association	NCI National Cancer Institute
AOHC American Occupational Health Conference	NHANES National Health and Nutrition Examination Survey
APHA American Public Health Association	NIEHS National Institute of Environmental Health and Sciences
ASSP American Society of Safety Professionals	NIH United States National Institute for Health
ATSDR United States Agency for Toxic Substances and Disease Registry	NIOSH National Institute for Occupational Safety and Health
BPA Bisphenol A	NORA National Occupational Research Agenda
CACHET The Chicago Center for Health and Environment	OEE Occupational and Environmental Epidemiology
CCIIO Center for Consumer Information and Insurance Oversight	OHIP Occupational Health Internship Program
CCT Chicago Community Trust	OHN Occupational Health Nursing
CDC United States Centers for Disease Control and Prevention	OM/OMR Occupational Medicine/ Occupational Medicine Residency
CE Continuing Education or CEO Continuing Education and Outreach	OS Occupational Safety
CEPH Council on Education for Public Health	OSH Occupational Safety and Health
CHS-Community Health Sciences	OSHA United States Occupational Safety and Health Administration
CME Continuing Medical Education	PCB Polychlorinated Biphenyls
COE College of Engineering (UIC)	PhD Doctor of Philosophy
COM College of Medicine (UIC)	PI Principal Investigator
CWC Chicago Workers Collaborative	PPRT Pilot Projects Research Training
EB Epidemiology and Biostatistics Division (UIC-SPH)	R01 Code used for Research Project Grant Program
EC Executive Committee	RFT Raise the Floor
EOHS Division of Environmental and Occupational Health Sciences(UIC-SPH)	RN Registered Nurse
ERC Education and Research Center	ScD Science Doctorate
FQHC Federally Qualified Health Center	SEIU HCII Service Employees International Union Health Care Illinois and Indiana
FY Fiscal year	SPH School of Public Health
GME Graduate Medical Education	TRT Targeted Research Training
International Commission on Occupational Health (ICOH)	TSM Technical Systems Management
IEEE Institute for Electrical and Electronics Engineers	UIC University of Illinois at Chicago
IH Industrial Hygiene	UIUC University of Illinois at Urbana-Champaign
IOM Institute of Medicine	UIUC Ag University of Illinois at Urbana Champaign Agricultural Health and Safety
IRB Institutional Review Board	US United States
MD Medical Doctorate	US EPA United States Environmental Protection Agency
MEd Master of Education	USDA United States Department of Agriculture
MIE Mechanical and Industrial Engineering Department (UIC-COE)	

## 2. Abstract

The Illinois Occupational and Environmental Health and Safety Education and Research Center (Illinois ERC – now called the Great Lakes Center for Occupational Health and Safety) is a recognized leader in the national and international movement to promote safe workplaces and healthy workers. Our vision is to improve, promote, and maintain the health of workers and communities through innovative and interdisciplinary activities that:

- Educate graduate students to be professionals and researchers who contribute to ongoing improvements in occupational and environmental health and safety;
- Prepare professionals to be leaders who expand awareness of and solutions for public and worker health and safety;
- Enhance the expertise of employers, worker organizations, and communities through outreach and technical assistance;
- Enrich the knowledge base for solving current and future problems;
- Foster networks of professionals and organizations that advocate for and raise awareness of occupational and environmental health and safety issues; and
- Communicate needs and solutions broadly to all stakeholders.

The Illinois ERC is a multi-campus, multi-college Center that is administratively housed in the University of Illinois at Chicago (UIC) School of Public Health. Academic training programs include Industrial Hygiene, Occupational Safety, Occupational Medicine, Agricultural Safety and Health Programs, and Occupational and Environmental Epidemiology. The Center also supports Pilot Projects Research Training, Targeted Research Training, Outreach, and Continuing Education programs. The Illinois ERC promotes inter-disciplinary activities for trainees such as a required weekly seminar, monthly process tours, and an annual regional research symposium that ensure the overall trainee experience is greater than what individual programs can provide. The External Advisory Board represents a broad range of industries, governmental entities, and labor organizations; and trainees are successful in obtaining positions in their field of study within two years of graduation.

There continue to be far too many workplace injuries and illnesses and an unmet need for professionals to address workplace health and safety issues. The Illinois ERC has a long track record of successfully meeting the Occupational Safety and Health(OSH) needs of our region. Over the past 5 years we have graduated 71 OHS professionals. Our Continuing Education and Outreach programs have reached over 18,000 learners – from occupational medicine physicians in Continuing Medical Education courses to domestic workers learning about the hazards of cleaning products. We funded 25 pilot research projects, contributing to the development of research careers in ergonomics, occupational injury, and occupational toxicology, among many others. Our program provided support for the work for over 100 published manuscripts by our faculty and trainees, who continue to enrich the knowledge base in OSH and translate that knowledge to practice.

In the final years of the funded cycle, the Illinois ERC created an Evaluation Planning team that developed an evaluation plan that follows the Centers for Disease Control and Prevention Framework for Program Evaluation. The purpose of the evaluation is to document processes, make improvements and changes where necessary, measure outcomes, provide guidance for ongoing decision-making with stakeholders, support accountability and findings and ensure effective practices. Evaluation activities have already begun and will continue throughout the funded cycle.

### 3. Program Summaries

## CENTER-WIDE ACTIVITIES

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Final Report (July 1, 2014-June 30, 2019)

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## **A. Program Description**

The Illinois Occupational and Environmental Health and Safety Education and Research Center (Illinois ERC – now called the Great Lakes Center for Occupational Health and Safety) is a recognized leader in the national and international movement to promote safe workplaces and healthy workers. Our vision is to improve, promote, and maintain the health of workers and communities through innovative and interdisciplinary activities that:

- Educate graduate students to be professionals and researchers who contribute to ongoing improvements in occupational and environmental health and safety;
- Prepare professionals to be leaders who expand awareness of and solutions for public and worker health and safety;
- Enhance the expertise of employers, worker organizations, and communities through outreach and technical assistance;
- Enrich the knowledge base for solving current and future problems;
- Foster networks of professionals and organizations that advocate for and raise awareness of occupational and environmental health and safety issues; and
- Communicate needs and solutions broadly to all stakeholders.

As educators, researchers, and professionals working to promote occupational safety and health, we believe that everyone has the right to healthy work – a job that pays a living wage, a workplace that is safe, a work environment where everyone is treated with respect, and access to qualified occupational safety and health professionals.

The Center Administration goal is accomplished by providing oversight of and support to the activities of five academic programs (Industrial Hygiene, Occupational Safety, Occupational and Environmental Epidemiology, Occupational Medicine and Agricultural Safety and Health), the two research programs (Pilot Projects Research Training Program and Targeted Research Training Program) and the Continuing Education and Outreach programs. The Center Administration also supports diversity recruitment and interdisciplinary coordination. The ERC is administered by the Center Director (Susan Buchanan), Deputy Director (Lorraine Conroy), and by Caitlin Donator, Project Coordinator; together they are responsible for the day-to-day activities of the ERC. They communicate with NIOSH on matters of funding and reporting. Staff in the Division of Environmental and Occupational Health Sciences assist with personnel appointments, hiring, payroll, and purchasing. The ERC has an executive committee that meets monthly and is comprised of the program directors and deputy directors for each of the programs in the ERC. Monthly Program Director meetings include budget review, program updates, and announcements. Meetings may also include Advisory Board planning, development of new ERC initiatives, periodic review of interdisciplinary curricular and extracurricular activities, strategic planning, reporting of related activities, program development and similar periodic activities.

The ERC has an External Advisory Board that meets 1-2 times per year to review progress toward accomplishment of strategic goals and provide support to ERC activities. The External Advisory Board (EAB) consists of members from industry, unions and worker centers, and government and regulatory agencies. Members are also representatives from a wide variety of OSH professions including nursing, safety, industrial hygiene, occupational epidemiology, environmental health, and risk management. The EAB's most recent meeting was held on April 17, 2019 and included 12 ERC faculty and staff, and 12 advisory board members attended.

Our five academic programs as well as our Targeted Research Training Program, the Pilot Projects Research Training Program and our Continuing Education and Outreach Programs exist as a cohesive unit that offers a stimulating environment of learning for our trainees. In order to better measure our impact and prepare our trainees for their future careers, we implemented a robust evaluation program in 2018, which has already begun to result in changes to our approaches and enhancements to student life.

## Center-wide Highlights 2014-2019

- *Strategic goals.* In the previous funding cycle, we updated the Center's strategic goals. This activity involved program directors, affiliated faculty, trainees and the Advisory Board. The five strategic goals for the Illinois ERC for the five years were to:
  - a. Increase the number of qualified people who apply to and enroll in our graduate programs;
  - b. Ensure student success for academic achievement and relevant employment following graduation;
  - c. Expand the capacity of workers and organizations for health and safety knowledge, skills and action;
  - d. Expand the reach and impact of continuing education activities on professional practice; and
  - e. Expand understanding of and solutions for workplace health and safety problems.
- *ERC Leadership.* Changes in leadership in our ERC occurred in Spring 2018 as a result of the resignation of the ERC Director Lisa Brosseau and retirement of the Continuing Education and Outreach Director Joe Zanoni. Susan Buchanan became ERC Director, having previously served as Deputy Director and Director of the Occupational Medicine Program. Preethi Pratap became Director of Outreach and Continuing Education, having worked with the CE team since 2009. She has also participated in the TRTs and advised IH trainees. Based on the previous experience with both Dr. Buchanan and Dr. Pratap with the Illinois ERC and the UIC SPH Division of EOHS, the transition was smooth, and both had over a year of experience in their new roles before the start of the new funding cycle. Dr. Margaret Sietsema was hired as a tenure-track Assistant Professor in the Industrial Hygiene program after Dr. Rachael Jones resigned in spring 2019.
- *Innovation.* Several initiatives in the past five years illustrate our commitment to using innovative approaches to our trainee experiences and community outreach. The School of Public Health has combined its school-wide required courses into an integrated curriculum of courses that are problem-oriented instead of using the traditional didactic approach. All UIC SPH students including ERC MPH trainees are required to take **Determinants of Population Health** in place of the introductory environmental and occupational health and behavioral health courses. This course introduces students to the concept that where one is born, lives, learns, plays, works and ages influences overall health and health outcomes. **Analytic and Research Methods in Public Health** introduces students to the analytic and research methods used to carry out the core functions of evidence-based public health, in place of the introductory biostatistics and epidemiology courses. **Public Health Systems, Policy, and Management** introduces problem and case-based pedagogy in public health management and practice, including community health assessment and improvement planning; policy development and advocacy; and organizational planning and management, in place of the introductory courses in health policy and administration and community health sciences. EOHS has also made changes to some of its courses motivated by changes in accreditation requirements from CEPH and by limitations identified in the EOHS Division and IH program curricula. The Occupational Safety program has changed its curriculum to add approaches to automation and data mining. Another innovation in our approach to our trainees is that we have established a Blackboard site for trainees only. We use this site to announce weekly noon conference schedule, site visits, social outings, TRT meetings and other activities. This helps the trainees feel more like a cohort that proceeds through the programs together. The ASHP Grain Safety curriculum utilizes a variety of teaching methods and behavior change approaches and an on-line youth training program to increase its impact on grain-related injuries and deaths. Occupational medicine residents are now receiving training in telemedicine from Dr. Marder, who has incorporated it into the services offered by University Health Service. The ERC's close relationship with the new Center for Health Work (PI-Lorraine Conroy) has increased trainee opportunities for research, field practicums, and Capstones.
- *Illinois ERC 40th Anniversary celebration and Regional Health and Safety Research Symposium.* Our 40th Anniversary celebration is described in the CE and Outreach section below. The day-long anniversary celebration was followed the next day by the ERC Regional symposium, attended by 90 participants. This event, planned by Illinois ERC Director Dr. Lisa Brosseau and facilitated by the ERC CE program staff, was the third annual symposium offered jointly by the Illinois ERC and our regional ERC partners from the University of Michigan and the University of Cincinnati (described in Interdisciplinary Activities, below). Faculty from each

institution presented current research, and students presented their work during poster sessions. Dr. David Michaels offered the keynote address, describing how employers can improve operations at the same time as keeping workers healthy and safe. The symposium culminated with a tour of the historic Pullman district and National Monument, and the Pullman Porters' Museum on the south side of Chicago, organized by the CE program in collaboration with the Illinois Labor History Society.

- *Planning and Evaluation.* In preparation for our competitive renewal application, the ERC created an Evaluation Planning team headed by Dr. Preethi Pratap. The team consists of the ERC Director, the ERC Program Coordinator, the Director of Evaluation, one Academic Program Director, and one trainee. The Centers for Disease Control and Prevention (CDC) Framework for Program Evaluation guided the development of the evaluation plan. The purpose of the evaluation is to document processes, make improvements and changes where necessary, measure outcomes, provide guidance for ongoing decision-making with stakeholders, support accountability and findings and ensure effective practices. From July 2017 through June 2018, the Planning and Evaluation Team performed the first three steps in the CDC framework: We identified stakeholders (Step 1); we identified evaluation specific short- and long-term goals and the specific aims for the Illinois ERC (Step 2); and we focused the evaluation design (Step 3). The **evaluation-specific aims** are: 1) *to assess the fidelity and implementation of the mission and activities of the ERC core programs, and 2) to describe the impact of IL- ERC's outputs and outcomes in improving worker health and safety.* The **long-term goals** mirror the center's strategic plan: 1) *UIC ERC continues to serve the NIOSH mission of improving worker health and safety by reducing occupational injury and fatalities in the United States, and 2) UIC ERC continues to serve as a premier resource for OS&H needs in academia, industry, labor, government, and the public.* The Evaluation Team identified four main areas to focus the evaluation design: 1. Capacity building in OSH; 2. Building networks and partnerships to address OSH needs; 3. Building evidence and innovation in OSH, and 4. Raising awareness to address ongoing and emerging OSH issues. The evaluation design involved development of five key questions that respond to the evaluation aims and goals and assess how well the Illinois ERC has achieved its strategic goals. For each evaluation question, metrics have been identified that will be used to answer the evaluation questions, and some potential data sources/evaluation tools to gather these data. Each ERC program created their own metrics that will be used for individual program evaluation and improvement. The team created a center-wide Logic Model with inputs, activities, outputs, and short-term goals leading to the long-term goals, all of which undergo continuous monitoring to feedback for quality improvement.

The Planning and Evaluation Team was very active in the 2018-2019 academic year. Activities included three evaluation meetings with trainees over the course of the year: December 2018 to review expectations and get feedback on the fall semester; in May we held two meetings to make sure all trainees could attend and were able to obtain end-of-year feedback. We also met individually with each program director to refine evaluation metrics and indicators. We identified common indicators to all programs as well as identifying indicators we would like to use for continuous improvement. We then developed a new centralized annual metrics tracking tool. The tool tracks all faculty, student and program specific accomplishments in accordance with the ERC reporting requirements.

### **C. Interdisciplinary Activities**

Interdisciplinary activities are an important part of the trainee curriculum and assist trainees to gain competency in hazard identification, problem solving, teamwork, and communication. Trainees in the Illinois ERC interact in a number of planned ways, described below. Additionally, there are many informal interactions that are facilitated by the Illinois ERC. The most important factor in the cohesiveness of the ERC trainees via informal interactions is the funding that is sufficient to allow trainees to study full-time. Being a full-time student provides the opportunity for all trainees to be on campus, to work together on class assignments, projects, etc. and to socialize with each other. Our Planning and Evaluation Team has also incorporated more interactive activities during the last year such as lunches in our new departmental lounge area and a social night at a local pub during orientation.

**Activity 1: Interdisciplinary Seminar.** The *Environmental and Occupational Health Sciences Seminar* (EOHS 495, 1 semester hour) occurs weekly on Wednesdays at noon. All Chicago-based trainees are required to participate in the seminar for 4 semesters, though they must enroll for credit only 1 semester. Participation by trainees at University of Illinois Urbana Champaign (Ag Safety trainees) is facilitated by sharing the session through Blackboard Elluminate. Enrollment in the seminar is required by several degree programs in the EOHS Division that are not affiliated with the Illinois ERC, helping to ensure diverse perspectives. The seminar has been re-organized for the 2018-2019 academic year. It now follows a monthly theme, chosen and facilitated by one of the ERC program directors, who will cover one month each. The monthly curriculum includes: Week 1) topic presentation by faculty; Week 2) professional practice presentation; Week 3) student-led journal club, and Week 4) student-led process talk.

**Activity 2: Common Coursework.** In addition to the 3 core courses required by all UIC SPH students, the courses *Occupational Health and Safety Practice* (EOHS 421, formerly *Fundamentals of Industrial Hygiene*) is required for IH, OEE, OS and OM trainees. *Environment, Toxicology and Diseases* (EOHS 502) and *Occupational Safety and Health Management Systems* (EOHS 563) are required for trainees in the IH, OS and OM programs. All of these courses have group assignments that ensure trainees work in interdisciplinary teams to solve practical occupational health and safety programs. In addition, the course *Exposure Assessment Strategies* (EOHS 501) is required for trainees in the IH, OEE and OS programs. Though this course does not involve interdisciplinary teamwork, concepts and methods (qualitative and quantitative) in exposure assessment are addressed for both occupational and environmental settings.

**Activity 3: Industrial Process Tours and Talks.** Process tours of regional industrial facilities are arranged approximately monthly by the ERC Coordinator. Trainees are required to attend at least four process tours per academic year. Accompanying each process tour is a process talk developed and delivered by 1-4 students during the interdisciplinary noon seminar. The process talk includes a general description of the industry and business, a detailed description of the industrial process and work activities to be observed, and information about anticipated or known hazards associated with the industrial process and work activities. Eight process tours (not including the additional ones required in various courses) were offered in 2018-2019, which is double what was offered the previous academic year. The following lists the process tours taken in the 2018-2019 academic year followed by a list of sites visited in the previous 4 years of the funding cycle.

Process Tours 2018-2019

- Sept 28, 2018: UIC Steam Plant
- October 26, 2018: UIC Hospital Sterilization Unit
- Nov 16, 2018: Michael Lewis Company, Distribution Warehouse
- January 22, 2019: Chicago Tribune Freedom Center Printing Plant
- February 26, 2018: Aurora Specialty Textiles
- March 13, 2019: Method Soap Factory
- March 23, 2019: Cincinnati Fire Museum
- April 19, 2019: Asmark Grain Safety Training Center

Additional process tour sites 2014-2018

Process Site	Type of Facility	Location
BP Refinery	Petroleum Refinery	Whiting, Indiana
Biological Research Laboratory at UIC	Animal Research Laboratory	Chicago, Illinois
Mitsubishi Motors	Automotive Manufacturer	Normal, Illinois
Chicago Transit Authority	Public Transportation	Chicago, Illinois
Jelly Belly	Candy Manufacturer	North Chicago, Illinois
Argonne National Laboratory	Research Laboratory	Lemont, Illinois
Lincoln Park Zoo	Public Zoo	Chicago, Illinois

Nabisco	Triscuit Manufacturer	Naperville, Illinois
PepsiCo	Pepsi Bottling Facility	Chicago, Illinois
Kohler Industries	Kitchen and Bath Fixtures Manufacturing	Kohler, Wisconsin
ArcelorMittal	Steel Manufacturer	Burns Harbor, Indiana
Stickney Wastewater Treatment Plant	Wastewater Treatment Facility	Stickney, Illinois
Lakeshore Recycling Facility	Recycling Facility	Chicago, Illinois
Abbott Laboratories	Pharmaceuticals Manufacturer	Chicago, Illinois

**Activity 4: Regional ERC Research Symposium.** For the past three years, the ERCs based at UIC, the University of Michigan and the University of Cincinnati have hosted a research symposium hosted on a rotating basis (in March 2018 the event was at UIC). Each symposium involves several talks by ERC-affiliated faculty or trainees about ongoing research activities, a poster event where trainees can present their research, time for networking, and a tour of an industrial site. All trainees are strongly encouraged to participate, and transportation and lodging is provided by the Illinois ERC for trainees who wish to participate in the symposium when it is in Ann Arbor, MI or Cincinnati, OH. The Regional ERC Symposium for the 2018-2019 academic year was held March 22-23 in Cincinnati, Ohio. Six trainees attended the conference (4 from UIC, 2 from UIUC Ag) and two UIC trainees presented their research during the poster session.

**D. Recruitment Activities** – As part of our new Planning and Evaluation team and our new ERC coordinator’s role in it, we are ramping up our recruitment activities. The following lists the events in 2019 at which we actively recruited, in addition to our recruitment activities described in our Competitive Renewal application.

- February 27, 2019: AIHA Student Night
- March 13, 2019: Undergraduate Public Health Round Tables. 2 ERC Faculty participated
- March 18, 2019: Loyola University Chicago Environmental Science Undergraduate Program. Presented on Occupational Health to 40 undergraduate students
- AIHce Expo 2019, May 19-22: Tabled in the exhibit hall
- Safety 2019, June 9-12: Tabled in the exhibit hall

**E. Website.** During the 2018-2019 year the Illinois ERC coordinator updated and transitioned the ERC website to a new platform to prepare for the University of Illinois at Chicago School of Public Health’s website launch in Spring 2019. The new platform allows the ERC website to be more user friendly, engaging, accessible on mobile devices and photos are displayed throughout it. The new platform also makes it easier for prospective students to find information about each program and connect with program contacts to learn more. The ERC’s Facebook page is directly linked to the website and a thread of activities and posts can be viewed on the homepage, which encourages more engagement. The new website can be found at: <https://glcohs.uic.edu/>.

## Pilot Projects Research Training Program

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Final Report (July 1, 2013-June 30, 2019)

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## Accomplishments for 2014-2019 Project Period

In each of the previous funding cycles the Illinois ERC Pilot Projects Research Training Program has received a greater number and variety of proposals in terms of institutions, departments and disciplines. The success rate (percent) for awards has decreased however, since the funding amount has remained relatively stable and the number of applications received has increased from 4.9 per year in the first 9-year interval to 7.2 per year in the second 6-year interval, and to 10 proposals per year in the last five-year interval (Table 1). The quality of the proposals has improved, and the diversity of applicant disciplines and topics has increased. This increase has been fueled by a greater percent of proposals from institutions other than UIC: 20%, 38%, and 40% in each interval, respectively. These institutions include most of the states in our geographical region, including Wisconsin, Iowa, Indiana, multiple academic institutions in Chicago and throughout Illinois (Table 2). Submitted and funded proposals for the current project period are shown in Table 3 and publications resulting from PPRT funded projects are shown in the Publications list section of this overall report.

Although the number of submitted proposals fluctuates from year to year for reasons that are not clear, the average number increased to 10 proposals per year. Additionally, the quality of the proposals has improved, and the diversity of applicant disciplines and topics has increased. We began to promote the PPRT program to two mid- and southern Indiana universities at which two EOHS/ IH program graduates are currently employed as associate professors.

For this 5-year period, this program has awarded \$399,228 for 25 projects that have helped support 11 junior faculty, 13 PhD candidate principal-investigators, 1 Masters candidate PIs, 1 academic staff person, and 8 student research assistants for one semester or more. The projects have generated 9 subsequent grant proposals based on the pilot project research findings, 6 of which were successfully funded, 21 presentations at regional, national, or international meetings, 10 reports/abstracts/posters or papers, and 8 publications. One Pilot Project received supplementary funding from other sources and 17 resulted in or are expected to result in findings used toward MS or PhD degree theses. Many of the researchers provided comments that indicated the value of the program to their careers. The comments are too numerous to include all, but a selection are provided below:

- Dr. Ellen Wells, Purdue University: *This project has been one of the first grants received by my laboratory; as such this has been instrumental as a first step in establishing my own independent, externally-funded, research group by providing support for additional grants as well as data to be used for projects by my first group of students.*
- Dr. Margaret Sietsema, UIC: *This award significantly helped my career by allowing me the resources to finish my PhD research in respiratory protection. With my PhD in respiratory protection I was able to obtain a postdoctoral position at the National Personal Protective Technology Laboratory.*
- Dr. Joseph Mazzola, Roosevelt University: *This program elicited numerous developmental benefits including project management, research methodology, technical competency, and greater expertise in subject matter. My career is still in its infancy, however, this grant program provided the resources to further develop proper research protocol, enhanced understanding of research (especially experimental methods), and the funding processes, and improved exposure to the professional field. It also gave me practice navigating the grant funding process here at Roosevelt for future funding possibilities, and indirectly has led to the university investing in better resources and procedures for grant management.*
- Dr. Mark Wilson, UIC: *Without this grant, I do not believe that I would have been able to successfully recruit the appropriate number of subjects for the study and I would have had great difficulty in obtaining the equipment and supplies needed to conduct the study as well. The study, which I was able to conduct with the assistance of this grant, will be instrumental in being able to obtain funding for additional studies during my career.*

**Table 1: Summary of Pilot Project Research Training Applications and Awards**

		<b>Applications</b>	<b>Awards</b>	<b>Success Rate</b>
<b>1999-2008 (9 yrs)</b>	Within ERC/EOHS	43	31	72%
	Other UIC	7	5	71%

	Non-UIC Institutions	12	6	50%
	Total	62 (6.9/yr)	43 (4.8/yr)	69%
	Percent from non-UIC Institutions	19%	14%	
<b>2008-2014 (6 yrs)</b>	Within ERC/EOHS	19	15	79%
	Other UIC	6	4	67%
	Non-UIC Institutions	18	9	50%
	Total	43 (7.2/yr)	28 (4.7/yr)	65%
	Percent from non-UIC Institutions	42%	32%	
<b>2014-2019 (5yrs)</b>	Within ERC/EOHS	22	13	58%
	Other UIC	8	5	50%
	Non-UIC Institutions	20	7	35%
	Total	50 (10/yr)	25 (5/yr)	50%
	Percent from non-UIC Institutions	40%	28%	

\*One FY2005 proposal awarded \$15,901 was later withdrawn by the PI. These funds were carried over to FY 2006 for award. One FY2007 proposal awarded \$2,854 was later withdrawn by the PI, and one proposal awarded \$4,439 did not receive IRB approval from NIOSH. These funds were carried over to FY2008 for award

\*\* One FY 2017 proposal awarded \$7,476 was later withdrawn by the PI. These funds were awarded to other proposals that had not received full award or were carried over to FY 2018 for award. This award is not counted as funded in this table.

**Table 2. Applicant Institutions**

<b>2014-2019 (5yrs)</b>	
<i>Within ERC/EOHS</i>	
EOHS; Occupational Medicine; Epi/ Bio; (UIC), & Agricultural Safety (UIUC)	
<i>Other UIC</i>	
IHRP Community Health Sciences; Health Policy and Administration; Institute for Minority Health Research; Pathology	
<i>Non-UIC Institutions</i>	
Purdue University School of Health Sciences; Marquette University, Physical Therapy; Roosevelt University, Industrial Organizational Psychology; Texas A&M, Engineering Experiment Station Mechanical Engineering; University of Wisconsin-Milwaukee, Occupational Science and Technology; Illinois State University, Health Sciences; University of Wisconsin- Madison, School of Nursing; University of Wisconsin- Madison, Psychiatry; Northern Illinois University, Industrial and Systems Engineering; Purdue University, Industrial Engineering; DePaul University, Psychology	

**Table 3: Application Title, PI, & Institution, all PPRT Applications Received July 1, 2014-June 30, 2019**

Project Title	Principal Investigator	Institution
<b>FY2015 (Jul '14-Jun '15)</b>		
<b>AWARDED PROPOSALS</b>		
Impact of co-exposure to metals on manganese neurotoxicity	Ellen M. Wells, Assistant Professor	Purdue University School of Health Sciences
Chicago Transit Authority Train Noise Exposure	Linh Phan, Graduate student	University of Illinois at Chicago, SPH, EOHS
Reducing MSD Risk among CNAs: An Untapped Strategy around Models of Agency	Emily Stiehl, Clinical Assistant Professor	University of Illinois at Chicago, SPH, HPA
Do OSHA Fit Tests Predict Respirator Performance During Healthcare Tasks?	Margaret Sietsema, PhD candidate	University of Illinois at Chicago, SPH, EOHS
The Role of Stress Mindset on Physiological Stress Levels and Task Performance	Joseph J. Mazzola , Assistant Professor	Roosevelt University, Psychology

<b>Project Title</b>	<b>Principal Investigator</b>	<b>Institution</b>
Stress and Cardiac Risk Factors in the Working Population	Mark Wilson, PhD candidate	University of Illinois at Chicago, SPH, EOHS
<b>PROPOSALS NOT AWARDED</b>		
Cultivating and Maintaining Positive Health in Home Care Aides: An Exploration Using Oral History	Vida Henderson, PhD candidate	UIC SPH, IHRP Community Health Sciences
Hepatitis E in Workers with Occupational Exposure to Swine: Assessing Prevalence and Exposure Risks	Jyotsna S. Jagai, Research Assistant Professor	University of Illinois at Chicago, SPH, EOHS
Linking Data to Inform Patient, Worker and Environmental Outcomes	Susan Kaplan, Research Assistant Professor	University of Illinois at Chicago, SPH, EOHS
Development and Validation of a Neutron Activation Analysis (NAA) to Quantify Aluminum in Bone In Vivo	Linda H. Nie, Assistant Professor for Patrick Byrne, PhD candidate (listed as collaborator)	Purdue University School of Health Sciences
Effects of Cognitive Demand and Stress on Steadiness and Motor Neuron Excitability	Hugo Maxwell Pereira	Marquette University Physical Therapy
Hazard Assessment of Nanocrystals and Nanotubes Released from a Novel Laser-shocked High-rate Generic Chemical Synthesis Production and Resulting Exposure	Candace Tsai	Purdue University School of Health Sciences
<b>FY2016 (Jul '15-Jun '16)</b>		
<b>AWARDED PROPOSALS</b>		
Can low-cost interventions to home-based workspaces result in improved occupational health outcomes among weavers?	Gabriela Gracia, PhD candidate	UIC-SPH/EOHS
Linking Data to Inform Worker, Patient and Environmental Outcomes	Susan Kaplan, Research Assistant Professor	UIC-SPH/EOHS
Assessment of Toxic Heavy Metal and Smoking Exposures on Breast Cancer Characteristics in Cook County, IL	Jacob K Kresovich, PhD Candidate	UIC-SPH/Epi-Bio
Mortality study of the Great Lakes Fish Consumption Cohort	Yangyang Liu, PhD Candidate	UIC-SPH/Epi-Bio
Emphysema in Black South African Miners; an analysis and comparison with US miners using the Pathology Automated System of South African Miners (PATHAUT) data 1975- 2013 and the US National Coal Workers Autopsy Study (NCWAS).	Sithembile L. Mabila, PhD Candidate	UIC-SPH/EOHS
<b>PROPOSALS NOT AWARDED</b>		
Helmet use in multimodal commuters in an urban bike share program	David Swedlar, Research Assistant Professor	UIC-SPH/EOHS
Workers' Compensation and the Working Poor	Lisa Topete, MS Candidate	UIC-SPH/EOHS
The Effect of Vibrotactile Stimulation on People's Tool Maneuverability	Han Ul Yoon, Postdoctoral Researcher	Texas A&M Engineering Experiment Station Mechanical Engineering
<b>FY2017 (Jul '16-Jun '17)</b>		
<b>AWARDED PROPOSALS</b>		
Community Concept Mapping to Describe Work as a Determinant of Health	Jennifer Hebert Beirne, Assistant Professor	CHS, SPH, UIC

<b>Project Title</b>	<b>Principal Investigator</b>	<b>Institution</b>
Establishing Research Methods to Study the Occupational Health Risk of Hair Braiders	Alfreda Holloway-Beth, Research Asst. Professor	EOHS, SPH, UIC
Exposure to a Common Agricultural Herbicide and Alterations in the Brain Serotonin System	Katharine Horzmann, PhD Graduate Student	Purdue University, School of Health Sciences
Evaluation of Wearable Sensors for Detection of PM2.5 Exposure among Transit Workers*	Liza Topete	EOHS, SPH, UIC
Health and Safety Hazard Assessment In Asian Home Care Workers	Jing Zhang, Senior Research Specialist	EOHS, SPH, UIC
<b>PROPOSALS NOT AWARDED</b>		
Heavy Metals, Fish Consumption, and Cardiovascular Disease: Risk vs Benefit among Great Lakes Sport Fish Consumers	Michael J. Blackowicz, MS/ Doctoral Student	EB, SPH, UIC
Metals and Metabolic Syndrome Risk Factors among Chicago Adults	Catherine M. Bulka, PhD Student/ Pre-doc trainee	Institute for Minority Health Research, UIC
Exploring State Laws and Regulations that Effect the Frequency of Drug Testing in Truck Drivers in the Midwest	David Swedler, Research Assistant Professor	EOHS, SPH, UIC
An Evaluation of Sit-to-Stand Lift: Influence of Raised Height and Upper Extremity Strength	Ruoliang Tang, Postdoctoral Fellow	University of Wisconsin-Milwaukee, Occupational Science and Technology
Evaluating the Efficacy of UVC Surface Decontamination under Various Environmental Conditions	Liangcheng Yang, Assistant Professor	Illinois State University, Health Sciences
<b>FY2018 (Jul '17-Jun '18)</b>		
<b>AWARDED PROPOSALS</b>		
Moving from Healing into Action: Addressing Gender-based Violence in Support of Total Worker Health	Alisa J Velonis, Assistant Professor	UIC- Community Health Sciences
Presenteeism in Nursing	Jessica Germaine Rainbow, (Dykstra) PhD Candidate	University of Wisconsin-Madison, School of Nursing
Safety Evaluation of Cured-in-Place-Pipe Exposures	Jonathan Shannahan, Assistant Professor	Purdue University, School of Health Sciences
Needs Assessment for Re-employment	Dana Madigan, PhD Candidate	UIC-Environmental & Occupational Health Sciences
Systematic Evaluation of Patient Transfer Devices to Improve Musculoskeletal Health among Caregivers	Jaejin Hwang, Assistant Professor	Northern Illinois University, Industrial and Systems Engineering
<b>PROPOSALS NOT AWARDED</b>		
Improved Methodology for Modeling the Turbulent Diffusion Coefficient in Occupational Settings	Miranda Engberg-Brazeal, PhD Candidate	UIC-Environmental & Occupational Health Sciences
Validation of a Portable XRF Technology for Noninvasive In Vivo Quantification of Pb in Bone and As in Skin Among a Population Living in Pb- and As-contaminated Superfund Site	Xinxin Zhang, Graduate Research Assistant	Purdue University, School of Health Sciences
Biomechanical Evaluations of Bed-to-Wheelchair Transfer: Gait Belt vs. Walking Belt	Ruoliang Tang, Post-doc Fellow	University of Wisconsin-Milwaukee, Occupational Science and Technology

<b>Project Title</b>	<b>Principal Investigator</b>	<b>Institution</b>
Ergonomics coaching program to reduce worker injuries in surgical environments	Jackie Cha, PhD Candidate	Purdue University, Industrial Engineering
Real-Time Assessments of Culture- and Context-Specific Factors Influencing Smoking among Asian American Immigrant Workers	Anne Saw, Assistant Professor	DePaul University, Psychology
Measuring the Social Value of Work	Kee Chan, Assistant Professor	UIC-Health Policy Analysis
Understanding the Effects of Flex Time in the Workplace.	Kyle Page, M.A. I/O Psychology	Roosevelt University, Industrial Organizational Psychology
<b>FY2019 (Jul 18-Jun 19)</b>		
<b>AWARDED PROPOSALS</b>		
Identifying Candidate Epigenetic Biomarkers of Fatigue-Related Impairment	David T. Plante. MD, MS, Assistant Professor	University of Wisconsin- Madison, Psychiatry
Understanding the Effects of Environmental Exposure to Cadmium on Prostate Cancer Progression	Rama Ali, PhD candidate	UIC Pathology
Impacts of Technical Assistance Providers' Participation in a Health, Labor, and University Capacity Building Process	Tessa Bonney, MPH, PhD Candidate	UIC EOHS
Occupational Personal Exposure to Fine Particulate Matter using Sensors: Feasibility and Performance	Saisattha Noomnual, PhD candidate	UIC EOHS
Safety Climate among precarious workers: Construed External Safety Image	Emily Stiehl, Clinical Assistant Professor	UIC Health Policy Administration
<b>PROPOSALS NOT AWARDED</b>		
Developing Public Health Professional Occupational Epidemiologic Cohort through Professional Associations, Academic Institutions, Non-profit Organizations	Alfreda Holloway-Beth, Research Assistant Professor	UIC EOHS
Systematic Evaluation of Patient Turning Devices to Reduce Biomechanical Stresses among Caregivers	Jaejin Hwang, Assistant Professor	Industrial and Systems Engineering, Northern Illinois University
Comparative Assessment of Hazard Exposure and Health Status of Organic and Conventional Farm Workers	Liangcheng Yang, Assistant Professor	Illinois State University, Agriculture

\*Note: FY2017 award "Evaluation of Wearable Sensors for Detection of PM2.5 Exposure among Transit Workers" was withdrawn by investigator

## TARGETED RESEARCH TRAINING

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Final Report (July 1, 2014-June 30, 2019)

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## **A. Program Description**

The Illinois Occupational and Environmental Safety and Health Education and Research Center (Illinois ERC) is based in the Division of Environmental and Occupational Health Sciences (EOHS) of the University of Illinois at Chicago (UIC) School of Public Health (SPH). The mission of the Illinois ERC is to improve, promote and maintain the health of workers and communities through innovative activities that: 1) educate graduate students to be professionals and researchers, 2) prepare professionals to be leaders and practitioners, 3) enhance the expertise of community members, and 4) enrich the knowledge base for solving current and future problems.

The goals of the Targeted Research Training (TRT) Program at the Illinois ERC have been to provide NIOSH trainees with research training in general, and in particular, with training that entails interdisciplinary expertise. The specific objectives of the overall research training are to provide training in:

1. research project planning, implementation logistics, and budgeting;
2. developing research proposals;
3. communication of results through publications and presentations;
4. qualitative research methods;
5. quantitative research methods;
6. research ethics

The approach to the TRT program in the Illinois ERC has been to form interdisciplinary teams, each focused on one or more priority areas in the national Occupational Research Agenda (NORA). In the past five years, four teams were established, facilitated by Illinois ERC faculty who collaborate with participating students to establish the mission of the team, set practical goals for team, develop plans to achieving the goals, and implement the plans. Trainees from all the Illinois ERC academic programs are expected to participate in a TRT Program team, and other students are welcome to participate. Thus, each team includes multiple disciplinary perspectives. The team approach has been employed because increasingly there is need for occupational safety and health professionals and researchers to work collaboratively in teams owing to the complexity of occupational health and safety problems.

Concepts for new teams are submitted by faculty and reviewed by the Illinois ERC Executive Committee, which determines whether the topic of the proposed TRT Program team is relevant to NORA and responsive to student interests, and allocates resources from the TRT Program budget. Since the last competitive renewal, one new TRT program team about sensor technology has been formed, bringing the total to four teams.

## **B. Summary of Team Accomplishments**

### **Sensor Technology Team**

The Sensor Technology TRT team was formed by Drs. Jones and Brosseau in Fall 2015 with a focus on new sensors and sensor technologies as they may contribute to environmental and occupational exposure assessment in the context of industrial hygiene, occupational and environmental epidemiology and occupational medicine applications. The team spent the fall 2015 semester collecting materials, discussing sensors in general, visiting a microsensor fabrication laboratory in the UIC Computer Engineering department, and exploring ideas for specific projects. Dr. Igor Paprotny of the microsensor lab gave an invited talk about his work with microsensors for particulate matter in an ERC seminar.

Since the first year up until Spring 2019, the sensor technology TRT group has met 1-2 times per month during the academic year, with 8-12 participants at each meeting. Most participants are trainees in the Industrial Hygiene and Occupational Safety programs, but some trainees in the Occupational and Environmental Epidemiology program participate. A full summary of the activities of this group during the last funding cycle can be found in the annual progress reports, but highlights include a workshop delivered by an Occupational

Safety trainee about circuits and electronics and building particulate matter sensors. In 2017, the group decided to study outdoor air pollution using low-cost sensor devices and, through literature review of air pollution sensors, selected the AirBeam device based on its performance and popularity. The group settled on assessing exposure misclassification associated with the use of EPA-measured and modeled air pollution data relative to sensor data collected on individuals in the context of the association between air pollution and asthma. This assessment leverages existing data sources about the environment and health to explore how exposure misclassification can impact associations between exposure and adverse health outcome. This topic is relevant to occupational health because many workers are exposed to air pollution through outdoor work, and experience asthma. Exposure misclassification for outdoor workers is likely to be extreme because exposure is typically linked through residential address, but outdoor workers spend a lot of time working outside, perhaps far from their homes.

In the past year (2018-2019) the group acquired 10 AirBeam devices and several inexpensive Android mobile phones to operate the devices. The group self-selected into three teams. Team 1 developed a written protocol about how to operate the AirBeam device and trained other students in their operation. Team 2 developed a data management protocol describing how the data were to be archived and cleaned in preparation for data analysis. Team 3 was to develop a sampling strategy that would characterize exposures encountered by outdoor workers: Team 3 failed to complete their task. Activities of the sensor TRT were curtailed in early spring 2019 with the departure of Dr. Jones from UIC.

### Sensor Technology Team Products

The team manages a shared Box folder in which published resources, websites and other resources are collected. Students collected articles on current sensors and their applications in occupational and environmental exposure assessments.

### Occupational and Environmental Epidemiology Team

The Occupational and Environmental Epidemiology (OEE) team, facilitated by Drs. Stayner and Turyk, is broadly concerned with providing a forum for students to engage in discussions about research, including their own research products (e.g., dissertation proposals, manuscripts), related to occupational and environmental epidemiology. A full summary of the activities of this group during the last funding cycle can be found in the annual progress reports. In the first years of the funding cycle the students were actively involved in conducting a study of the potential hazards from air and noise pollution related to bicycling in Chicago: The students received funding to conduct the study from the NIOSH Pilot Project Training Grant Program. Field work for the study was completed during the summer, and students analyzed the results during the following academic year. In the past several years, the OEE team has been focusing on aiding trainees with their own research. The team meets approximately monthly, and at each meeting a trainee presents some aspect of their work. The presentation might be the trainee's proposal, and the team provides feedback on the proposed aims and/or research methods; or it might be practice for an upcoming presentation at a local or national conference, and the team provides feedback on the clarity and style of the presentation. Several PhD students have presented their proposed research plans and have received valuable feedback that improves their final research proposal.

The following shows examples of meeting content from the past several years:

- Presentation by Harvey Checkoway, guest speaker from the University of Washington School of Public Health: Cancer risk among Chinese textile workers (10/14/15)
- Presentation by Benjamin Booth, PhD candidate in Epidemiology (former NIOSH trainee, now NCI fellow): Agricultural and biological exposures and childhood cancer risk (10/27/15)
- Presentation by Matthew Schmidt, PhD candidate in Environmental and Occupational Health Sciences and NIOSH OEE trainee: Biomarkers for asbestos exposure (12/04/15)
- Presentation by Sithembile Mabila-Abduba, PhD candidate in Environmental and Occupational Health Sciences and OEE trainee: Emphysema among coal miners in South Africa and the United States

(01/28/16)

- Presentation by Michael Blackowicz, PhD student in Epidemiology and OEE trainee: Cardiovascular outcomes and exposure to persistent organic pollutants (03/03/16)
- October 24: Communicating risks and benefits of fish consumption for expectant or breastfeeding mothers (10/24/17)
- Discussion on the *Fight for 15* campaign and how income impacts health (11/30/17)
- February 1: Review of papers and debate on reproductive health impacts of the Flint, MI lead crisis (2/1/18)
- Student presentation of the association of PCB exposure and sex hormones in men (NHANES) (2/20/18)
- Presentation by Jessica Madrigal, PhD candidate in Epidemiology and OEE trainee: Relationships among exposure to environmental pollutants, endogenous hormones and kidney disease (9/18/18)
- Presentation by Madhawa Saranadasa, PhD candidate in Epidemiology and OEE trainee: Characterizing benzene metabolism using the Shanghai Health Study (10/31/18)
- Presentation by Allison Stapp, MS student and OEE trainee on environmental exposures and noise pollution (3/19/19)

### Occupational and Environmental Epidemiology TRT Program Products

- Successful pilot project grant submission: Estimating personal exposure to traffic-related air pollutants and noise among on-road workers. PI: Almborg K. Co-investigators: Sietsema M, Schmitz M, Czarnecki B, Fritz H, Pananookooln S, Moy M, Jett, C.
- Pananookooln S, Fritz H, Moy M, Hepler J, Sietsema M, Almborg K and Conroy L. Estimating near road noise exposure in Chicago, IL. Poster presented at: American Industrial Hygiene Association Student Night; February 19, 2014; Chicago, Illinois.
- Almborg K Sietsema M, Schmitz M, and Hepler J. Estimating personal exposure to traffic-related air pollutants among on-road workers. Presented at: International Epidemiology in Occupational Health; June 25, 2014; Chicago, Illinois.
- Fritz H, Pananookooln S, Moy M, Hepler J, Sietsema M, Almborg K and Conroy L: Estimating near- road noise exposure in Chicago, IL. Abstract and poster presented at: American Industrial Hygiene Conference and Exposition; May 2014; San Antonio, Texas.

### Occupational Surveillance Team

The Occupational Surveillance team is led by Drs. Forst and Friedman. This TRT has focused on three topic areas over the course of the last funding cycle. In the 2014-2015 year, the focus moved from learning how databases can be used for analysis to determine the occupational health needs of community health centers and the workers they serve. The team began its work by hosting a workers' compensation attorney as an invited speaker to learn about workers' compensation laws in Illinois and challenges for low wage working populations. We then produced a research proposal: Reducing the Burden of Health Care for the Working Poor: The Role of Workers' Compensation (submitted to National Institute of Minority Health and Health Disparities - not funded). The team created, piloted and refined a survey tool. They developed a workers' compensation fact sheet in English and Spanish. They submitted an IRB protocol for a study to be conducted in a Federally Qualified Health Center (FQHC) network that reaches out to migrant farm workers and their families and two urban clinic sites in Chicago. Training sessions on RedCap and Qualtrics (survey software) were conducted. Survey interviews were conducted/collected from 25 participants in the rural center. An additional 25 surveys were conducted among English speakers in the 2 urban FQHCs.

In the past two years the focus has shifted to examining how best to communicate findings from surveillance programs to non- scientific audiences. One of the key elements of surveillance is translating our findings into policy recommendations and health recommendations for the general public. While effective public health communications are critical, they are often overlooked. Without translating scientific research into common lay language, it is difficult to: 1) get the public and employers to adopt healthier and safer

behaviors/policies, and 2) create consensus and support from policy makers to help facilitate change. The business world has developed sophisticated approaches to get individuals and groups to adopt new products. These marketing tools are also effective for public health practitioners. In our TRT meetings we covered how to translate and communicate scientific findings to non-scientists via the media, public discourse and meetings. We conducted the following exercises in our group:

Exercise 1: Developing an outline for your press release:

- Identify 1 to 3 aspects of your study that are important. Why are they important? Who cares? What is the key storyline? The “selling point”?
- Write 1 to 3 statements explaining why your study needed to be done
- Write 1 to 3 statements explaining what your study found?
- Write 1 to 3 statements explaining what are the next important steps? What are the implications of your research?

Exercise 2: Using the narrative form to communicate complex scientific ideas: This exercise required the students to communicate a study they are working on in a narrative form. We covered examples and worked on ideas collectively.

In subsequent meetings we discussed how to translate science online through graphics, with an introduction to Photoshop and Illustrator, and we covered how to give public testimony and size up your audience.

### **Precarious Work and Underserved Worker Populations Team**

Over the course of this funding period the Precarious Work/Underserved Worker Populations group continued its activities to 1) support students and junior faculty on research projects that address our targeted worker population, and 2) expand our engagement with organizations that support these workers to use scientific principles to bring workers' hazardous conditions to light and to test/implement injury prevention interventions. Drs. Buchanan and Zanoni facilitated this group along with Marsha Love from the ERC CE and Outreach program.

Over the last 5 years we have supported a research specialist in EOHS, Dr. Jing Zhang, in her first occupational research project: assessing the health and safety needs of Asian home care workers serving Asian consumers and of the resource needs of Asian home care organizations providing home care services. This included: 1) development of a proposal to the Illinois ERC Pilot Projects Research Training (PPRT) Program (2015-2016); 2) advising on implementation of the proposal, including survey design and the conceptual framework (2016-2017); reviewing her manuscript (2017-2018); advising her through the journal submission and peer review process, resulting in a publication, and advising her on development of a new manuscript based on her data (2018-2019). Similarly, the team has provided critical review and discussion to Dr. Emily Stiehl, Clinical Assistant Professor in the UIC SPH, on her PPRT-funded study about the impact of management relationships on turnover among certified nursing assistants. The team reviewed and discussed a draft article describing her research approach, methods and findings.

This TRT team supported students in the Occupational Health Internship Program (OHIP) through the Association for Occupational and Environmental Clinics. Marsha Love is the liaison between the OHIP students and the Illinois ERC. Tessa Bonney, OHIP 2015 intern (and current ERC PhD student) worked with the Chicago Workers Collaborative(CWC) organizers and worker leaders to conduct and complete 98 interviews with participants about their experiences with temporary work in the Chicago region. She worked closely with two leaders who subsequently collaborated with CWC to file OSHA complaints against employers for lock out tag out and other hazardous conditions. Tessa created a give-back product in the form of a website for workers to report powered vehicle hazards and other concerns.

Over the course of the funding cycle, the Precarious Workers TRT developed an initiative aimed at home care workers. Marsha Love worked with Latino Union worker center and Chicago Workers Collaborative to submit an article describing the PPRT funded home care worker and ergonomic hazards inquiry conducted with members of SEIU HCII. The article was reviewed in the TRT meetings with the goal of strengthening the submission; the final product was published in New Solutions.

## Precarious Worker Populations TRT Program Products

- Bonney T (MPH candidate). Occupational Health Internship Program (OHIP): Twelve years on- still shaping the future of OHS. Presented at: American Public Health Association Annual Meeting, Session 331977, Occupational Health Section; November 3, 2015, Chicago, Illinois.
- Created website for workers to report powered vehicle hazards and other concerns.
- Marsha Love submitted an article about the Home Care Worker and Ergonomic Hazards Inquiry conducted with SEIU HCII.
- Jing Zhang and other members of the Precarious Worker Populations TRT published the following article: “Zhang, J., Buchanan, S., Rospenda, K.M. & Zandoni, J. (2019). Health and safety of limited English speaking Asian homecare aides in Chicago – a pilot study. Journal of Occupational and Environmental Medicine, 61(1), 81-88.”

## INDUSTRIAL HYGIENE

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Final Report (July 1, 2014-June 30, 2019)

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## **A. Program Description**

The Illinois Occupational and Environmental Safety and Health Education and Research Center (Illinois ERC) is based in the Division of Environmental and Occupational Health Sciences (EOHS) of the University of Illinois at Chicago (UIC) School of Public Health (SPH). Industrial Hygiene (IH) is one of five academic programs and has existed since 1972. The IH program was included in the Illinois ERC in 1977, when the Illinois ERC was first funded by the National Institute for Occupational Safety and Health (NIOSH). Students in the IH program may obtain an MPH degree with a concentration in IH, an MS degree with a concentration in IH, or a PhD degree in EOHS with a major in IH. The MPH and MS degrees have been accredited by the Accreditation Board of Engineering and Technology, Inc (ABET) since 1993, and were recently re-accredited until September 30, 2021.

The mission of the IH program is to develop the skills and knowledge of graduate students to become IH practitioners and researchers capable of: 1) systematically anticipating, assessing and solving occupational health and safety problems, and 2) leading the profession and organizations through changing conditions in workplaces and the profession. The mission of the IH program is achieved through classroom and real-world learning experiences that emphasize active and problem-based learning in interdisciplinary terms. Graduates are prepared to become Certified Industrial Hygienists.

## **B. Highlights and Accomplishments**

### **1. Curriculum Changes**

The IH program curriculum was substantially revised as a result of new accreditation criteria issued by the Council on Education in Public Health in 2016. Implementation occurred in the 2018-2019 academic year. The number of required credits was reduced from 52 to 49 semester hours for the MPH program, and the MS program remained at 53 semester hours. The curriculum revision was motivated by changes in accreditation requirements from the Council on Education in Public Health, which accredits the UIC SPH, but also to address gaps recognized in our curriculum related to statistics, data management, and the interface between the occupational and ambient environment. The curriculum revision required specification of new competencies for each degree program, development of evaluation rubrics for each degree program competency, development of new classes, and revision of some existing classes.

### **2. Trainee Accomplishments**

NIOSH Tables 1 and 2 describe trainees and graduates from the Industrial Hygiene program and indicates the degree received and current employment. Annually 2-6 new students enter the Industrial Hygiene program. Expected time to graduation is 2 years for MPH students, 2-2.5 years for MS students, and 3-5 years for PhD students. From July 2014 through Spring 2019, a total of 30 students pursued degrees in the IH program (19 MPH, 5 MS and 6 PhD). All of the full-time MPH and MS students graduated or are anticipated to graduate within 2 years. One MPH student that started the program on a part-time basis (Guilbo) took more than 2 years to graduate. All four of the full-time PhD students graduated or are anticipated to graduate in 3.5-5 years. Two PhD students were part-time students at least for some portion of their degree and required more than 5 years to complete their degree. Seven of the 30 (23%) students in the IH program were from underrepresented minority groups (6 MPH and 1 MS student). Two students in the MPH program and 1 student in the MS and now PhD program were international students from China, Saudi Arabia and Vietnam, respectively.

All graduates of the IH program are now working in the occupational health and safety field or pursuing further graduate studies in occupational health and safety. Graduates since 2014 currently work at: AbbVie, Boeing, California Occupational Health and Safety Administration, Chicago Transit Authority, Edward Hines Jr Veterans' Administration hospital, Golder Associates, National Nurses United, Nicor Gas, RHP Risk Management, Inc., Sandia National Laboratory, Saudi Aramco, Siemens, the University of Illinois at Chicago, and the US Navy. In addition, in each MPH cohort, 1-3 students take portions of the IH program curriculum, and pursue careers in occupational health and safety: These students choose not to participate formally in the IH program because of the high number of credits required and/or because they do not meet the admissions standards required by ABET-accreditation. Examples include: A. Kalat who is now an Industrial Hygienist with the Occupational Safety and Health Administration in Illinois, R. Venkatraman who is now a Safety Engineer with Applied Materials, and B. Berg who is now Associate Director of Research Safety at Northwestern

University. All MPH students are required to complete an internship, and have interned at AbbVie, Northrup Grumman, Chicago Transit Authority, Illinois OSHA, TTX, Cardo ChemRisk, Henkel, the US Navy, the UIC Environment, Health and Safety Office and other locations.

### Scholarships/Awards

Students in the Industrial Hygiene program have received scholarships, fellowships and grants to support their education and research. Students received scholarships from the American Industrial Hygiene Foundation, AIHA Chicago Local Section, the Board of Certified Safety Professionals, the International Chapter of the Philanthropic Educational Organization Sisterhood, the International Society for Respiratory Protection, and the UIC School of Public Health (Michael Brouton Workplace Safety Foundation Scholarship and others). Students have also received the UIC Chancellor's Graduate Research Fellowship and the Schweitzer Fellowship.

### Research Awards

Adam Cox won the best student poster at the Chicago AIHA Student Night, 2019.

### Grant Funding

Two students have received Pilot Project Research Training Grants to support their research from the Illinois ERC:

- Phan LT. Noise Exposure on Chicago Transit Authority Trains, 2014-2015
- Bonney T. Needs assessment for re-employment, 2017-2018 (with D Madigan, OS Trainee)
- Bonney T. Impacts of Technical Assistance Providers' Participation in a Health, Labor, and University Capacity Building Process, 2018-2019

### Professional Membership/Service

Students in the IH program have been highly engaged in service, professional development and research, and have received numerous awards since July 2014. Several students have sought opportunities for leadership training, including at: the American Industrial Hygiene Association (AIHA) Leadership Workshop and the American Society of Safety Engineers Leadership Conference.

The UIC AIHA Student Section has been active, particularly in the past two years. With respect to administration, the Student Section has developed: a succession plan for the leadership, a shared platform for document storage, and a monthly newsletter for the Student Section and the AIHA Chicago Local Section. The Student Section has been engaged with Safety Matters program of the AIHA, and teamed with the Medical Organization for Latino Advancement, Medicinas, Young Public Health Professionals and Project Brotherhood to gain access to groups of students: Industrial Hygiene program students delivered Safety Matters six times to high school and college students. In addition, the UIC AIHA Student Section has been actively engaged with the AIHA Chicago Local Section, to ensure the professional development topics are relevant to students and increase student participation at events.

### Conference Attendance and Presentations

Students in the Industrial Hygiene program have presented their research at local, national and international conferences, including: the American Industrial Hygiene Conference and Expo, the American Industrial Hygiene Association Chicago Local Section, the American Public Health Association Conference, the Education and Research Center Regional Symposium, the International Society for Exposure Science Annual Meeting, the International Society for Respiratory Protection Conference, the Society for Risk Analysis Annual Meeting, and the UIC School of Public Health Research Day. Selected examples include:

- **Bonney T.** "I do have a right": Taking action against hazardous conditions in the temporary services industry. Poster presented at: American Public Health Association Conference. 2016.
- **Cuevas E.** Exposure to glyphosate in the agricultural sector: A critical review and comparison of biomonitoring results and potential exposures. Poster presented at: American Industrial Hygiene Conference and Expo. June 2017; Seattle, Washington. Received "Best Student Poster" award from the

AIHA Biomonitoring Committee and the Social Concerns Committee, and the “Best Use of UIC Library Research Tools and Materials Award” from the UIC Library.

- **Pagone F.** Excess cancer risk for Cook County, IL for benzene and formaldehyde: EPA air monitoring data vs EPA’s NATA Model Data. Presented at: International Society for Exposure Science Annual Meeting. October 2014; Cincinnati, Ohio.
- **Phan LT.** Personal protective equipment doffing practices of healthcare personnel. Poster presented at: UIC School of Public Health Research Day. April 2018; Chicago, Illinois. Received “Best Poster in Clinical and Translational Science” award.
- **Phan LT** (with R Jones). Managing occupational exposure to infectious agents. Oral presentation presented at: American Industrial Hygiene Conference and Expo. May 2018; Philadelphia, Pennsylvania.
- **Sietsema M.** Evaluating simulated workplace protection factors for a first responder low-level protective ensemble. Presented at: International Society for Respiratory Protection Conference. November 2014; Prague, Czech Republic.

Publications

Students in the Industrial Hygiene program have published their research, serving as lead or co-authors on more than 25 publications since 2014. Publications are listed in Section 4.

**3. Faculty Accomplishments**

- Mr. Michael Fiore was hired as an Adjunct Lecturer to teach the occupational health and safety systems management course.
- Dr. Lisa Brosseau resigned from the University of Illinois at Chicago in April 2018.
- Dr. Margaret Sietsema was hired, following a search, into a tenure-track faculty position. A search for another tenure-track industrial hygiene faculty member will begin in Sep 2019
- Dr. Jones left UIC in 2019 and Dr. Conroy became the director of Industrial Hygiene

Awards

- Dr. Sietsema and Lisa Brosseau received the John M. White Award, established by the AIHA® Respiratory Protection Committee to encourage scientific and application-oriented research in respiratory protection, for their publication, Are Quantitative Fit Factors Predictive of Respirator Fit During Simulated Healthcare Activities?, J. Occup. Environ. Hyg. 2018 Dec; 15(12):803-809

Certifications

- Dr. Rachael Jones became a CIH in 5/2016, and was promoted to Associate Professor, 8/2016. She became the Industrial Hygiene Program Director in 1/2017.
- Margaret Sietsema became certified (CIH) in the comprehensive practice of industrial hygiene, Spring 2019

Grant Funding

IH program faculty continue to engage in innovative research about occupational health and safety. Some of the grants and contracts received by faculty since 2013 include:

- The Center for Healthy Work, a Center of Excellence in Total Worker Health® from CDC/NIOSH. PI: **L Conroy**
- The UIC Epicenter for Prevention of Healthcare Associated Infections from CDC (1U54CK000445-01). PI: **RM Jones**
- Statistical Analysis of Occupational Exposure Data (1K01OH010537-01) from CDC/NIOSH. PI: **Jones**
- Miniaturized Wearable Personal Dust Exposure Monitor for Respirator and Alveolar Dust in Underground Coal Mines from CDC/NIOSH. PI: I Poprotny (Co-I: **RM Jones**)
- Exploratory Development and Validation of Data Infrastructure and Gateway for Public Health Research on the Environmental Causes of Disease from NIEHS (1R56ES028406-01A). PI: **RM Jones** and X Shi.
- Automated Visual Anthropometry for Three-Dimensional Assess of Respirators (AVATAR II) from Charles River Analytics. PI: **M Sietsema**

## Professional Service/ Leadership

IH program faculty continue to participate in service activities to engage in professional development. Selected activities include:

- RM Jones served as Vice-President (2016) and President (2017) of the Board of Directors of JOEH, LLC
- RM Jones served as an Ad-Hoc Member of the NIOSH Study Section (2017) and as an Ad-Hoc Member of the NIH Infectious, Reproductive, Asthma and Pulmonary (IRAP) Conditions Study Section (2016, 2018)
- RM Jones was an invited speaker at the Workshop on the Use of Elastomeric Respirators in Healthcare hosted by the National Academies of Sciences in Washington, DC (2018) and is a reviewer of the committee report.
- RM Jones participated in the Northwestern-Duke Main Causal Inference Workshop in Chicago, IL (2018)
- P Pratap, participated in the American Evaluation Association Summer Institute in Atlanta, GA (2017)
- M Sietsema served as Chair of the AIHA Respiratory Protection Committee

## Presentations

- Persing AJ, Peters TM, **Sietsema M**, Farmer KR: Assessing Respirator Protection Factor with Novel Personal Devices, Abstract and poster presentation, American Industrial Hygiene Conference and Exhibition, May 2019
- **Conroy LM**: Nuevos Trabajo, Nuevos Riesgos (New Work, New Risks), Mutual Summit 2019- Trabajo Futuro Sociedad, Santiago, Chile, April 25, 2019.
- **Conroy LM**: Keynote presentation, *Trends in Demographics and Work Arrangements*, National Occupational Injury Research Symposium, Morgantown, WV, October 16, 2018.
- **Conroy LM**: *Introduction to the NIOSH Total Worker Health Program*, Safety Directors' Meeting, Southern Glazer's Wine and Spirits Corporation, Chicago, Illinois, October 4, 2018.
- **Sietsema M**: Control Banding Strategies to Reduce the Demand for Respiratory Protective Devices During Emergency Response Scenarios. ISRP 2018, September 2018.
- **Conroy LM**, Altfeld S, Hebert-Beirne J, **Jagai J**, Mitchell U: Effective Teaching in Diverse Classrooms. Presented at: Boston University School of Public Health Dean's Symposium- Teaching Public Health; March 28, 2018; Boston, MA.
- **Conroy LM**, Hebert-Beirne J, Velazquez M, Castaneda D and the Greater Lawndale Healthy Work Research Team: A Community-based Approach to Total Worker Health. Presentation at: The 2nd International Symposium on Total Worker Health; May 2018.
- **Sietsema M**, **Brosseau LM**: Respirator Fit: After the Fit Test. Presented at: American Industrial Hygiene Conference and Exposition; June 7, 2017; Seattle, Washington.
- **Cali S**: Dermal Exposure and Chemicals that Really Get Under Your Skin. Presented at: Chicagoland Safety, Health, and Environment Conference; Sep 20, 2017.
- **Cali S**: Fire Safety and Control. Presented at: Chicagoland Safety, Health, and Environment Conference; Sep 21, 2017.

## Workshops and Continuing Education Courses Taught

### *Salvatore Cali*

- Sep 19, 2018: 1.5 hr session at Chicagoland Health & Safety Conference 2019, NIU Naperville: "Legal and Illegal Opioids in the Workplace" Abstract: Widespread availability and use of opioids is hazardous in daily life and potentially disastrous in workplaces. This presentation will cover background, toxicological issues, current status of the problem, first responder issues, and employee/ employer options and responsibilities for personal and workplace hazard reduction. Attendee discussion of relevant experiences will be encouraged.
- Mar 13, 2019: The Chicago Local Section of the American Industrial Hygiene Association would like to invite you to a Professional Development Seminar entitled "Practical Procedures for Handling and Disposal of Hazardous Substances (or How do I get rid of this stuff if I don't even want to touch it?)" The purpose of this seminar is to: Support interaction between students & professionals; Familiarize students & professionals with the scope of the issue in a variety of IH & Safety employment sectors; Promote awareness practical approaches to problem solving, experiences and perspectives in the IH and safety

fields. The perspective & focus includes the following sectors: Industrial/ manufacturing settings; Extraction/ mining industries; Laboratories; Medical facilities; Disposal facilities; Emergency response  
Co-sponsored by the Continuing Education (CE) program at Illinois Occupational and Environmental Health and Safety Education and Research Center (Illinois ERC) at University of Illinois at Chicago (<http://publichealth.uic.edu/illinois-erc/continuing-education>).

*Margaret Sietsema*

- AIHce 2019 – May 2019 – Minneapolis – Lead Instructor - PDC 501 ‘Selection and Use of Powered Air Purifying Respirators’

## OCCUPATIONAL MEDICINE

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Final Report (July 1, 2014-June 30, 2019)

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## A. Program Description

The mission of the UIC Occupational Medicine Residency is to advance the field of occupational medicine through training, research, and outreach at the local, regional, and national level. Graduates evaluate, diagnose, and treat occupational illnesses and injuries for all occupations and are prepared to become Board Certified Occupational Medicine Physicians, Consultants and Directors. The University of Illinois at Chicago Occupational Medicine Residency (UIC-OMR) is the only ACGME accredited OEM residency program in the four state region of Illinois, Wisconsin, Indiana, and Michigan. The UIC-OMR has graduated 111 residents since its inception in 1978, providing board certified OM specialists to both public and private outpatient practices, companies, government agencies, insurance companies, and other settings across the US. The majority of our graduates (>70%) establish their careers in clinical care. In the last five years, 11 graduates have taken positions as Occupational Medicine attending physicians in Occupational Medicine Clinics, two graduates are Occupational Medicine Physicians and officers in the Air Force, two are residency Program Directors in Occupational Medicine and two are Academic Occupational Medicine working in University programs. One hundred percent of the graduates in the last 5 years have passed their certification board exams and are practicing in the specialty of Occupational and Environmental Medicine.

## B. Highlights and Accomplishments

Our first-time board exam pass rate is 93% for the past five years and is well above the required 75% set by the ACGME our accrediting body during this project period. Additionally, the program has received commendation from the ACGME for the last two consecutive academic years for substantial compliance to its standards and practices with no citations or areas of concern noted. The program continues to attract diverse and qualified applicants. The table below summarizes our trainee's demographic break down by year for all residents during the project period, demonstrating the diversity among our residents.

Trainees 1 <sup>st</sup> & 2 <sup>nd</sup> Year	African American	Caucasian	East Asian	Latin American	Native American	South Asian	Middle Eastern	Total
2014-15	1	1**	3	1	1	1		8
2015-16	2*	0	1	1	1		1	6*
2016-17	3*	1		1*			1	6*
2017-18	2*	1		1*		2		6*
2018-19	2	1		1*		2		6*
<b>Total Graduated 2014-19</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>15***</b>

\*Designates a military candidate

\*\*Resident became board eligible after one year of training

\*\*\*Designates total number of graduates over the five year project period

### a. Accomplishments - Trainees

*Sonya Meyers* ('15) completed a rotation at OSHA and helped develop the new silica standard. She presented on "Tuberculosis Hazards in Daycare," at the end of her rotation. She presented a poster at the annual conference of the American Public Health Association (APHA November 2014): "Inter- and Intra-rater Reliability of the AMA Guides 6th Edition. In addition, she presented a poster at the Central States Occupational and Environmental Medicine Spring Conference, on March 2014 in Lisle, IL titled "AMA Guides to the Evaluation of Permanent Impairment for the Low Back."

*Sumeet Batra* ('15) presented the yearly bloodborne pathogen report to the UIC Hospital Safety Committee in February 2015. He also presented a poster titled "Comparison of Online vs. Classroom Didactic Education in

Occupational Medicine,” at the American Occupational Health Conference, April 2014 and a poster titled an “Overview of Emergency Vehicle Crashes in Chicago” at the AOHC 2015.

Other residents who presented posters at AOHC include: *Molly Tran* ('14): “Not on the Radar: Commuting As A Workplace Wellness Issue,” *Ana Nobis* ('14): “A Bitter Reality in the Fields of Sugarcane: Mesoamerican Nephropathy,” *Vamsi Kanamuri* ('14): “Back Pain in Airline Pilots” which has also been submitted for publication.

*Tim Sutton* ('18) published “The Current State of The Health Effects of BPA,” in the World Medical Journal and is currently authoring four chapters in “The Encyclopedia of Environmental Health in the 21st Century: From Air Pollution to Zoonotic Diseases.”

*Ivorie Stanley* ('18) co-authored a book chapter with faculty Peter Orris on “Global Substitution of Mercury - Based Medical Device in the Health Sector” for the second edition of *Water and Sanitation Related Diseases and the Environment*.

*Linda Fitts* ('16) presented her research at the APHA Conference in Oct 2015 and won the graduate student poster contest. Topic: “Evaluation of all heat and cold related injuries in Illinois 2011-13.” She has submitted this research for publication. Dr. Fitts was a guest lecturer for the Occupational Diseases class, Sep 2015. Topic: Temperature regulation, cold and heat related illness. She was a guest speaker for the monthly CME lecture at the Chicago Medical Director's Club meeting in Oct 2015. Topic: Pathophysiology, diagnosis, prevention and treatment of decompression sickness, pulmonary barotrauma & air gas embolism.

*Anitha Nimmagadda* ('19) rotated at the University of Milan's World Health Organization's collaborating center to work with their team and the International Labor Office (ILO) to finalize a group of mini- monographs addressed at defining criteria for diagnosis and prevention of the diseases listed in the new ILO list of Occupational Diseases. She additionally presented to the faculty at the University on Occupational and Environmental Medicine at University of Illinois at Chicago during the same rotation. Anitha's research in conjunction with faculty Dr. Forst resulted in a “Descriptive Analysis of Occupational Pesticide-Related Illnesses and Injuries in Illinois,” presented to NIOSH and publicly at both the University of California, San Francisco's - Vulnerable Workers and Communities at Environmental Risk conference in, March 2019 and at the American Occupational Health Conference Poster Session (April 2019).

*Aditi Vyas* ('19) presented on ethylene oxide at the following venues: Strandness Symposium, American College of Occupational and Environmental Medicine, and the Central States Occupational and Environmental Medicine Association (2019). She also contributed to policies and resolutions on Ethylene Oxide at the American Public Health Association, Chicago Medical Society and the World Federation. Dr. Vyas additionally helped create a webinar on Ethylene Oxide for Hinsdale Hospital and was the webinar speaker for Condell Hospital. She additionally presented on her research which on Musculoskeletal injuries among Personal Care Workers at the American Occupational Health Conference in 2019. Dr. Vyas had the opportunity to rotate with ABC news and published the following media articles: “When small bugs cause big problems: This insect's bite can lead to heart disease,” “What to know about coconut oil after a Harvard professor called it 'pure poison,'” “Long lingering pesticides may increase risk for autism,” “How to stay safe around red tide water that is green, scummy or smells bad,” “Gabrielle Union reveals Adenomyosis diagnosis, here's what to know about it,” “Low-calorie diets affect men's and women's bodies differently, study shows,” “Opioids after wisdom teeth removal might set young people up for addiction,” “Women more likely to survive heart attacks if treated by another woman,” “Living in the city may not be heart healthy: Study functional heart failure at higher rates,” “Lung cancer deaths among women expected to increase worldwide: Study: female smokers aren't as aware that CAT scans are now available to try to detect lung cancer,” “Alcohol-based hand sanitizers: can they backfire?” Dr. Vyas also produced an Ammonia fact sheet for Lake County Public Health community.

#### **a. Accomplishments – Faculty**

Dr. Peter Orris was awarded the Alice Hamilton-Tony Mazzocchi Award by the American Public Health Association and the Paul Cornely Award at Health Activist Dinner at APHA. Dr. Orris became a Fellow of the Institute of Medicine Chicago as well as receiving the Environmental Health Hero Award from Health Care Without Harm in 2014. He presented at the Korean Federation for Environmental Movement, National Library, Seoul, Korea: "Health and Energy Generation" in 2014, and also presented at Round Table Discussions in both Beijing, China and Delhi, India on the "Health Effects of Coal Energy Generation" in 2014. Dr. Orris, presented at the 14th World Congress on Public Health in India on "Health Effects of Coal Energy Generation" at the Central States Environmental and Occupational Medicine association and at the American College of toxicology on "Hypersensitivity Issues in Occupational Medicine," (2019 and 2018 respectively). Dr. Orris lectured on "Coal Dust Mercury, and Environmental Health at the National Environmental Activist Meeting of the Community Monitoring Network in India. He was invited and gave the following international lectures on: Primary Care Physicians and the Environment, Seminar, residents, students, practitioners, Chennai, India on June 23<sup>rd</sup>, 2018. Dr. Orris continues to teach formal courses at Northwestern University's Master of Public Health Program.

Dr. Linda Forst became the Senior Associate Dean at the School of Public Health at the University of Illinois at Chicago. She was invited to be a member of the Special Emphasis Panel on Occupational Health for NIOSH Education and Research Centers in February 2015. She was also the invited speaker to the Council of State and Territorial Epidemiologists giving a webinar on: "Occupational Hazards in the Temporary Services Industry" in February 2015. Dr. Forst published the following: "Safety Climate among Non-traditional Workers in Construction," in *New Solutions* in 2018, "Workers' Compensation and the Working Poor," in the *American Journal of Industrial Medicine* in 2018, "Tractor Rollovers Are Preventable," in the *American Journal of Public Health* in 2018. "Outreach to Low-Wage and Precarious Workers: a Concept Mapping Workshop for Public Health Officers," and "The status of surveillance for occupational diseases in the USA," both in the *Journal of Occupational and Environmental Medicine* in 2019 as well as "A Systems Evaluation of Occupational Injuries and Illness in the US Army," in 2019. Dr. Forst performed a policy analysis on Surveillance for Pesticide Related Illness in Illinois, wrote a policy brief on Workers compensation should protect the Illinois Work force and also wrote a letter to the Mayor on the Future of Work and Health Workers Compensation in Chicago.

Dr. Susan Buchanan became chair of the Pediatric Environmental Health Specialty Unit National Network Steering Committee and Director of the Illinois ERC. She was also an invited subject matter expert and author of the reproductive environmental content for a web application developed by the American College of Medical Toxicology. She gave media interviews on the health effects of artificial turf, talcum powder, and lead in soil. In response to lead contamination of the soil in East Chicago. Dr. Buchanan gave a Grand Rounds to area primary care providers and a follow up meeting to local residents in a Town Hall meeting. Dr. Buchanan annually plans and presents a one-day curriculum on Occupational and Environmental Health for UIC medical students in the Urban Medicine Program and teaches a Family Medicine selective which is a two-session "selective" on Occupational and Environmental Medicine every 6 weeks to UIC medical students. She became a medical advisor/consultant to Pepsico-Chicago, CDK Global, and NMR Chicago and was appointed to the Children's Health Protection Advisory Committee Work Group on fish consumption guidelines at the USEPA.

Dr. Daniel Bakston was named the president of the Association of Occupational and Environmental Clinics and serves on their Board of Directors. He also was inducted to the American College of Occupational and Environmental Medicine as a Fellow and regularly speaks to manufacturing corporations regarding safety and regularly tours manufacturing facilities in south Chicago. He was appointed to the Faculty of Emergency Medicine (Division of Occupational Medicine) at the University of Chicago and served as Medical Director of the Occupational Medicine Clinic. Additionally, Dr. Bakston was also appointed Associate Medical Director of the University of Chicago-Ingalls Memorial Occupational Health Program. Dr. Bakston presented a return to work protocol for Traumatic Brain Injuries at the Central States Occupational and Environmental Medicine

Association in September, 2018. Dr. Bakston completed his MBA at the University of Illinois Liautaud School of Business in 2019.

Dr. Anne Krantz is the co-medical director of the Healthy Lungs Initiative, a program of the Cook County Health and Hospitals System.

Drs. Kathy Duvall and David Marder presented webinars to the Illinois Critical Access Hospital Network on Occupational Medicine for Primary Care Providers. Dr. Marder presented at the regional component (central states) Occupational and Environmental Medicine on Occupational Health and Safety of Employees Working with Non-Human Primates and Viral Vectors. He was also an invited subject matter expert on a debate of mandatory flu vaccination for healthcare workers during the conference. Dr. Marder additionally presented at the Central States Occupational and Environmental Medicine Association on Medical Center Occupational Medicine in 2019.

Dr. Sam Dorevitch continues to mentor residents in their research projects. He developed a new course at the School of Public Health - "Climate Change and Public Health." Dr. Dorevitch visited health departments in Central and Western Illinois and met with staff to explain impacts of climate change on the essential services delivered by local health departments. In 2019 Dr. Dorevitch presented the "Waterways as Reservoirs of Multi-Drug Resistant Enterobacteriaceae (MDR Ent) in a High-Risk Region for MDR Ent Infection in Children in Lisbon, Portugal. Dr. Dorevitch participated in several news and media stories which include: "Dirty water taking toll on Americans' health, wallets" and "Let the swatting begin: Mosquito season kicks off after cool, wet spring" both carried by the Chicago Tribune in 2018; "Some infectious bacteria resistant to chlorine, CDC warns," and "Chicago beaches open Friday but is Lake Michigan clean enough to swim in?" both by Channel 7 Eyewitness News in 2018; "Why don't Chicago beaches have a poop threshold?" by WBEZ in 2018; "Is this beach making your children sick?" carried by CBS2 in 2018 and "The scoop on poop at Chicago's beaches" carried by WBEZ in 2019.

Dr. Ivorie Stanely – Presented at Pediatric Environmental Health and Specialty Unit national conference on Children's Environmental Health Disparities in 2017. In 2019, Dr. Stanley presented A Systematic Review on "Cumulative Exposure to Shift work and Leading Chronic Disease," at the OSHER Integrative Medicine Research Day in and "A Content Analysis of Employment Resources for People with Parkinson's Disease." Dr. Stanley co-authored "The Environment and Children's Health in a Changing World in the International Public Health Journal in 2018.

## OCCUPATIONAL SAFETY

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Final Report (July 1, 2014-June 30, 2019)

### Program Directors

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## **A. Program Description**

The Illinois ERC is composed of a Planning and Evaluation Core, Academic Program Core with 5 academic training programs, and a Research Core with 2 research training programs. It is the overarching goal of the Illinois Occupational and Environmental Health and Safety Education and Research Center (Illinois ERC) to be a recognized leader in the national and international movement to promote healthier and safer workplaces and workers and to improve, promote, and maintain the health of workers and communities. We do this through innovative and interdisciplinary activities that: 1) Educate graduate students to be professionals and researchers in occupational and environmental health and safety; 2) Prepare professionals to be leaders and practitioners in their disciplines; 3) Enhance the expertise of employers, worker organizations, and communities through outreach and technical assistance; and 4) Enrich the knowledge base for solving current and future problems. As educators, researchers, and professionals working to promote occupational safety and health, we believe: 1) Everyone has the right to healthy work – a job that pays a living wage, a workplace that is safe, an organization that treats them with respect, and access to qualified occupational safety and health professionals; and 2) Our public responsibility and charter requires that we give the highest priority to ensuring healthy work for everyone.

The overall goal of the Occupational Safety program is to train safety professionals at the masters and doctoral levels. The specific objectives of the training program are to develop safety professionals with:

- A knowledge base grounded in engineering and public health
- Quantitative skills to solve occupational safety problems
- Aptitude for a systematic approach to problem solving, developed through research training in occupational and environmental safety and health
- As much practical experience as possible.

We aim to develop a cadre of trainees with interdisciplinary perspectives, who are capable of entering into practitioner and research activities in industry, government, as consultants, or in academe.

## **B. Highlights & Accomplishments**

### **1. Curriculum Changes**

A number of curriculum changes have been introduced for the 2018-2019 academic year. The UIC School of Public Health updated all of our curricula in response to changes in accreditation criteria set by the Council on Education for Public Health (CEPH). The OS program has used these accreditation changes as well as the results from periodic evaluation processes in the Illinois ERC to revise the curriculum for all students in the division of Environmental and Occupational Health Sciences (EOHS) and for the MS and MPH degrees in Occupational Safety. Changes include a stronger focus on ethics and social justice, systems' approaches to solving occupational health problems, and more advanced exposure assessment methods. Implementation of these changes began in the Fall 2018.

### **2. Trainee Accomplishments**

NIOSH Tables 1 and 2 describe trainees and graduates from the Occupational Safety program and indicates the degree received and current employment. Ten trainees graduated during the current project period. There are 8 continuing trainees; 2 have completed all requirements but must present their MPH capstone or MS thesis. Three new trainees began in Fall 2018. Other noteworthy accomplishments are noted here:

#### Scholarships/Awards:

- Morgan Lawson received the ASSP Safety Travel Grant, 2018 and 2019 (sponsored by Georgia Pacific), the ASSP Greater Chicago Chapter Scholarship, the Steven F. Kane Memorial Scholarship, 2019 (ASSP Foundation), and the AIHA Chicago Local Chapter Scholarship, 2019.
- Angela Chiappone received the AIHA Local Section Scholarship (Apr, 2017), UIC-SPH APHA Travel Scholarship (Nov, 2017), and the Board of Certified Safety Professionals Scholarship (Dec, 2017)

- Olusegun Larinde received the Spring 2016 University of Illinois Board of Trustees Scholarship
- Eric Dangoy received the AIHF Chicago Local Scholarship (2016)
- Dana Madigan received a Special Recognition Award from the American Public Health Association Chiropractic Health Care Section
- Gabriela Gracia received the UIC Provost's Award for Graduate Research

#### Certifications

- Kevin Cisner: Certified Safety Professional (CSP)
- Olusegun Larinde: Associate Safety Professional (ASP)
- Tanya Rojas: Certified Safety Professional (CSP)

#### Research Awards

- Angela Chiappone won two awards for her capstone research. The first was at the ASSP Conference where her poster won the Best Poster Award in June 2018. The other was Best Presentation Award at the Chicago American Industrial Hygiene Association Student Night, February 2018.
- Eric Dangoy won the Grand Prize for his capstone poster at the ASSP annual safety conference in June 2017.

#### Grant Funding

- Two OS trainees, Dana Madigan with Tessa Bonney- IH Trainee (2017-2018); and Gabriela Gracia (2015-2016) were awarded pilot grant funding from the Illinois ERC Pilot Project Research Training program.

#### Professional Membership/Service

- All of the OS trainees are members of the student chapters of ASSP and AIHA at UIC. Angela Chiappone, Morgan Lawson, Olusegun Larinde, Eric Dangoy, and Madiha Ahmed have served as officers of the student chapter of ASSP. Graduates Ryan Cole, Mariana Lever, Katie Chojnacki, Tanya Rosas, and Eric Dangoy have served or are serving in leadership roles with the Greater Chicago Chapter of the American Society of Safety.
- Nia-Nicole Mitchell served as Chair for the UIC Minority Health Conference, 2019 and serves as the Vice-President of the UIC SPH Minority Students for the Advancement of Public Health.
- Dana Madigan is active with the American Chiropractic Association (Guideline Review Committee Member; Millennial Think Tank; Public Health Committee Member) and the American Public Health Association, Chiropractic Health Care Section (Secretary, Program Planner). She also serves as a peer reviewer for Association of Chiropractic Colleges Research Agenda Conference, Journal of Bodywork and Movement Therapies, Journal of Chiropractic Medicine
- Gabriela Gracia served as a reviewer for ICOH MinOS as well as a member of the International Commission on Occupational Health (ICOH), Scientific Committee on Mining Occupational Safety and Health (MinOSH) working group, and VOZ, Environmental and occupational health project development working group and as a reviewer for the Center for Consumer Information and Insurance Oversight (CCIIO)

#### Conference Attendance and Presentations

All of our trainees have attended either the annual ASSP, AIHCE, or another conference at least one time during their academic program. Most have presented their MPH capstone, MS thesis, or PhD dissertation research at a national or international conference. Additionally, nearly all of them have also presented their work at local or regional events.

#### Publications

Trainee publications are included in Section 4.

### **3. Faculty Accomplishments**

- Dr. Darabi received a National Science Foundation S-STEM Symposium Travel Award, 2019

- Dr. Sietsema and Lisa Brosseau received the John M. White Award, established by the AIHA® Respiratory Protection Committee to encourage scientific and application-oriented research in respiratory protection, for their publication *Are Quantitative Fit Factors Predictive of Respirator Fit During Simulated Healthcare Activities?*, *J. Occup. Environ. Hyg.* 2018 Dec; 15(12):803-809.
- Dr. Darabi was featured in an article in the December issue of *American Society for Engineering Education PRISM: Real World 101*, December 2017
- Dr. Darabi received the UIC Award for Excellence in Teaching, October 2017

#### Certifications

- Dr. Sietsema, CIH

#### Grant Funding

- Dr. Darabi is Principal Investigator, “An Integrated Program for Recruitment, Retention, and Graduation of Academically Talented Low Income Engineering Students”, NSF, 2017-2022 (with J. Abiade, et al.)
- Dr. Conroy assumed the position of Principal Investigator/Center Director for the UIC Center for Healthy Work, a NIOSH-funded Center of Excellence in Total Worker Health. 2016-2021.

#### Professional Service/Leadership

- Dr. Darabi was Guest Editor: Special Issue on Time Series Classification, *Journal of IEEE/CAA*
- Mr. Salvatore Cali serves on the AIHA Chicago Section Board of Directors and organized two workshops between UIC and the Chicago AIHA chapter
- Dr. Conroy serves on the Healthy Work Design and Well-Being NORA Council, National Institute for Occupational Safety and Health 2018-present
- Dr. Conroy served as the chair for the Centers of Excellence in Total Worker Health (primary contact person between NIOSH TWH office and the university-based center directors), 2017-2018
- Dr. Sietsema serves as Vice-Chair of the AIHA Respiratory Protection Committee
- Drs. Conroy, Friedman, Darabi, and Sietsema serve as peer-reviewers for grant and manuscript reviews.
- Dr. Friedman serves on the National Advisory Workgroup of the AAPCC (poison centers) to develop crosswalk of ICD-9 to ICD-10.
- Dr. Friedman serves on the Board of Directors to MIPA (Midwest Injury Prevention Association) – Association of PH practitioners in academia and government
- Dr. Friedman is leading the development of MidwestON – regional occupational health group of experts from funded NIOSH programs in surveillance, Ag Centers, and ERCs. We had our third meeting with NIOSH and are in the organizational phase.

#### Presentations

- Persing AJ, Peters TM, Sietsema M, Farmer KR: *Assessing Respirator Protection Factor with Novel Personal Devices*, Abstract and poster presentation, American Industrial Hygiene Conference and Exhibition, May 2019
- Conroy LM: *Nuevos Trabajo, Nuevos Riesgos (New Work, New Risks)*, Mutual Summit 2019- Trabajo Futuro Sociedad, Santiago, Chile, April 25, 2019.
- Nazempour R, Darabi H, Nelson P, Revelo R, Siow Y, Abiade J, Nitsche L: *Execution Details and Assessment Results of a Summer Bridge Program for First-year Engineering Students*. The Proceedings of the ASEE’s 126th Annual Conference and Exposition, 2019.
- Nazempour R, Darabi H, Nelson P, Revelo R, Abiade J, Nitsche L: *An Integrated Program for Recruitment, Retention, and Graduation of Academically Talented Low-Income Engineering Students*. The Proceedings of the ASEE’s 126th Annual Conference and Exposition, 2019.
- Conroy LM: *Keynote presentation, Trends in Demographics and Work Arrangements*, National Occupational Injury Research Symposium, Morgantown, WV, October 16, 2018.
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- Darabi H, Karim F, Harford S, Douzali E, Nelson P: Detecting Current Job Market Skills and requirements Through Text Mining. The Proceedings of the ASEE's 125th Annual Conference and Exposition, 2018.
- Darabi H, Karim F, Douzali E, Harford S: Incorporating Socioeconomic Factors into the Admission Process of Freshmen Students Entering the College of Engineering at the University of Illinois at Chicago. Presented at: The Proceedings of the ASEE's 124rd Annual Conference and Exposition; June 2018; New Orleans, Louisiana.
- Darabi H, Karim F, Douzali E, Johnson H, Harford S: Life After University for Engineering Graduates, The Proceedings of the ASEE's 124rd Annual Conference and Exposition; June 2017; New Orleans, Louisiana.
- Sietsema M, Brosseau LM: Respirator Fit: After the Fit Test. Presented at: American Industrial Hygiene Conference and Exposition; June 7, 2017; Seattle, Washington.
- Cali S: Dermal Exposure and Chemicals that Really Get Under Your Skin. Presented at: Chicagoland Safety, Health, and Environment Conference; Sep 20, 2017.
- Cali S: Fire Safety and Control. Presented at: Chicagoland Safety, Health, and Environment Conference; Sep 21, 2017.
- Darabi H, Karim FSM.: A comparative analysis of underrepresented engineering applicant's admission practices and their academic performance at the University of Illinois at Chicago. Presented at: ASEE 123rd Annual Conference & Exposition; 2016.
- Douzali E, Darabi H.: A Case Study for the Application of Data and Process Mining in Intervention Program Assessment and Improvement. Presented at: ASEE 123rd Annual Conference & Exposition; 2016.
- Sharabiani A, Sharabiana A, Darabi HA: Novel Bayesian and Chain Rule Model on symbolic representation for time series classification. Presented at: 2016 IEEE International Conference on Automation Science and Engineering; 2016.
- Sharabiani A, Karim F, Sharabiani A, Atanasov M, Darabi H.: An Enhanced Bayesian Network Model for Prediction of Students' Academic Performance in Engineering Programs. Presented at: Global Engineering Education Conference (EDUCON); 2014.

#### Workshops and Continuing Education Courses Taught

##### *Salvatore Cali*

- Sep 19, 2018: 1.5 hr session at Chicagoland Health & Safety Conference 2019, NIU Naperville: "Legal and Illegal Opioids in the Workplace" Abstract: Widespread availability and use of opioids is hazardous in daily life and potentially disastrous in workplaces. This presentation covered background, toxicological issues, current status of the problem, first responder issues, and employee/ employer options and responsibilities for personal and workplace hazard reduction.
- Mar 13, 2019: The Chicago Local Section of the American Industrial Hygiene Association Professional Development Seminar entitled "Practical Procedures for Handling and Disposal of Hazardous Substances (or How do I get rid of this stuff if I don't even want to touch it?)" The perspective & focus included the following sectors: Industrial/ manufacturing settings; Extraction/ mining industries; Laboratories; Medical facilities; Disposal facilities; Emergency response

##### *Margaret Sietsema*

- AIHce 2019 – May 2019 – Minneapolis – Lead Instructor - PDC 501 'Selection and Use of Powered Air Purifying Respirators'

#### 4. Additional Publications

##### Reports

1. Madigan, D (contributing author): 10th meeting of the global network of WHO collaborating centres for occupational health, 28–29 May 2015, Jeju Island, Republic of Korea. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.
2. Technical Paper #1: Environmental and Occupational Health Hazards Associated with Artisanal and Small-Scale Gold Mining. WHO, 2016 (Gracia G, **Forst L**, Bose-O'Reilly S, Pfeiffer M, Vickers C, Dora C)
3. Holloway-Beth A, **Friedman L**, Rubin R, Joshi K, Murray LR, Williamson M, Seweryn S, Edwards C, Madigan D. Surveillance of Legal Interventions in Illinois: Development of a System to Track Acute and Long-term Effects. Cook County Department of Public Health. 2017 Feb.

##### Book Chapter

1. Karim F, **Darabi, H**: The Demand Prediction of Location Dependent Services. In Contemporary Issues in Supply Chain Management and Logistics, A. Pagan and M. Gyimah, eds., 2017, Business Expert Press.
2. **Conroy LM**, Altfeld S, Hebert-Beirne J, Jagai J, Mitchell U.: Effective Teaching in Diverse Classrooms. In Teaching Public Health, S. Galea and L. Sullivan, eds., 2019, Johns Hopkins University Press.

##### Thesis/Dissertations

1. Lawson ME: A Systematic Analysis of Census and Labor Data to Create a Community Profile of Work (MS Thesis, 2019)
2. Gracia G: Identifying, Implementing and Evaluating Ergonomic Interventions Among Home-Based Mapuche Weavers (PhD Dissertation, 2017)
3. Lever-Ortiz M: Are Correctional Facility Workers in Illinois Receiving Excessive Compensation? (MS Thesis, 2015)
4. Kaewken U: Driving Distraction Effects on Reaction Time in Simulated Driving (MS Thesis, 2015)

## OCCUPATIONAL AND ENVIRONMENTAL EPIDEMIOLOGY

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Final Report (July 1, 2014-June 30, 2019)

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## A. Background

The Occupational and Environmental Epidemiology (OEE) program at UIC is administratively housed in the Division of Epidemiology and Biostatistics (EB) within the School of Public Health (SPH). Faculty for the program are drawn from both the Division of EB, and the Division of Environmental and Occupational Health Sciences (EOHS). Students in the program have their primary home in EB.

The overall goal of the OEE ERC academic training program is to develop highly qualified scientists with state-of-the-art training for conducting Occupational and Environmental Epidemiology research. In order to achieve this goal, we offer trainees a highly multidisciplinary program that includes training in epidemiology, biostatistics, exposure assessment, industrial hygiene, risk assessment and toxicology. At the completion of the program our MS and PhD graduates have developed a thorough understanding of: 1) the fundamental principles of epidemiologic study design and data analysis and how to apply these to the study of environmental and occupational diseases and injuries, 2) the theory and use of statistical methods commonly used in occupational and environmental epidemiology, 3) industrial hygiene and biologic methods used for assessing exposures in the workplace and general environment, 4) the toxicological and biological basis for occupational and environmental diseases, and 5) how to translate the findings from OEE studies to develop approaches and policies to reduce the risks associated with workplace and environmental hazards. In addition, our PhD students receive training on the most advanced methods in occupational and environmental epidemiology; on how to develop a research proposal for a study of occupational and environmental hazards; gain experience in teaching epidemiology and develop the capability to conduct independent research.

## B. Program Products (Publications and Presentations)

### 1. OEE Student Publications. (Students are in bold, ERC faculty underlined)

Our students have been highly productive and have published 33 peer-reviewed publications since the program began, and 27 during the five-year reporting period which are presented below.

#### 2015

**Booth B**, Ward MH, Turyk ME and Stayner LT. Agricultural crop density and risk of childhood cancer in the Midwestern United States: an ecologic study. *Environ Health*. 2015;14(1):82. doi:10.1186/s12940-015-0070-3  
**Buchanan S**, **Anglen J**, **Turyk M**. Methyl mercury exposure in populations at risk: Analysis of NHANES 2011-2012. *Environ Res*. 2015;140:56-64. doi:10.1016/j.envres.2015.03.005

**DeFlorio-Barker SA**, Turyk ME. Associations between bone mineral density and urinary phthalate metabolites among post-menopausal women: a cross-sectional study of NHANES data 2005-2010. *Int J Environ Health Res*. 2015;26(3):326-345. doi:10.1080/09603123.2015.1111312

**Mabila SL**, Gracia G, Cohen R, **Almberg K**, Friedman LS. Injury and illness data for Illinois mining industry employees, 1990 to 2012. *J Occup Environ Med*. 2015;57(12):1305-1310. doi:10.1097/jom.0000000000000554

Turyk M, Fantuzzi G, Persky V, Freels S, **Lambertino A**, Pini M, Rhodes DH, Anderson HA. Persistent organic pollutants and biomarkers of diabetes risk in a cohort of Great Lakes sport caught fish consumers. *Environ Res*. 2015;140:335-344. doi:10.1016/j.envres.2015.03.037

Dorevitch S, **DeFlorio-Barker S**, Jones RM, Liu L. Water quality as a predictor of gastrointestinal illness following incidental contact water recreation. *Water Res*. 2015;83:94-103. doi:10.1016/j.watres.2015.06.028

#### 2016

**Schmitz M**, Forst L. Industry and occupation in the electronic health record: an investigation of the National Institute for Occupational Safety and Health industry and occupation computerized coding system. *JMIR Med Inform*. 2016;4(1):e5. doi:10.2196/medinform.4839

**Bulka CM**, Davis MA, Karagas MR, Ahsan H, Argos M (2016). The unintended consequences of a gluten-free diet. *Epidemiology*. 2017;28(3):e24-e25. doi: 10.1097/EDE.0000000000000640

**DeFlorio-Barker D**, Wade TJ, Turyk M, Dorevitch S. Water recreation and illness severity. *J Water Health* 2016;14:713-726. doi:10.2166/wh.2016.002

**Bulka CM**, Jones RM, Turyk ME, Stayner LT, Argos M (2015). Arsenic in drinking water and prostate cancer in Illinois counties. *Environ Res*. 2016;148:450-456. doi:10.1016/j.envres.2016.04.030

**Graber, JM**, Worthington, K, **Almberg, KS**, Meng, Q, Rose, CS, Cohen, RA. High cigarette and poly-tobacco use among workers in a dusty industry: New Jersey quarry workers. *J Occup Environ Med*. 2016;58(4). doi:10.1097/jom.0000000000000686

**Blackowicz MJ**, Hryhorczuk DO, Rankin KM, Lewis DA, Haider D, Lamphere BP. The impact of low-level lead toxicity on school performance among Hispanic subgroups in the Chicago public schools. *Int J Environ Res Public Health*. 2016;13(8):774. doi:10.3390/ijerph13080774

**Holloway-Beth A**, Forst L, Lippert J, Brandt-Rauf S, Freels S, Friedman L. Risk factors associated with legal interventions. *Inj Epidemiol*. 2016;3(1). doi:10.1186/s40621-016-0067-6

**Holloway-Beth A**, Forst L, Freels S, Brandt-Rauf S, Friedman L. Occupational injury surveillance among law enforcement officers using workers' compensation data. Illinois 1980-2008. *J Occup Environ Med*. 2016;58(6):594-600. doi:10.1097/jom.0000000000000708

Christensen KY, Raymond M, **Blackowicz M**, **Liu Y**, Thompson BA, Anderson HA, Turyk M. Perfluoroalkyl substances and fish consumption. *Environ Res*. 2017;154, 145-151. doi:10.1016/j.envres.2016.12.032

## 2017

**Almberg KS**, Turyk ME, Jones RM, Rankin K, Freels S, **Graber JM**, Stayner LT. Arsenic in drinking water and adverse birth outcomes in Ohio. *Environ Res*. 2017;157:52-59. doi:10.1016/j.envres.2017.05.010

**Booth BJ**, Jones RR, Turyk ME, Freels S, Patel DM, Stayner LT, Ward MH. Livestock and poultry density and childhood cancer incidence in nine states in the USA. *Environ Res*. 2017;159:444-451.

doi:10.1016/j.envres.2017.08.023

**Bulka CM**, **Mabila SL**, Lash JP, Turyk ME, Argos M. Arsenic and obesity: a comparison of urine dilution adjustment methods. *Environ Health Perspect*. 2017;125(8):087020. doi:10.1289/ehp1202

**Bulka CM**, Daviglius ML, Persky VW, Durazo-Arvizu RA, Aviles-Santa ML, Gallo LC, Hosgood HD, Singer RH, Talavera GA, Thyagarajan B, Zeng D, Argos M: Occupational exposures and metabolic syndrome among Hispanics/Latinos; Cross-sectional results from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). *J Occup Environ Med*. 2017;59(11):1047-1055. doi:10.1097/jom.0000000000001115

Stayner LT, **Almberg K**, Jones R, **Graber J**, Pedersen M, Turyk M. Atrazine and nitrate in drinking water and the risk of preterm delivery and low birth weight in four Midwestern states. *Environ Res*. 2017;152:294-303.

doi:10.1016/j.envres.2016.10.022

## 2018

**Liu Y**, Buchanan S, Anderson HA, Xiao Z, Persky V, Turyk ME: Association of methylmercury intake from seafood consumption and blood mercury level among the Asian and non-Asian populations in the United States. *Environ Res*. 2018;160:212-222. doi:10.1016/j.envres.2017.09.031.

**DeFlorio-Barker, S**, Wing C, Jones RM, Dorevich S. Estimate of incidence and cost of recreational waterborne illness in United States surface waters. *Environ Health*. 2018; 17:3.

**Madrigal JM**, Atluri M, Radeke E, Patel A. Looking Through the Lens of a Family Planner to Prioritize Reproductive Health Among Women With Cancer. *Journal of Oncology Practice*. 2019 Feb;15(2):e141-e152. doi: 10.1200/JOP.18.00429. Epub 2018 Dec 17. PubMed PMID: 30763204.

**Madrigal JM**, Persky V, Pappalardo A, Argos M. Association of heavy metals with measures of pulmonary function in children and youth: Results from the National Health and Nutrition Examination Survey (NHANES). *Environ Int*. 2018 Dec;121(Pt 1):871-878. doi: 10.1016/j.envint.2018.09.045. Epub 2018 Oct 18. PubMed PMID: 30343186; PubMed Central PMCID: PMC6277046.

## 2019

**Madrigal JM**, **Ricardo AC**, Persky V, Turyk M. Associations between blood cadmium concentration and kidney function in the U.S. population: Impact of sex, diabetes and hypertension. *Environ Res* Feb 2019;169:180-188. doi: 10.1016

Blaisdell J, Turyk M, **Almberg K**, Jones R, Stayner L. Prenatal exposure to nitrate in drinking water and the risk of congenital anomalies. *Environ Res* 2019; 176.

**Bulka C**, Persky V, Daviglius M, Durazo-Arviz R, Argos M. Multiple metal exposure and metabolic syndrome: a cross-sectional analysis of the National Health and Nutrition Examination Survey 2011-2014. *Environ Res* 2019; 168:397-405.

## 2. OEE Student Presentations

OEE trainees are encouraged to attend and present at conferences locally, nationally and globally. The majority of OEE trainees have presented at a conference while receiving funding as a trainee. Some of the presentations are highlighted below.

#### 2015

**Bulka CM, Jones RM, Turyk ME, Stayner LT, Argos M** (June 2015). Arsenic in drinking water and prostate cancer in Illinois counties. Poster presented at the Annual Meeting of the Society for Epidemiologic Research. **Stayner L, Almberg K, Jones R, Graber J, Anderson R, Banda E, Turyk M**. Exposure to the Herbicide Atrazine and the Risk of Adverse Birth Outcomes in the Midwestern, United States. The 2nd International Symposium on Agriculture and Environmental Health Rehovot, Israel, May 28, 2015.

#### 2016

**Blackowicz M, Persky V, Freels S, Anderson H, Turyk M**. Cardiovascular disease incidence and exposure to persistent organic pollutants in Great Lakes fish consumers. International Society for Environmental Epidemiology Annual Meeting, Rome, Italy, September 2016.

**Liu Y, Turyk M, Persky V, Anderson H, Sanchez A**. Association of fish consumption and persistent organic pollutants with cause-specific mortality -results from the Great Lakes fish consumption study cohort. International Society for Environmental Epidemiology Annual Meeting, Rome, Italy, September 2016.

**Madrigal J., Persky V., Forst, L.** September 2016. Understanding risky health behaviors in Illinois workers: Findings from the 2013 Behavioral Risk Factor Surveillance System (BRFSS) using the industry and occupation module. Epidemiology in Occupational Health Conference, Barcelona, Spain. (oral) Occupational and Environmental Medicine Sep 2016, 73 (Suppl 1) A63.

**Saranadasa M, Argos M, Jasmine F, Parvez F, Rahman M, Islam T, Rakib-Uz-Zaman, Islam T, Yunus M, Kibriya M, Ahsan H**. Differential gene expression and chronic arsenic exposure in a transcriptome-wide association study of adults in Bangladesh. Poster presented at the National Institute for Environmental Health Sciences (NIEHS) EHS festival in Durham, North Carolina, December 5, 2016

#### 2017

**Catherine Bulka, Molly Scannell Bryan, Ramon Durazo-Arvizu, Vesna Slavkovich, Joseph Graziano, Tariqul Islam, Mohammad Yunus, Habibul Ahsan, Maria Argos**. Metal Exposures and Blood Pressure Changes in a Bangladeshi Cohort. Society for Epidemiologic Research Annual Meeting, Seattle, WA. June 2017.

**Liu Y, Buchanan S, Zhang J, Zhiwen Z, Chavez N, Liu H, Turyk M**. Do beliefs about seafood consumption correlate with fish consumption behaviors among Asians in Chicago? 13th International Conference on Mercury as a Global Pollutant, Providence, RI, July 16-21, 2017.

**Madhi Saranadasa, Maria Argos, Farzana Jasmine, Faruque Parvez, Mahfuzar Rahman, Tariqul Islam, Muhammad RakibuzZaman, Md. Tariqul Islam, Mohammad Yunus, Muhammad G Kibriya, Habibul Ahsan**. Differential Gene Expression and Chronic Arsenic Exposure in a Transcriptome-wide Association Study of Adults in Bangladesh. Society for Epidemiologic Research Annual Meeting, Seattle, WA. June 2017.

**Madrigal J., Forst, L.** June 2017. Understanding the Health Promotion Needs of Illinois' Workforce: Findings from the Behavioral Risk Factor Surveillance System (BRFSS) using the Industry and Occupation Module. Work, Stress, and Health 2017 Conference, Minneapolis, MN. (poster).

**Liu Y, Buchanan S, Zhang J, Zhiwen Z, Chavez N, Liu H, Turyk M**. Do beliefs about seafood consumption correlate with fish consumption behaviors among Asians in Chicago? 13th International Conference on Mercury as a Global Pollutant, Providence, RI, July 16-21, 2017.

#### 2018

**Madrigal J, Ricardo A, Persky V, Turyk M**. Cadmium and kidney function in the US population: impact of sex, diabetes and hypertension. ISES-ISEE Joint Annual Meeting, Ottawa, Canada, August 26-30, 2018.

**Turyk M, Liu Y, Zhang Z, Kim K, Chavez N, Buchanan S**. Seafood consumption and mercury exposure in Chicago Asian communities. ISES-ISEE Joint Annual Meeting, Ottawa, Canada, August 26-30, 2018.

#### 2019

**Madrigal, JM., Persky, V., Sargis, R., Turyk, M**. August 2019. Multiple Pesticide Exposures and Measures of Sex Steroid Hormones in Adult Males: Cross-sectional findings from the 1999-2004 NHANES. Annual Meeting of the International Society for Environmental Epidemiology 2019, Utrecht, Netherlands. (poster)

**Madrigal JM., Johnson, C., Patel, A**. June 2019. Social Support and Risk Factors for Cardiovascular Disease Among Women Accessing Care in an Urban Public Health Care System. Society for Epidemiology Research Annual Meeting, Minneapolis, MN. (poster)

**Madrigal, JM.**, Cedillo, E., **Ricardo, A.**, Appel L., Anderson, C., Deo, R., Hamm, L., Sha, D., Hsu, J., Zenk, S., Saunders, M., Persky, V., Lash, JP., on behalf of the CRIC Investigators. March 2019. Associations of Food Environment with Bone Mineral Disorders in the Chronic Renal Insufficiency Cohort (CRIC) Study. University of Illinois at Chicago, Department of Medicine Scholarly Activities Day, Chicago, IL. (poster)

OEE students (**Madrigal, Bacon, Stapp**) and faculty (**Turyk, Argos, Jagai**) attended the 2019 Society for Epidemiologic Research Conference in Minneapolis, MN on June 18-21, 2019. The conference had a strong focus on state of the art epidemiologic methodology and offered tailored sessions for students to develop scholastic, networking, and career building skills. The OEE students and faculty also took advantage of three-hour preconference workshops on R programming, directed acyclic graph's, and data visualization.

### **C. Highlights of Faculty Developments and Accomplishments**

During the past five years several faculty have been hired and added to our program Two new faculty members have been hired in the Division of Epidemiology and Biostatistics (Drs. Mary Turyk and Maria Argos) and three in the Division of Environmental and Occupational Health Sciences (Drs. Jyotsna Jagai, Kirsten Almberg and Robert Cohen) who have an interest in Occupational and/or Environmental Epidemiology and are providing mentoring to our students.

#### **1. Faculty Awards and Other Accomplishments**

##### **Leslie Stayner**

2013: received the H.A. Tyroler Distinguished Alumni, Department of Epidemiology, University of North Carolina at Chapel Hill.

2013 appointed as Associate Editor of the journal Environmental Health.

2014: organized and served as the chair of the Chair of the Organizing Committee of the EPICOH 2014 Conference on "Challenges for Occupational Epidemiology in the 21<sup>st</sup> Century" in Chicago, June 24-27<sup>th</sup>, 2014.

2013-2018: served as a U.S. EPA's Scientific Advisory Board, Chemical Assessment Advisory Committee.

2014: was a member of the International Agency for Research on Cancer (IARC) on IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 111: Some nanomaterials and some fibres."

2015: Leslie Stayner was elected to the governing board of EPICOH.

2016: Leslie Stayner was made a member of the Cochrane Editorial Board for Occupational Health and Safety.

##### **Mary Turyk**

2014: UIC Institute for Minority Health Research Affiliate

2016: Minnesota Department of Health, Consultant for Fish are Important to Superior Health (FISH) Project

2017: Appointed to Environmental Health, Editorial Board

2019: New Jersey Firefighters Cancer Prevention Study Advisory Board

2012-2018: Peer review of ATSDR/DHS protocol Anniston Community Health Survey: Follow-up Study and Dioxin Analyses and scientific manuscripts for ATSDR

2019: NIEHS Maintain and Enrich Resource Infrastructure for Existing Environmental Epidemiology Cohorts Special Panel, ad hoc reviewer

2019: NIEHS Virtual Consortium for Translational/Transdisciplinary Environmental Research Special Panel, ad hoc reviewer

##### **Maria Argos**

2015: Poster prize winner, Society for Epidemiologic Research Annual Meeting

2018: Rising Star in Clinical Sciences, 2017 Researcher and Scholar of the Year, University of Illinois at Chicago.

##### **Victoria Persky**

2012: 2011 Paper of the Year Occupational and Public Health Specialty Section at the 51<sup>st</sup> Annual Meeting Society of Toxicology for: Persky VW, Poirkowski J, Turyk M, Freels S, Chatterton R, Je, Dimos J, Bradlow HL, Chary LK, Burse V, Unterman T, Sepkovic D, McCann K: Associations of polychlorinated biphenyl exposure and endogenous hormones with diabetes in postmenopausal women previously employed at a capacitor manufacturing plant. Environ Res 111: 817-24, 2011

2013-2015: Member State Board of Health  
2013-2017: Member Policy Committee of the Community Health Worker Network  
2014-2018: Chair, Data Safety Monitoring Board of University of Pennsylvania PCORI grant: Using IT to Improve Access, Communication and Asthma in African American and Hispanic Latino Adults  
2015: Ad hoc reviewer for KNOD NIH study section  
2016: NIIH ad Hoc Review of ECHO grants  
2016: Review of RDX for EPA Scientific Advisory Board CAAC

## **2. Grants Awarded**

2017-2021 **Nitrate in drinking water and the risk of adverse birth outcomes.**  
NIH/NIEHS R01 ES027823  
Role: Leslie Stayner is the PI.

2014 - 2020 **Molecular and clinical endocrine impacts of arsenic exposure in children**  
NIH/NIEHS R01 ES024423  
Role: Maria Argos is the PI

2015 - 2020 **Bangladesh Center for Global Environmental and Occupational Health**  
NIH/NIEHS/Fogarty (UChicago sub to UIC) – U2R TW010122  
Roles: Maria Argos is a Co-Investigator/Subcontract PI

2017 - 2021 **Chicago Center for Health and Environment (CACHET)**  
NIH/NIEHS P30 ES027792  
Roles: Maria Argos, Mary Turyk, Vicky Persky are Co-Investigators/

2017 – 2020 **Preclinical indicators & biomarkers of cardiovascular effects of arsenic exposure**  
NIH/NIEHS R00 ES024144  
Role: Maria Argos is a co-Investigator/Subcontract PI

2018 - 2020 **Linking environmental and public health data to evaluate health effects of arsenic exposure from domestic and public supply wells**  
Role: Maria Argos is Principal Investigator

2018-2022 **Innovative methodologic advances for mixtures research in epidemiology**  
NIH R01 ES028790  
Roles: Mary Turyk is MPI and Mary Argos and Victoria Persky are a co-Investigators

2019 – 2020 **Relationships of toenail with soil measurements of metals in SE Chicago**  
NIEHS P30 CACHET Pilot Grant  
PI: Argos/Persky  
Role: Maria Argos and Vicky Persky are Principal Investigators

2015-2020 **Promoting healthy seafood choices in Asian communities**  
NIH/NIEHS R01ES025179  
Role: Mary Turyk is MPI

2016-2020 **Persistent organic pollutants, endogenous hormones and diabetes in Latinos**  
NIH/NIEHS R01ES025159  
Role: Vicky Persky is PI and Mary Turyk is Co-Investigator

2018-2019 **Characterization of agricultural herbicide exposures in reproductive age women**  
UIC School of Public Health Seed Funding Program and ChicAgo Center for Health and EnvironmenT Pilot Funding  
Role: Mary Turyk is Co-Investigator

2019-2021 **Endocrine disruption by perfluroralkyl substances and mercury**  
NIH/NIEHS R01ES028790.  
Role: Mary Turyk is PI

## AGRICULTURAL SAFETY AND HEALTH

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Final Report (July 1, 2014-June 30, 2019)

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## **A. Program Description**

The Agricultural Safety and Health Program (ASHP) was established in the Illinois ERC in 1991. The primary focus of the program initially was on developing a strong continuing education and outreach program for agricultural health and safety professionals in Illinois. The ERC serves some of the most productive agricultural states in the country, and it is well established that production agricultural industry experiences one of the highest incidents of occupational injuries and illnesses of any industry in this country. Effectively addressing the agricultural safety and health issues facing this industry is challenging due to a variety of issues. These include: the exposures inherent to working in agriculture including machines, chemicals, animals and confined spaces that pose high risk of injury and illness; geographical dispersion of farm enterprises that makes providing effective emergency response significantly challenging; exposure of very young and the very old individuals to the work environment on family farms (common in the Midwest); minimal safety regulations and difficulties in adequately enforcing those safety and health regulations that affect production agriculture; and, a significant percentage of migrant and seasonal workers who are transient and often have low levels of literacy. Thus, the ERC saw the need to provide training to those who directly serve the farm population and to whom farmers find credible: their health care providers, agricultural educators, and agricultural service personnel. This led to the development of the academic program in agricultural safety and health at the Illinois ERC, which is administered through the Department of Agricultural and Biological Engineering (ABE) in the University of Illinois College of Agriculture, Consumer and Environmental Sciences (ACES).

The ASHP consists of a “special emphasis” academic program that offers stipend support for six graduate trainees per year, three graduate-level courses in Ag Safety and Health taught annually, independent study courses, internship opportunities, and interdisciplinary activities with other trainees in the Illinois ERC. The special emphasis academic program consists of three core graduate level agricultural safety and health courses, independent study courses, an internship, and 22 other elective courses for graduate trainees available throughout the university system. Graduate trainees take courses that may or may not be required within their respective degree curricula. For students in a thesis degree program, research is conducted primarily under the mentorship of student’s primary program advisor. Drs. Aherin and Petrea are on the students’ thesis committee if a portion of their thesis involves safety. If their thesis does not include safety then they are required to complete a special problems course that addresses an agricultural or general industry occupational safety issue. This provides trainees with a basic technical background in agricultural safety and health that they can utilize within their chosen careers in the agricultural industry or rural health care.

The objectives of the Agricultural Safety and Health Program are to:

- 1) provide trainees with a strong base of understanding of the occupational safety and health hazards and issues facing production agriculture.
- 2) familiarize trainees with the primary injury control methodologies of behavioral persuasion, engineering design, and regulation or enforcement and their related strengths and weaknesses of affecting injury and occupational illness rates among agricultural populations.
- 3) prepare trainees to develop an agricultural safety risk management plan for a farm or agricultural business.

## **B. Program Accomplishments**

### **Trainees:**

During the 2014-2019 grant cycle there were 20 funded trainees including 13 graduate trainees and 7 undergraduate trainees, and we educated over 500 students in our classes. The University of Illinois College of Agriculture, Consumer and Environmental Sciences (ACES) has recognized the importance of our Agricultural Safety and Health Program; the dean of our college and associate dean for extension have directed the ACES office of fund development to work towards a goal of raising 5 million dollars over the next 4 to 5 years to provide endowment support for our Agricultural Safety and Health Program. They will be launching this fund raising program at the end of August 2018.

Since the funding for undergraduates was discontinued at the end of the first year of the project period we did not accept new undergraduate trainees after the first year. Our trainees' academic majors covered seven different programs including agricultural and biological engineering, technical systems management, community health, economics, crop sciences, animal science, and professional sciences. The graduate trainees consisted of 6 PhD and 7 Master's degree trainees. Twelve of the trainees graduated, and one student had some significant personal problems and dropped out of the university with one course to complete in our program. We are currently working with her to complete the course. Most of the graduates who were supported by this program are involved in careers for which they have significant responsibilities for safety either directly for workers or agricultural customers or as trainers for public organizations. Highlights include:

- Martin Flores, an undergraduate trainee who went on to complete an Occupational Safety Masters as a graduate student trainee at the ERC at UIC is now the health, safety and environmental coordinator for the Anixter Corporation.
- Emily Rogier, an undergraduate trainee, is a county Farm Bureau manager in Illinois.
- Eric Coronel, a PhD graduate student trainee, is a research analyst for The Alliance for Sustainable Agriculture.
- Jane Tan, a MS graduate student trainee, is a quality control manager for the Georgia Nut Company.
- Eric Dahlke, a MS graduate student trainee, is the manager and operator of his family farm and has primary safety responsibilities and supervision of the employees and family members who work on the farm.

One of our graduate trainees who received a PhD in health economics in the previous funding cycle has a position at USDA in their national rural health program. As a result of her traineeship program she developed a special interest in developing better national data collection on agricultural injuries and disabilities among the farm population as well as the economic impact occupational injuries and illnesses have on the agricultural industry. Her PhD research focused on the evaluation of national databases and their strengths and limitations to collect agricultural injury and cost data. She was selected by the national Rural Health Association for one of 11 young leader's fellowships. She had the opportunity to attend a series of special conferences, travel programs and meetings with policy makers that provided her with training on current issues affecting rural health. She has the potential to have significant influence on agricultural safety and health issues on a national basis.

For the past 6 years the grain industry has been an OSHA target industry. Approximately 10 of our trainee graduates over the past 10 years hold safety management positions with grain companies. The trainees helped fill a need for managers with training in occupational safety and health and who also had an agricultural background. These trainee graduates have informed us that they felt one of the primary reasons they were offered these positions was because their academic training in agricultural safety and health prepared them to develop strong safety management programs. The companies they are working for include ADM, Monsanto, Cargill, Bunge and local grain co-ops. This has had a positive impact on reducing injury risk within this high hazard industry. One student was hired by a cooperative that operates over 20 grain elevators. During his initial year with the company he pointed out to the upper management several deficiencies in their safety program. They then decided to create their first full time safety position and promoted the student to that position. In the past 5 years he has developed an outstanding safety risk management program and has been recognized as a grain safety leader in the region. Additionally, Jaime Thissen, a current PhD graduate trainee, has been involved in evaluating the impact of a comprehensive grain safety education program we developed through OSHA Susan Harwood grants over the past 6 years. He has made 4 presentations on various results of his work at national professional conferences and has written 4 technical papers.

#### Publications and Technical Presentations (faculty underlined, trainees bolded)

**Thissen J**, Shanta B, & Aherin R. Grain safety coalition interpretative report. Presented at: 2016 Midwest Rural & Agricultural Safety & Health conference; November 2016; Sioux City, Iowa.

Aherin R. Comprehensive grain safety training program. Presented at: 2016 Midwest Rural & Agricultural Safety & Health conference; November 2016; Sioux City, Iowa.

**Thissen J.** Sustainability analysis of safety practices as part of in Dolakha, Nepal regarding essential oil production. Poster presented at: 2016 Midwest Rural & Agricultural Safety & Health conference; November 2016; Sioux City, Iowa.

Aherin R. Coalition building: Improving occupational safety and health for the ag industry and farmers. St. Joseph, Michigan: American Society of Agricultural and Biological Engineers Resource Magazine. 2017;24(6): 20-21. <https://elibrary.asabe.org/abstract.asp?aid=48605>.

**Thissen, J, Shanta B, & Aherin R.** Grain safety coalition interpretive report. Abstract published in the proceeding of the 2017 Midwest Rural Agricultural Safety and Health Conference; November 2017; Pella, Iowa.

**Thissen J.** Feedback survey metrics development from the grain handling safety coalition train the trainer program to determine preferred teaching methods to grain bin safety educators. Presented at: 2017 Midwest Rural Agricultural Safety and Health Conference; November 2017; Pella, Iowa.

**Thissen J.** An Analysis of Selected Safety Indicators of Breweries in North America, Midwest Rural Agricultural Health and Safety Conference, Council Bluffs, IA, November 2018

Miller CD & Aherin RA. Health and functional limitations of older farmers: An examination of the health and retirement study. *Journal of Rural Health*. In review.

Research and Extension Agenda for Agricultural Confined Spaces. Developed by the Committee on Agricultural Safety and Health Research and Extension – NCERA 197 National Institute for Food and Agriculture United States Department of Agriculture, June 2016. Published by Purdue University (Robert Aherin was one of the authors of this publication).

The Agricultural Safety and Health Program conducted numerous outreach activities during the funding cycle. These are listed in the Continuing Education and Outreach report below.

The grain safety training program has had a significant impact on the region: numerous grain companies utilize the training resources we have developed, which include 10 one to two- hour training modules, 4 professional grain safety videos, and web based 2 hour overview of grain safety, and we have conducted direct face-to-face training in 20 states. We also co-sponsor the Midwest Rural Agricultural Safety and Health conference that is held in November every year. We have trained four Spanish workers to provide information on safety and assistance to workers who utilize the community health clinics in Illinois and have any type or severity of disability directly. We have translated all of our grain safety training modules into Spanish for use by the agricultural industry throughout the U.S. in training migrant and seasonal workers.

The Agricultural Health and Safety program sponsored several activities for Stand up for Grain Safety Week March 25-29, 2019. We sponsored a series of 4 webinars hosted by Grainnet and held a kickoff event in Bloomington, IL at the Asmark grain safety training facility. The speakers included Loren Sweatt, the acting Assistant Secretary for OSHA, and the president of the National Grain and Feed Association who are the primary sponsors of the week with our coalition. We also took advantage of social media and used a live stream on Facebook to share the kickoff event more widely.

## Continuing Education and Outreach

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Final Report (July 1, 2014-June 30, 2019)

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## A. Program Description

The goal of the Continuing Education program is the development and delivery of education in occupational health and safety that enhances the expertise of occupational health and safety professionals. The goal of the Outreach program is the development and delivery of education in occupational health and safety that enhances the expertise of workers to recognize and protect themselves from workplace hazards.

Owing to the CE program's strong reputation and visibility in the region, we receive numerous requests annually to provide CE courses or technical assistance on curricula and materials development. We consistently exceed our goal numbers of participants who participate in CE activities in the fields of Industrial Hygiene (IH), Occupational Safety (OS), Occupational Health Nursing (OHN), Occupational Medicine (OM), Occupational and Environmental Epidemiology (OEE) as well as Agricultural Safety. (Table A). We have noticed a decline in our numbers over the past few years. We believe there are several possible reasons: 1) CE offerings nationwide have declined as people have on-line options to choose from, 2) Dr. Linda Forst chose not to offer her on-line Global Public and Occupational Health Practice courses, and 3) the retirement of CEO Director Joe Zanoni, who had countless connections and engagements in the larger Chicago OSH community. We are taking the following steps to increase our numbers: Identifying more opportunities to elevate the events/meetings/ conferences we sponsor to CE offerings; resurrecting the successful Radon courses; restructuring our approach to reporting of outreach activities to include numbers, wherever possible; working with Joe Zanoni to establish/maintain his contacts with more partners; working with UIC's Center for Healthy Work to offer CE and outreach services.

**Table A: Number of CE and Outreach offerings and Number of trainees from 2014-2019**

<b>Offerings</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Trainees</b>	4,486	3,826	3,826	3,383	2,620
<b>Courses</b>	113	117	117	66	70
<b>Person Hours</b>	34,892	18,372	18,372	19,028	13,072

## B. Highlights 2014-2019

**OHIP** - In the last funding cycle we successfully implemented and hosted interns as part of the Occupational Health Internship Program (OHIP) supported by the Association for Occupational and Environmental Clinics. In 2016 we brought together local workers' centers and university investigators to build a corps of Occupational Health Promoters (OHPs) and to test a survey tool and recruitment methods to identify hazards and raise awareness among workers employed by temporary staffing companies. Surveys identified workplace hazards in manufacturing and warehousing sites that led to reporting of two companies to OSHA, resulting in several OSHA citations. One of our trainees published the results. (Bonney et al., 2017). There were two OHIP projects in the summer of 2018. One project, based at UFCW Local 881, a local union representing grocery workers, identified hazards in the non-unionized grocery industry through surveys and interviews with workers at two local grocery chains. The interns presented findings to union staff and drafted a photo-based hazard identification tool for workers to document hazards. The other project was based at Centro de Trabajadores Unidos, a local worker center on Chicago's southeast side, the community most impacted by industrial pollution in the city. Interns interviewed workers who sorted scrap metal and e-waste in recycling plants in this community about the hazards in this very dangerous industry. The findings, presented in August, 2018 were used to assist the worker center, a local environmental justice organization, and city council member who are fighting against locating additional metal recycling plants in this community and safer working conditions for existing facilities.

**Initiatives on Workplace Sexual Violence** - As is characteristic of our outreach approach, the OHIP project led to further activities with local, regional and national partners on tackling sexual harassment and gender-based violence in the workplace. The ERC program designed a webinar that was broadcast in October 2017 by the UIC Center for Healthy Work and the MidAmerica Public Health Training Center. The webinar titled: *“Workplace Sexual Violence Prevention: Approaches and Action”* featured the OHIP project results, the groundbreaking work of Unite HERE in the “Hands Off – Pants On” campaign which resulted in a local ordinance requiring panic buttons for hotel housekeepers, and finally, a description of legal services, counseling and education programs for victims of sexual harassment and violence designed by two local groups, the Coalition Against Workplace Sexual Violence and Healing to Action. Marsha Love designed and co-facilitated a workshop on workplace sexual harassment and violence at the annual conference of the National Council on Occupational Safety & Health (NCOSH) in early December, 2017. This conference convenes health and safety activists in COSH groups, labor unions, worker centers, and allies every year to sharpen skills and strategize on cutting edge issues on health and safety. Marsha Love and a colleague at UC Berkeley facilitated a panel presentation and capacity-building workshop to share promising practices for workers centers, unions and community-based organizations. Our workshop brought together national legal and policy advocacy groups which focus on fighting gender-based violence outside the workplace with COSH groups and worker centers who have been tackling violence inside the workplace. The dialogue of shared experiences and expertise at the 2017 workshop prompted the formation of an NCOSH collaborative taskforce, “Our Turn: Sexual Harassment Action Network”, which launched in June 2018. This national network is focusing on worker and public education on workplace sexual violence, collective action, and policy/legislative initiatives for low wage workers. ERC staff are on the steering committee of the Our Turn network. <http://coshnetwork.org/our-turn>. Ms. Love planned and co-facilitated a workshop on workplace gender-based violence prevention at the annual NCOSH conference in December 2018. We supported Healing to Action, a non-profit organization with a mission to create a worker-led movement to address gender-based violence, by co-sponsoring a training series on leadership development for gender violence prevention activists. The group consisted of 10 immigrant and African American workers in low wage employment from worker centers and community organizations. Seven sessions (each at 2.5 hours) were held at UIC SPH between January and April 2019.

**40th Anniversary Celebration** - In March 2018, the ERC celebrated our 40th Anniversary with a series of events titled “Looking Backward and Moving Forward”. The CE program organized and facilitated a celebration and symposium with sixty past and present faculty, staff, students, alumni and partners gathered to remember highlights of our decades of work and to reflect on what has been learned, how we have partnered with worker and employer communities, and what our plans are for the future. Dr. John Howard was the featured speaker.

**Black Lung Disease** – In 2017 the CE program coordinated the National Coalition of Black Lung & Respiratory Disease Clinics (NCBLRDC) Conference held September 27-29, 2017 at the Radisson Salt Lake City Downtown, Salt Lake City, UT and we hosted it in Chicago September 26- 28, 2018. Dr. Wayne Giles and Dr. Robert Cohen are the directors of new MinER Center that launched at this conference in the fall of 2018. We hosted the National Coalition Black Lung & Respiratory Disease Clinics in Chicago. We also coordinated the annual Regional West Virginia Association of Black Lung Clinics program June 5-7, 2019.

**On-going engagement with local worker centers** - Marsha Love continues to work with our worker center partners to offer health and safety trainings on a wide range of topics and issues to build their practice capacity and to provide an exchange of knowledge. We have ongoing collaboration with Arise and Latino Union (two worker centers) on workshops for domestic workers:

- Six workshops for nannies – 5 in Spanish, 1 in Polish covering infectious disease prevention, job stress, child development milestones
- Three workshops on green cleaning for domestic workers - 3 in Polish and 3 in Spanish

- Co-planned and co-sponsored two workshops with Latino Union health & safety for elder care givers (handling emergencies, job stress, infectious disease prevention)
- Co-planned and hosted OSHA 10-hr general industry training for staff at Centro de Trabajadores Unidos, UFCW Local 881, and OHIP interns (April 2019)
- Co-planned and co-sponsored with Healing to Action (a non-profit advocacy organization on workplace sexual trauma) a 2-hour training for allies of sexual trauma survivors. The audience was worker centers, community organizations, and non-profit organizations providing treatment and legal services in Chicago. (November 2017)
- Outreach staff recruited Centro de Trabajadores Unidos (a worker center) and UAW Local 551 to serve as labor representatives on a community advisory board of CACHET, an NIEHS funded three year citizen scientist project, to measure toxic metals in air, soil, and water in a highly contaminated community in southeast Chicago. Some community residents work in businesses located there, such as metal and e-waste recycling, which are the sources of the contaminants.
- We continue to co-sponsor health and safety trainings/workshops for domestic workers in conjunction with three Chicago based worker centers, Arise Chicago Latino Union and Chicago Workers Collaborative (CWC) : Ms. Love supported 16 workshops (total of 286 participants) ranging in topics from green cleaning, various health and safety issues for home care workers, to the structure and function of health and safety committees and workers compensation for temp workers. Fourteen of the 16 workshops focused on non-English speaking minority/vulnerable worker populations. We also partnered with CWC to provide an OSHA 10-hour general industry training course in Spanish for 21 temp workers in April, 2019.
- We recently co-sponsored a CPR training event on January 24, 2015 for 14 participants with Latino Union based on a needs assessment of their domestic worker members.
- Based on a long standing partnership between Salvatore Cali, CIH and Opportunity, Advancement and Innovation in Workforce Development (OAI), Dr. Brosseau identified funding for us to create a training and evaluation partnership between this NIEHS-funded organization with a national focus to provide health and safety training for vulnerable workers and the Raise the Floor Alliance, a coalition of eight workers centers in the Chicago region. RTF will communicate with workers centers to have organizers identify worker leaders and participants who may then receive funding to participate in up to 16 hours of health and safety training. We will partner with both organizations to evaluate the skills learned and outcomes of the training for participants and for workers' center organizers.

**Collaboration with the UIC Center for Healthy Work** - a NIOSH funded Total Worker Health center, is conducting a participatory action research outreach project which explores strategies to address precarious employment arrangements and health impacts through Policy, Systems and Environmental change. ERC Outreach staff are members of the research team. In spring 2018, the Center invited public health advocates, health care providers, and government agencies to collaborate with labor representatives on addressing a precarious employment issue impacting the communities they serve. Eight teams of multi-sectoral partners were selected to participate in a six-session action learning process over two months. ERC outreach staff enlisted worker centers to provide technical assistance to the public health teams and have facilitated team problem solving sessions in this process, which began in May 2018.

**Climate Change** - Climate change is a new area of focus for the IL-ERC. Marsha Love participated in a planning committee and provided logistical support for a national conference on labor, climate change and sustainability, which was held in Chicago June 28-30, 2018. The Labor Network for Sustainability initiated the call for the conference, "Strengthening Labor's Voice to Help Shape the Green New Deal", and we were the principal co-sponsor. The conference attracted 260 labor and environmental justice activists from around the country. We organized and facilitated a workshop with a representative from Public Citizen, who discussed current legislative and policy initiatives to protect workers from heat stress, including the petition to OSHA to promulgate a heat standard. There were 14 participants. We expect to continue collaborating on climate change with labor organizations and environmental justice organizations in Chicago who had previously not worked together before the planning of this conference. On May 14, 2019 IL- ERC staff convened a roundtable of UIC faculty, staff and community allies in the environmental justice movement to prepare a memo to the new

mayor identifying the impact of various dimensions of climate change in the City and offering suggestions for addressing this problem for workers and community residents. This roundtable was one of many “On the Table” civic discussions that day, coordinated by the Chicago Community Trust (CCT) to help raise awareness of community needs. CCT presented the memos to the Mayor’s transition team.

**Agricultural safety and health** – In the last funding cycle our Ag CE and Outreach program has been extremely impactful. Activities addressed the complex issues associated with the reduction of safety risk for grain system workers both on farms and at grain elevators. A capacity building proposal written to OSHA under the Susan Harwood grant program was approved for 4 years to partially fund the further development of a national grain safety training program and the activities of the Grain Handling Safety coalition starting in 2014. ERC resources were used in helping support the development of new training materials and programs of the Grain Handling Safety Coalition. New training materials were completed that included two videos and three training modules on select issues. An all-day train the trainer program was developed and held as well as worker training programs. Two grain bin training simulators were developed to allow for hands on training of how to establish a lifeline in a grain bin. We also conducted our first national webinar on a grain safety topic in December 2015 that had 108 participants. In that same year, ten different agricultural safety and health trainees viewed a total of 23 archived AgriSafe webinars. Dr. Chip Petrea and Dr. Robert Aherin, directors of the Ag CE program, sponsored the International Society for Agricultural Safety and Health 2015 annual conference held in Normal, IL. Farmers, their representatives and agricultural businesses are a key part of the target audience for this conference. Summary of our AgriSafe Network Collaboration (National network): The use of materials and archived webinars from the ASHNET/AgCE partnership continues to be effective. The Ag Illness and Disease Course, TSM 422, within the Agricultural and Bioengineering Department used the archives as the initiating source of each undergraduate student’s semester project for the course. While some overlap occurred in student selections, 23 different webinars were used among the 40 students. Dr. Aherin represented the Ag CE program through his involvement and co-sponsorship of the annual Midwest Rural and Agricultural Safety and Health (MRASH) conference. Ag CE was also a co- sponsor with the Grain and Feed Association of Illinois of a Grain Entrapment Prevention Symposium that attracted about 140 participants. We also conducted a half day grain safety session at the annual International Society of Agricultural Safety and Health (ISASH) conference that was held in Bloomington. Approximately 85 agricultural safety professionals from the U.S., Canada, Western Europe and Australia participated in the training.

**Process evaluation-** Based on reviewer feedback and as described in our continuing review application, we focused the last year of the current fiscal cycle to review all CE/O activities and protocols through an evaluative lens in order to streamline the in-take, delivery and impact of activities. We created a new system for tracking in-take of all requests for CE and O activities- to facilitate prompt and efficient delivery of program activities. This includes communicating and agreeing on deadlines for documents and honoring registration requirements, which in the past have been difficult to meet. Our goal is to refine how and when we accept requests without compromising quality of delivery. This system also helps streamline use of resources and staff time. We have moved to an online platform to record delivery of all CE and O activities- number of participants, partners etc. This database provides one platform that can be accessed by all staff at any time to create annual reports, data tables etc. We are currently working on developing a plan to systematically identify CE and Outreach needs among our partners and engaging new partners. In May 2019, Dr. Pratap and Ms. Donato conducted focus groups with current and graduating ERC trainees to identify how students can participate in the support and delivery of CE/O program activities. In response, we are currently working on implementing processes to improve student engagement. Our next step is to involve faculty in this discussion. Currently, although we participate in a number of Outreach activities we do not have a system for monitoring impact of our program. We are in the process of working with our ERC trainees and Outreach partners to develop and implement follow-up evaluation of our Outreach activities.

### **C. Additional Progress and Accomplishments**

- We continue to work with Eugene Goldfarb to present the annual course *Orientation to Sustainable Environmental Assessment*. This course provides skill in conducting environmental impact statements and reviews for government agency staff.
- We support the monthly training activities of the Medical Directors Club of occupational medicine physicians leading our ERC residency program and collaborating with corporate medical directors.
- Dr. Linda Rae Murray collaborates with Drs. Zanoni, Mildred Williamson and Griselle Torres to present the undergraduate course titled: “Using the Public Health Toolbox” for 43 UIC undergraduate public health students focusing on assessment and inquiry through projects with eight community-based partners. Distance learning technology enables participants to engage in the course.
- The Great Lakes Center for Children’s Environmental Health/Region 5 Pediatric Environmental Health Specialty Unit has hosted two annual conferences (2018, 2019) for prenatal healthcare providers titled, “Chemicals, Pollution, and Pregnancy.”
- On February 3-10, 2019, occupational physicians Drs. David Hinkamp and Gilbert Munoz offered the Health in the Arts course in Cuba. Continuing medical education (CME) credits were offered.
- Dr. Pratap received a small NIOSH contract to test a pilot continuing education training module (i.e., “the Guide) that was created with the aim to promote knowledge of the science on interrelationships of prescription opioid and benzodiazepine use and raise awareness of relevant variables in occupational settings that may need to be considered when making prescription decisions. Dr. Pratap conducted a focus group session with 5 primary care physicians, and will conduct two more sessions in future (with primary care and advanced practitioners). The goal is to develop a user-friendly version of the Guide for CE credits.
- Dr. Pratap is currently working with partners from NIOSH and ATSDR to develop a continuing education module for pediatric primary care practitioners focused on recognizing occupational illnesses and injuries in adolescent patients. The module is currently under review at NIOSH and should be available for release early next year. These efforts highlight a new direction for the IL-ERC CE program wherein we are leading collaborative efforts to develop CE content/materials for diverse audiences.
- We continued our engagement with local nurses: Dr. Zanoni presented to the annual Illinois Association of Occupational Health Nurses meeting held in Bloomington, IL on November 4, 2016 on the new Center for Healthy Work. We collaborated with IAORN and Rebecca Mischak from UIC’s Occupational Health Service Institute (OHSI) to offer continuing education credits in November 2018 in Bolingbrook, IL. Co-sponsored five one-hour seminars with IAORN during the fall and spring months of fiscal year 2019. Over 100 nurses attended the one-hour seminar and received CE credits.
- We collaborated with Dr. Emily Stiehl who received an ERC pilot project grant to conduct focus group research with nursing home certified nursing assistants concerning injury reduction, ergonomics and job stress. We observed the focus groups and we are now assisting in data analysis.

#### **D. Selected Program Products** (students under-lined, faculty bold)

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