



# ANNUAL REPORT

JULY 2021 - JUNE 2022

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**Heartland** CENTER FOR OCCUPATIONAL  
Health & Safety

## /// SUMMARY

The vision of the Heartland Center for Occupational Health and Safety is to be the leading educational and outreach resource for workplace safety and health in the states of Iowa, Kansas, Missouri and Nebraska (Region VII). Its mission is to reduce injuries, illnesses, and fatalities of workers by expanding and strengthening the occupational health and safety workforce with well-trained and well-informed professionals.

The Heartland Center serves as a resource for Federal Region VII and other regions of the US by providing interdisciplinary graduate-level training as well as continuing education and outreach for practitioners and researchers in professions related to occupational health and safety (OHS). The Heartland Center is well positioned to address OHS issues unique to the region by preparing trainees with knowledge and experience in the discipline areas most relevant to the needs of workers in this

region. Heartland Center strengths include: a rigorous planning and evaluation structure; the productive research capacity of its faculty; a commitment to interdisciplinary training and research, active continuing education and outreach programs, and institutional support of Center activities.

The Heartland Center has six graduate-level academic training programs focusing on industrial hygiene, occupational safety, agricultural safety and health, ergonomics, occupational epidemiology, and occupational injury prevention. The Center's active continuing education and outreach programs reach thousands of practitioners, utilizing both traditional educational methods as well as innovative distance-education technology.



## KEY PERSONNEL

### **Patrick O'Shaughnessy**

Center Director

patrick-oshaughnessy@uiowa.edu

### **Carri Casteel**

Director, Occupational Injury Prevention  
Training Program

carri-casteel@uiowa.edu

### **Nathan Fethke**

Director, Ergonomics Training Program

nathan-fethke@uiowa.edu

### **Bill Field, PhD**

Center Deputy Director

Director, Occupational Epidemiology  
Program

Director, Pilot Program

bill-field@uiowa.edu

### **Nir Kiren**

Director, Occupational Safety Program

nir@iastate.edu

### **Tammi Goerd**

Director, Continuing Education

Director, Center Outreach

tammi-goerd@uiowa.edu

### **Thomas Peters**

Director, Industrial Hygiene Training Program

thomas-m-peters@uiowa.edu

### **Diane Rohlman**

Director, Agricultural Safety and Health  
Training Program

diane-rohlman@uiowa.edu

The major rationale for the Heartland Center is to address OHS problems unique to Federal Region VII, in particular a demand for trained OHS professionals in this region with a high rural population. The Heartland Center trains over 30 graduate-level students each year who obtain jobs directly related to their training in industry, academia, and government agencies.

The Center's continuing education program, which serves nearly 1200 professionals annually, improves their ability to reduce the high regional rates of occupational disease and injury. The Center also reaches out to over 13,000 regional businesses through an outreach program that provides consultation and current information to increase awareness of occupational health and safety issues in Region VII.





## Trainees Disseminate COVID Research in the Journal of Occupational and Environmental Hygiene

We are extremely proud of the trainees and alumni from the University of Iowa's ERC training program who overwhelmingly contributed to the 2022 Special Topic Issue in the Journal of Occupational and Environmental Hygiene. **Dr. Renée Anthony**, Industrial Hygiene (IH) faculty and editor of the journal, solicited papers from around the country to share case studies on COVID-19 control throughout the pandemic. The May issue of JOEH (19(5)) contains papers submitted and reviewed for publication on this special topic. Six of the 11 manuscripts were authored by UI ERC trainees.

**Nicholas D'Antonio (MS IH 2021)** analyzed ventilation and particle transport in a multi-chair dental clinic, which was coauthored by another alumni, **Justin Newnum (MS IH 2010)**. **David Rabidoux**

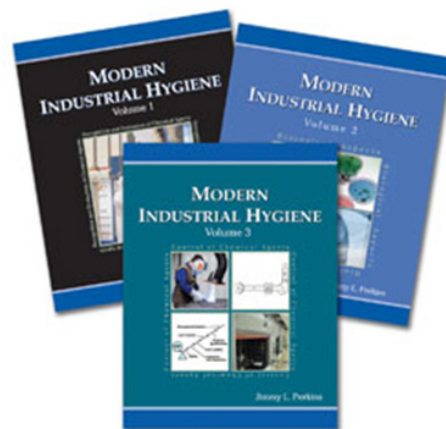
**(MS IH 2021)** shared results from an assessment of classroom ventilation using carbon dioxide tracer gas generated from fire extinguishers, useful when access to research tools were limited in the early phases of the pandemic.

**Sophia Chiu (MPH Occ. Med. Res. 2015)** and her team at NIOSH presented investigations in medical examination of coroners' offices. **Kimberly Anderson (MS IH 2010, PhD 2013)** and her team at NIOSH examined dental evacuation system performance in aerosol reduction. **Allison Persing (MS IH 2020)** presented an evaluation of outdoor dining enclosures used in the pandemic. And, **Changjie Cai (PhD 2017)** presented a study examining particle generation during toilet flushing.

## Peters Serves Three-Year Term on the Board of Advisors for ACGIH

Heartland Center faculty member, **Dr. Thomas Peters**, is serving a three-year term on the Board of Advisors for the American Conference of Governmental Industrial Hygienists (ACGIH).

He is the board liaison for the Biological Exposure Indices Committee. Also, as an editor, Dr. Peters is working closely with the Industrial Ventilation Committee to revise the book, “Modern Industrial Hygiene, Volume 3, Control of Chemical Agents.” A signature publication of ACGIH, this book will serve as a teaching text that introduces students to more complex text-based material like “Industrial Ventilation: A Manual of Recommended Practice for Design.” In Spring 2022, Dr. Peters was also inducted as a Fellow in the American Industrial Hygiene Association.



## Research on Pesticide Sampling Wins Best Scientific Paper Award

Exposure levels of certain occupational airborne hazards can be difficult to completely quantify because they can exist as both droplets and as a vapor. Examples include many liquid pesticides dispersed with a sprayer that form small droplets as well as a harmful vapor when the droplets evaporate. To capture both phases, a sampler must be used that can collect the droplets onto a filter and collect the vapor with the use of an adsorbent media.

University of Iowa Industrial Hygiene trainees, **Shaunae Alex (MS IH 2018)** and **Matthew Sovers (MS IH 2020)**, worked under the direction of Center Director, Dr. Patrick O'Shaughnessy, to evaluate a sampler designed for dual-phase sampling. This work resulted in two master's theses as well as a scientific paper awarded as the best aerosol-related paper in the Journal of Occupational and Environmental Hygiene. This research has now included a third trainee, Spencer Baker (MS IH 2023), who is performing a side-by-side comparison of the samplers worn by local groundskeepers and lawncare professionals. The goal is to make recommendations to OSHA and NIOSH regarding the use of the new sampler when sampling pesticides.

## Occupational Injury Prevention PhD Trainees Selected for CDC Internships



Chelsea Hicks, PhD



Robyn Espinosa, PhD



Dan Corry, MPH

Since 2018, the CDC's National Center for Injury Prevention and Control (NCIPC) has offered summer internships to graduate students interested in injury and violence prevention research. Students from universities with a CDC-funded Injury Control Research Center are eligible to apply. The process is competitive with only 8-10 internships available each summer. Since 2018, three Occupational Injury Prevention trainees from the Heartland Center for Occupational Health and Safety have been selected: **Dr. Chelsea Hicks (PhD, 2021)**, **Dr. Robyn Espinosa (PhD, 2022)**, and **Mr. Dan Corry (PhD, expected 2023)**.

Each worked on-site in the Atlanta, GA office for approximately 8 weeks. During this time, they were assigned to a primary research team and had opportunities to network and collaborate with other working groups and other interns. Specific training involved professional development opportunities, including workshops on scientific writing, identifying federal fellowship opportunities, and job searching for government and private industry careers.

## Former Ergonomics Program Trainee Publishes in Ergonomics

Continuing the theme of whole-body vibration, **Shamus Roeder (MS in Biomedical Engineering, 2019)**, published a paper titled "Novel Methods To Detect Impacts Within Whole-Body Vibration Time Series Data" in the journal *Ergonomics*, with Drs. Wilder and Fethke as co-authors. The paper describes methods and results from Mr. Roeder's thesis research, which leveraged data about whole-body vibration, muscle activity, and posture during the operation of agricultural machines.

Prior studies have generally examined the human response to vibration and impact in isolation, even though both are present in many occupational environments. A key finding from the study was that the posture of the seated operator was strongly associated with the likelihood of observing a response in the muscles of the low back, which supports the consideration of posture when evaluating the potential health risks from whole-body vibration exposures.



## Occupational Safety Trainee Use Virtual Reality to Advance Hazard Recognition Training

**Tavion Yrjo**, an Occupational Safety trainee, is passionate about combining mixed-reality platforms and occupational safety and health models and theories to develop next-generation safety training technology. Mr. Yrjo developed AssessVR, a virtual reality (VR) simulator that integrates VR video and digital elements to facilitate interaction in VR simulations. The Simulator enables students and safety personnel to experience hazard recognition processes (e.g., noise, particles, radiation), design evaluation strategies, and recognize risk levels by analyzing data collected within simulations.

Mr. Yrjo now tests AssessVR as a serious game platform and the impact of various priming modes on the quality of risk assessments. Mr. Yrjo states that “Another huge benefit of VR over traditional training is that learners and trainees can make mistakes safely and then review those

mistakes with a supervisor to understand and reflect upon what needs to be done differently to prevent those potentially life-altering mistakes from happening in the real world.” When the proof-of-concepts of AssessVR is complete, the simulator will be available for downloading from the internet. We believe Mr. Yrjo’s work will have a significant impact on those using his platform for training and enhancing risk assessment skills.



# Promoting Agricultural Safety and Health in the Midwest



Agricultural Safety and Health Program trainees were out in the field promoting health and safety. **Matison Bentley (PhD, 2024)**, **Anna Proctor (PhD, 2025)**, and **Ernesto Mendez (PhD, 2024)** partnered with the NIOSH-funded Great Plains Center for Agricultural Health (GPCAH) to address young worker safety; slips, trips, and falls; whole body vibration, roadway safety, and hearing protection at events held throughout the Midwest. Ms. Bentley presented findings about young workers' ability to identify hazards and knowledge of safety policies from students attending the National Future Farmers of America conference at the Agricultural Safety and Health Council of America (ASHCA) Safety Summit. Ms. Bentley and Ms. Proctor are also hosting the FarmSafe Podcast (<https://gpcah.public-health.uiowa.edu/farmsafe/>) in the GPCAH.

## Agricultural Safety and Health Alumni named Co-Director of the Outreach Core in New Agricultural Safety and Health Center

**Dr. Josie Rudolphi (PhD, 2017)** will co-direct the Outreach Core of the Great Lakes Center for Farmworker Health and Well-Being at the University of Illinois at Chicago. The Center focuses on farmworker health and safety. Dr. Rudolphi is a faculty member at the University of Illinois. She has received funding from the United States Department of Agriculture and the Centers for Disease Control and Prevention.



# Promoting Agricultural Safety and Health around the World

Faculty in the Agricultural Safety and Health training program led training programs in Canada and Nigeria. In collaboration with the NIOSH-funded Great Plains Center for Agricultural Health (GPCAH), they expanded the reach and impact of the Rural Health and Agricultural Medicine course (also known as the Agricultural Safety and Health Core Course <https://gpcah.public-health.uiowa.edu/education/agricultural-safety-and-health-the-core-course/>).

Course content has been adapted to create a series of online training modules (<https://gpcah.public-health.uiowa.edu/core-course-online-modules/>) which are available for use at no charge. In addition to the GPCAH, four NIOSH Ag Centers have integrated the online modules into their Outreach programs. The online training modules have been included in the SAY National Clearinghouse, aligned with the Agricultural, Food & Natural Resources (AFNR) Career Content Standards used by agricultural educators. In the fall of 2021, the Core Course was delivered in partnership with Farm Safety Nova Scotia for first-year college students in the Agricultural Farm Management program at Dalhousie University.

Also, ASH students and Program Director, **Dr. Diane Rohlman**, collaborated with Ms. Gift Udoh a safety professional from Nigeria on a project to reduce pesticide exposure among farmers in rural Nigeria. The project was funded by the Reciprocal Exchange component of the Mandela Washington Fellowship for Young African Leaders. Ms. Udoh, is the founder and chief executive officer of Norina Farms, a company in Nigeria that focuses on reducing agrochemical poisoning for rural farmers and consumers and mitigating postharvest losses. She was a Mandela Fellow at the University of Iowa where she participated in the Core Course and has been working with Dr. Rohlman to develop and deliver training on pesticide safety.



# An Impactful Career Enters a New Phase



The Heartland Center's Ergonomics Training Program celebrates the retirement of **Dr. David Wilder**, now Professor Emeritus of Biomedical Engineering at the University of Iowa. Dr. Wilder, a professional engineer and Certified Professional Ergonomist, has been integral to the Ergonomics Training Program since its inception in 2001. The broad theme of David's scholarship has been optimizing the interactions between the human spine and its physical environment. He is among world's foremost experts on the human response to whole-body vibration and shock, a leading risk factor for back problems among industrial vehicle and machinery operators. To highlight just a few of Dr. Wilder's substantial contributions:

- Together with the late Donald Wasserman, he laid the groundwork for the first American Conference of Governmental Industrial Hygienists Threshold Limit Value® (TLV) for whole-body vibration, published annually from 1995.
- He has been appointed since 1998 to national (American National Standards Institute, ANSI) and international (International Organization for Standardization, ISO) standard-setting bodies related to human exposure to vibration, and was the founding convenor of the ISO technical committee on posture in vibration and repetitive shock environments.
- He has provided accessible instruction on the anatomy and mechanics of the human spine tailored to student audiences across many disciplines, back pain patients, physicians, and industry leaders to increase understanding of injury mechanisms and prevention strategies.

Dr. Wilder's work has touched the lives of countless students, and millions of workers around the world experience safer and healthier working conditions because of his commitment to improving workers' quality of life through effective research translation. While he will be missed in the classroom, he remains engaged with ANSI and ISO vibration committees and is a co-investigator on a new whole-body vibration project within the 2022-2027 cycle of the NIOSH-funded Great Plains Center for Agricultural Health (**Dr. Nate Fethke**, Ergonomics Training Program Director, is the PI of the new project).