

**NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
TRAINING GRANT**

FINAL REPORT

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List of Abbreviations

ABPM	American Board of Preventive Medicine
ABPM-OM	American Board of Preventive Medicine-Occupational Medicine
ACGME	Accreditation Council for Graduate Medical Education
ACOEM	American College of Occupational and Environmental Medicine
AOHC	American Occupational Health Conference
APD	Associate Program Director
CTS	Clinical Training Site(s)
ET	External Track
GME	Graduate Medical Education
IT	Internal Track
JOEM	Journal of Occupational and Environmental Medicine
NIOSH	National Institute for Occupational Safety and Health
OEM	Occupational and Environmental Medicine
OM	Occupational Medicine
PM	Preventive Medicine
PD	Program Director
RAC	Residency Advisory Committee
SMSAs	Standard Metropolitan Statistical Areas
SAR	Subject Area Rotations
UPENN	University of Pennsylvania
UPHS	University of Pennsylvania Health System
URM	Underrepresented Minority

Abstract

The University of Pennsylvania (UPENN) Occupational and Environmental Medicine (OEM) Training Program, in existence since 1997, is the largest civilian OEM program in the nation. It is designed to provide midcareer physicians and recent medical school graduate physicians providing structured, supervised training and experience to ensure that residents achieve competency in areas required of the Accreditation Council for Graduate Medical Education (ACGME), the American Board of Preventive Medicine Examination in Occupational Medicine (APBM-OM) and the American College of Occupational and Environmental Medicine (ACOEM) for the specialist practice in OEM. Graduates practice in a variety of settings including federal, state and local government, not-for-profit, industry, academia, business, labor organizations, hospital based clinics, free-standing OM practice, private practice, corporate settings, public health programs, and legal or regulatory authorities where they take leadership roles. This unique, innovative, competency-based, train-in-place program, with measureable outcomes, created in response to the call of the National Academy of Science in 2000 to develop new routes to OEM certification, has helped address the national shortage of formally trained OEM physicians available to care for the nations' workforce. Qualified applicants complete at least 1 clinical year and have a Master of Public Health or equivalent degree, or a plan for completing the degree before graduation, in keeping with ACGME requirements. There are two tracks: Internal Track (IT) and External Track (ET). The ET, train-in-place track, helps overcome barriers that deter otherwise motivated physicians from specialist training. ET residents work full-time in OEM at an approved clinical training site (CTS) supervised by an ABPM certified physician. IT residents, more recent medical school graduates, rotate at the University of Pennsylvania Health System (UPHS) and affiliated hospitals, governmental agencies and industry. The IT was expanded over this grant period graduating six Internal Track residents, more than the combined number trained during the other years since program inception. There are two interrelated components, the applied component at the CTS and the didactic component that consists of monthly 3-day sessions at UPHS: 12 sessions during the first year and 5 during the second year. Both components work in tandem to allow acquisition of the ACGME milestones, program and ACOEM competencies, and success on the certifying examination. Faculty are national experts in the specific area they teach and are ABPM diplomats. During this grant period, the program received a 10-year accreditation from the ACGME, the longest period of accreditation given by this body. The letter noted that the program demonstrated substantial compliance to ACGME and Institutional Requirements. We trained 37 residents surpassing the goal of 30, bringing the total graduates to 143. Our graduates achieved all milestones, expressed satisfaction with training and continue to score higher on average than other residency trained physicians. Graduates are geographically dispersed, representing every region in the USA with most of this diverse workforce practicing outside the 25 largest standard metropolitan statistical areas. More than 95% have remained in the field. This innovative program contributed to 8% of the new ABPM-OM diplomates over the past decade and has revolutionized OEM residency training.

Significant Results / Impact

Over the course of the grant period our trainees have achieved several successes. All trainees have presented their research at local and national scientific conferences, some at international meetings. Many have published. The success of our residents in presenting and publishing scholarly work is a direct result of the Research Methods Course and Second Year Project co-directed by the PD and Dr. Shofer (Program Epidemiologist). Residents are required to complete a substantial research project and to date, all second year projects have been accepted for presentation at scientific meetings. UPENN OEM trainees have produced 51 poster presentations, given 6 oral presentations and achieved 5 publications over this five-year grant period.

As regards international conferences - Dr. Vearrier gave an invited international presentation at the VI International Seminar of Occupational Health in Mining Operation, Lima, Peru on October 23, 2014 entitled *Occupational Health of Miners at Altitude*. This educational conference was sponsored by the Instituto de Seguridad Minera. Dr. McLane was invited to give an oral presentation, entitled *Goodness Versus Fairness in Public Health Decision Making: Designing an Animated Bioethics Learning Module*, at the EACME Annual Conference in September 2017, in Barcelona.

As regards other oral presentations - one of our UPENN OEM residents was selected for the National American Occupational Health Conference (AOHC) Resident Research Award four years in a row. Dr. Vearrier was selected during both the 2014 & 2015 for his works was entitled, *Characterization of the Healthy Worker Effect among Residents of the US* (2014) and *Proposed Methodology for the Modification of Inhalational Exposure Limits at High Altitude* (2015). He also won the inaugural 2015 AOHC Occupational Physician Scholarship Fund Award. Dr. Kalliny was selected in 2016 for his work entitled, *Occupational Health and Sleep Issues in Underserved Populations* and Dr. Hannah McLane in 2017 for her work entitled *Goodness Versus Fairness in Public Health Decision Making: Designing an Animated Bioethics Learning Module* for which she was also awarded the Best Innovations Poster in Medical Education at Penn Medicine's Graduate Medical Education (GME) Health Equity Week - a week dedicated to Health Equity Research, Quality Improvement, and Medical Innovation.

Our residents were awarded 2 competitive pilot grants from the Prevention Research Center. Dr. Omeogu's work entitled *Efficacy of Self-Guided Cognitive Behavioral Therapy Intervention for Workers with Insomnia*, which she presented as a poster at both AOHC and Penn Medicine's GME Health Equity Week, was funded. It has been submitted for publication. Dr. Franklin's research, entitled *Diabetes Prevention in an Academic Occupational Setting*, as also funded. She presented her findings at both the AOHC and at Penn Medicine's GME Health Equity Week. The success of this pilot was used to justify funding a Diabetes Prevention Program for the University of Pennsylvania Health System (UPHS).

Other achievements include the research on opioids conducted by Dr. Kowalsk-McGraw under the mentorship of Dr. McKenzie (PD), Dr. Pandalai (NIOSH) and Dr. Schulte (NIOSH) and in partnership with NIOSH. This work culminated in the Journal of

Occupational and Environmental Medicine (JOEM) publication titled *Characterizing the Interrelationships of Prescription Opioid and Benzodiazepine Drugs with Worker Health and Workplace Hazards*. It was presented prior as a poster at the 2016 AOHC and also as a 90-minute session rated 4.85/5 by attendees at the 2017 AOHC. Dr. Kowalski continued this work with fellow resident, Dr. Saito, and they both presented a session at AOHC in 2019. Dr. Saito also presented a webinar for the Health Services Research Administration on Exposures at Camp Lejeune. Dr. Pandalai is currently working with the PD and Dr. Kowalski to create a CME offering for physicians based on this research.

Dr. Newcomb's second year research project culminated into the JOEM publication entitled *Hazardous Drug Surveillance, A Qualitative Assessment of Practices*. His mentors were Dr. McKenzie (PD) and Dr. Frasso. His publication was published ahead of print given its importance to the ACOEM membership. Dr. Newcomb was also selected to present this research at the 2017 AOHC and is the senior author on a subsequent JOEM publication entitled "*Medical Surveillance for Hazardous Drugs: A Qualitative Assessment of Current Practices*" on which the PD is an author. Dr. Newcomb also presented an educational session on Hazardous Drugs at the 2017 AOHC.

Dr. McLane's second year project entitled, "*Outcome Expectancy for Prolonged Exposure Therapy Predicts Symptom Improvement in Veterans with PTSD*" has since been published in the Journal of Traumatic Stress Disorders and Treatment. Dr. Shofer (program epidemiologist) is a mentor and author). Dr. Kalliny published a book chapter entitled *Occupational Health and Sleep Issues in Underserved Populations*, co-authored by Dr. McKenzie (PD). He also achieved board certification in Toxicology. Dr. Vanichkachorn published a book chapter entitled "Occupational Health Care" with co-authors Drs. McKenzie (PD) and Emmett (Program Mentor).

Other achievements include - Dr. Rouhbakhsh becoming a member of the American College of Lifestyle Medicine's Residency Curriculum Working Group, and being awarded a scholarship to attend the 61st Annual Western Occupational Health Conference held in Maui, Hawaii. He was elected as an alternate delegate to the ACPM by the ACOEM Resident and Recent Graduates committee. Dr. Saito was elected Treasurer/Secretary of the ACOEM Resident and Recent Graduates committee and member of the ACOEM House of Delegates. Dr. Savanoor played a leadership role in the ProMedica EBOLA preparedness steering committee giving expert advice to the Health System in regards to PPE, drills, community communication, employee communication and education. She was also featured on WTOL. Dr. Doria was involved with Ebola screening at airports and helped create an "Ebola" kit for employees working in Niger, Africa. Dr. Allen-Hardy was simultaneously a Postdoctoral Fellow in the Penn Superfund Research and Training Program (SRP), Community Engagement Core while in the program and developed a research plan entitled, "The Social and Economic Determinants of Effects of Asbestos Exposure". Dr. Allen-Hardy has returned to co-teach during the Environmental Health: Risk Hazard and Communication & Control module with Subject Area Rotation Director, Dr. Philip Lewis. Dr. Konkwo was the lead

OM physician on a complicated potential rabies case at his home institution which led to a collaboration with UPHS and the CDC. The residents presented their research entitled, *Burnout Among Occupational and Environmental Medicine Physicians*, at 2019 AOHC 2019. The research conducted by Drs. Somasundaram, Lawler, O'Hara, Shofer, Savul & Green-McKenzie indicated that OEM physicians from a nationwide survey have a 30% rate of burnout – the lowest in physician nationwide and is in keeping with the recent landmark paper by Shanafelt and colleagues which brought the issue of burnout to the fore. Dr McKenzie connected with Dr. Mohammed Jeebhay, Director of the Occupational Medicine Division at the University of Cape Town in South Africa. This interaction led to a collegial relationship and an international elective for our internal resident. We hope to continue this relationship in the future

Our graduates are employed in several spheres. Five of our graduates are in academia as Associate Professor and Vice Chair for Clinical Affairs (Dr. Kalliny), Associate Professor and Fellowship Director (Dr. Vearrier), Associate Professor (Drs. Newcomb), and other faculty positions (Rouhbakhsh, Vanichkachorn and Wolf). Several are doing hospital based OM in various capacities (Drs. Sidhom, Williams, Somasundaram, Konkwo, Isakari, Kowalski-McGraw, Saito, Savanoor, Bencivenga, Gumidyala). Dr. Walker is a Corporate Medical Director for a Fortune 500 company. Two are Medical Directors at a National Laboratory (Drs. Sayre and Turnbo). Dr. Allen-Hardy is employed by the State Public Health Department. (Dr. Walker). Two graduates are at the Veterans Healthcare System as Medical Director of OM (Dr. Omeogu) and Fellow in Patient Safety (Dr. McLane). Two are in the federal setting (Drs. Lee & Liu). Several are working in OM clinics of various sizes (Dr. Wheat-Hitchings, Koney-Laryea, Lawler, Taylor, Modi). Several are consultants in OEM (Drs. Wenzel, O'Hara, Allen-Hardy and Alipour). One graduate combines internal medicine/occupational medicine in her practice. Our current Internal Track resident continued onto the second year (Dr. Matthei) and two IT graduates are currently in a pain medicine fellowship to enhance their OEM training (Drs. Franklin and Deveau). Of the 21 graduates who sat the APBM-OM during the grant period, 20 were successful. An additional 15 graduates are slotted to sit the exam in October 2019. Our current Internal Track resident will be eligible in 2020.

Some innovative aspects of the curriculum developed over the study period include the development of a faculty development initiative where site supervisors and rotation directors are invited to join resident Grand Round sessions live via web conference. Many faculty members participate with positive reviews. The OM-2 residents now participate in a table-top exercise conducted during the Emergency Disaster Planning SAR. The OM-1 residents participate in a 5-hour workshop on Clinical Preventive Medicine, Worksite Wellness, Behavior Change Counseling and Cultural Competency. The annual experiential “Speaking with the Media Workshop” held as part of the Environmental Health: Risk Hazard Communication and Control rotation taught by faculty member Dr. Phil Lewis, continues to achieve high marks from the residents. Residents are interviewed on various OEM topics by media experts in a fictitious TV studio at the Annenberg Center on UPENN campus. Experts subject the resident

responses to constructive critiques and the process repeats itself as the residents use tools they acquire during the session to improve

We have had dedicated time to wellness, resiliency and burnout with offerings ranging from having corporate medical directors lecture on the outcomes of their corporate Wellness Programs to having our trainees undergoing experiential wellness offerings. These have included expert guidance with Crucial Conversations and Strengths Finders. In January 2019 we introduced The Burnout and Resiliency Workshop entitled *The Extraordinary Health Care Practitioner*. The workshop focused on providing access to inner resources that help the individual become fulfilled, engaged, and resilient at work and beyond. In this comprehensive program, using the science of positive psychology, performance psychology, and organization behavior, participants learned about, engagement, burnout, increased performance, work-life balance, work-life satisfaction, meaning & purpose, resilience, stress, and well-being & fulfillment.

We continue to update our syllabus mapping our clinical rotations, Subject Area Rotations and longitudinal courses to ACGME, ACOEM and UPENN OEM Residency program competencies to ensure we cover all required areas items. The Research Methods Course has been very successful in creating an environment where trainees can produce scholarly work. As we continue to grow our syllabus the residency focus remains to nurture and grow academically and clinically exceptional physicians with attention to diversity who will utilize their competence and skills in their own diverse regions throughout the US. Faculty rate the residents' performance highly and 360 evaluations of residents are highly favorable. The UPENN OEM Residency program has demonstrated ability to adapt to the changing needs of the residents, to the new ACGME requirements and to the changing healthcare environment with the aptitude to thrive in this climate of change. Trainees rate the program highly and indicate that they became more competent at program completion and that the program met their training needs.

The program's Diversity and Inclusion Committee maintains its commitment to helping ensure that our preventive medicine workforce addresses and reflects the diversity of the nation. Our committee more than doubled in size since its inception in 2008 and during the study period, as has the number of underrepresented minority (URM) trainees - increasing from 6 URMs during the 13 years from 2000-2013, to 9 during the 5 year grant period bringing the percentage of URMs during this period to 24%. This exceeds the national average of ~7% of medical students being URMs.

In summary, the program has met and exceeded the stated objectives over the 5-year Period. We have graduated 36 residents, with one in his second year of training, exceeding the expected 30 graduates. In response to requests to publish our program methods and outcomes Dr. McKenzie (PD) and Dr. Emmett (Program Mentor) and APD published an article in the Journal of Graduate Medical Education. The PD has received inquiries about potential duplication of the UPENN Train in Place OEM Residency program from other OEM programs as well as from Hyperbaric Medicine. We have increased the number of URM residents exceeding the national average of URMs

accepted to medical school. All of our residents have presented their research at local, national and international scientific meetings with some earning awards and being awarded pilot funding. We have iteratively updated our curriculum towards continuous improvement responding to feedback from our residents, our Residency Advisory Committee (RAC) members, our granting agencies, the ACGME, our local GME as well as to our societal needs. We continue to use experiential learning activities and mentored project completion to address required competencies. We have developed our residents to be teachers of prevention; 7 of the 36 graduates during the study period have returned to teach our residents and 5 graduates are now faculty in academic centers. Most trainees (67%) practice outside of the 25 largest SMSAs. We continue to keep track of our graduates and connect them with one another as well as keep them engaged using various methods, the largest being our annual alumni gathering during The American Occupational Health Conference. Having such a large cohort of UPENN OEM graduates also allows us an enviable network of talent from which to draw as needed. Graduates are encouraged to connect and do so for support in both their professional and indeed our personal lives. Program graduate Dr. Wolf has started an official alumni association and created a private LinkedIn group where alumni can connect and exchange ideas.

Overall, we have successfully trained OEM primary care preventionists to equip and empower individuals and populations to achieve high-quality, longer lives free of preventable disease, disability, injury and premature death as well as educate them toward promoting adoption of health behaviors across all life stages. The focus of the UPENN OEM residency has been, and remains, to train and nurture academically and clinically exceptional physicians, with attention to diversity, who will utilize their competence and skills in their own diverse regions throughout the United States to promote and maintain employee health and well-being, effectively addressing work, a significant social determinant of health.

Publications / Scholarly Output

Research Publications, Peer-Reviewed

Breeher L, Molella R, Vaughn A, Swift M, Spaulding A, Brueggen C, **Green-McKenzie J, Newcomb R**: Medical Surveillance Programs for Workers Exposed to Hazardous Medications: A Survey of Current Practices in Health Care Institutions. *Journal of Occupational and Environmental Medicine*, 2019 Feb;61(2):120-125

Adaji A, **Newcomb RD**, Wang Z, Williams M. Impact of Collaborative Care on Absenteeism for Depressed Employees Seen in Primary Care Practices: A Retrospective Cohort Study. *JOEM*. 2018 Jan; 60 (1):83-89

Newcomb RD, Frasso R, Cruz P, Breeher LE, Molella RG, **Green-McKenzie J**. Medical Surveillance for Hazardous Drugs: A Qualitative Assessment of Current Practices. *JOEM*. 2017 Dec 1 Epub 2017 Dec 01; June 2018, 60(6), 521-527.

Kowalski-McGraw M., Green-McKenzie J, Pandalai S, Schulte P: Characterizing the Interrelationships of Prescription Opioid and Benzodiazepine Drugs with Worker Health and Workplace Hazards. *JOEM*, 59(11), 1114-1126. November 2017

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Green-McKenzie J, McCarthy RB, Shofer FS. Characterization of occupational blood and body fluid exposures beyond the Needlestick Safety and Prevention Act. *J Infect Prev.* 2016 Sep;17(5):226-232.

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Book Chapters

Kalliny M, Green-McKenzie J: Occupational Health and Sleep Disorders in Underserved Populations. *Physician Assistant Clinics Elsevier*, 4(1): 81-105, January 2019.

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Abstracts (N= 49)

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Somasundaram P, Lawler T. O'Hara E, Shofer F, Savul S, Green-McKenzie J: Burnout Among Occupational and Environmental Medicine Physicians. American Occupational Health Conference. April 2019

Wolf M, Keren Y, Green-McKenzie J: Health Technologies Within the Corporate Wellness Marketplace: A Pilot Study. Penn Medicine's GME Health Equity Week. April 2019

Wolf M, Keren Y, Green-McKenzie, J: Health Technologies Within the Corporate Wellness Marketplace: A Pilot Study. American Occupational Health Conference. April 2019

B Allen-Hardy, F Shofer, J Green-McKenzie: The Effect of Obesity on Hospital Based Transport Worker Injuries. American Occupational Health Conference. April 2018.

Franklin, K., Shofer, F., Green-McKenzie, J: Diabetes Prevention in an Occupational Setting. Poster presentation at the 2017 Western Occupational Health in Maui, HI. September 2017.

Krystal A Franklin, MD, Frances Shofer, PhD, Judith McKenzie, MD: Workplace Diabetes Prevention. American Occupational Health Conference. April 2018.

Lalitha Gumidyala, MD; Frances Shofer, PhD; Judith McKenzie, MD, MPH: The impact of the 2016 CDC guidelines on opioid prescribing practices in Emergency Room Healthcare Workers American Occupational Health Conference. April 2018.

Hannah C. McLane, J. Ben Barnes, Frances S. Shofer, Jason T. Goodson. Outcome Expectancy for Prolonged Exposure Therapy Predicts Symptom Improvement In Veterans With PTSD. American Occupational Health Conference, April 2018, New Orleans, LA.

Hannah C. McLane. Goodness Versus Fairness in Public Health Decision Making: Designing an Animated Bioethics Learning Module. The Equity Poster Session represented Health Equity Research, Quality Improvement, and Medical Innovation Projects. April 2018. Penn Medicine's GME Health Equity Week.

Michael M. Sidhom, MD, MSPH Rosemary Szollas, MD, MSPH Timothy Schwalm, BA Chris Due, MSPT Frances S. Shofer, PhD Judith Green-McKenzie MD MPH: Reduction of Upper Extremity Injuries in Perinatal Sonographers: A Team Based Approach Limitations. American Occupational Health Conference. April 2018.

Charles Wenzel, William Miller, Frances S. Shofer, Judith Green-McKenzie: Relative Risk of Falls by Occupation. American Occupational Health Conference April 2018

Vernon Jon Williams, MD MPH CPH Frances S Shofer, PhD, Judith Green-McKenzie MD MPH: Accuracy of Mallampati Scoring by Occupational Medicine Practitioners: Outcomes of an Educational Intervention. American Occupational Health Conference. April 2018.

J Green-McKenzie, E Emmett: Outcomes of an Innovative Train-in-Place Occupational Medicine Residency Program. Poster presentation at the 32nd ICOH in Dublin, Ireland (2018-planned) May 2018.

McCarthy R, Shofer F, J Green-McKenzie: Effect of an Intervention to Reduce Heat Related Illness in Outdoor Workers. Oral presentation at the 32nd ICOH in Dublin, Ireland (2018-planned)

Franklin, K., Shofer, F., Green-McKenzie, J: Diabetes Prevention in an Occupational Setting. Poster presentation at the 2017 Western Occupational Health in Maui, HI. September 2017

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Jones C, Morris R, Shofer F, Chin C, Duran H, Green-McKenzie J: Assessment of Medical Student Knowledge of the Field of Occupational and Environmental Medicine. AOHC April 2017 in Denver, Colorado.

Bencivenga J, Shofer F, Green-McKenzie J: Evaluation of a Diabetes Incentive Program for Diabetic Employees of a Multispecialty Medical Group. AOHC April 2017, Denver, Colorado.

Alipour N, Nguyen M, Savul S, Saberi P, Shofer F, Green-McKenzie J: Effect of Early Physical Therapy Intervention on Occupational Low Back Pain Case Duration: A Comparison of Two Cohorts. AOHC April 2017 in Denver, Colorado.

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Wheat-Hitchings L, Shofer F, McKenzie J: Educational Model to Increase Resident Scholarly Activity Emergency Department Research Day, University of Pennsylvania April 2016

Wheat-Hitchings L, Shofer F, Green-McKenzie J: Educational Model to Increase Resident Scholarly Activity. Penn Medicine's GME Health Equity Week, April 2016.

Wheat-Hitchings L, Shofer F, Green-McKenzie J: Educational Model to Increase Resident Scholarly Activity. Annual AOHC, Chicago, IL April 2016.

Vanichkachorn G, Shofer F, Green-McKenzie J: Telehealth in Occupational Medicine: Expanding the western frontier Penn Medicine's GME Health Equity Week, April 2016.

Sayre WB, Miller J, Nettles W, Green-McKenzie J: Development of Chronic Pulmonary Disease After Acute Lithium Hydride Exposure Annual AOHC, Chicago, IL. April 2016.

Omeogu C, Shofer F, Gehrman P, Green-McKenzie J: Efficacy of a Mobile Behavioral Intervention for Workers with Insomnia. Emergency Department Research Day, UPENN 2016.

Omeogu C, Shofer F, Gehrman P, Green-McKenzie J: Efficacy of a mobile Behavioral Intervention for Workers with Insomnia. Annual AOHC April 2016 Chicago, IL.

Omeogu C, Saberi P, Green-McKenzie J: Barriers to Respiratory Fit Testing in a HCP Population. Annual American Occupational Health Conference April 2016 Chicago, IL.

Omeogu C, Saberi P, Green-McKenzie J: Improving Respiratory Fit Testing Compliance at a Public Hospital. Emergency Department Research Day, University of Pennsylvania April 2016.

Omeogu C, Saberi P, Green-McKenzie J: Barriers to Respiratory Fit Testing and Strategies for Improving Compliance. AOHC April 2016 Chicago, IL.

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Liu X, **Green-McKenzie J**, **Shofer F**, Werner T, Torigian D, Alavi A: Utility of 18F-2-fluoro-2-D-deoxyglucose-positron emission tomography/computed tomography (FDG-PET/CT) in differentially assessing metabolic activity in organs of chronic smokers vs. nonsmokers. Emergency Department Research Day, University of Pennsylvania April 2016.

Liu X, **Green-McKenzie J**, **Shofer F**, Werner T, Alavi A, Torigian D: Utility of 18F-2-fluoro-2-D-deoxyglucose-positron emission tomography / computed tomography (FDG-PET/CT) in differentially assessing metabolic activity in organs of chronic smokers vs. nonsmokers UPENN Health Equity Week April 2016.

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Kalliny M, **Green-McKenzie J**: Environmental Surveillance of Waste N2O Anesthetic Gas in Academic Medical Center. Annual AOHC Conference April 2016 Chicago, IL.

Kalliny M, **Green-McKenzie J**: Environmental Surveillance of Waste N2O Anesthetic Gas in Academic Medical Center. Penn Medicine's GME Health Equity Week, April 2016.

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Savanoor U, **Shofer F**, **McKenzie J**: Occupational Medicine: How and Why Practitioners Entered the Field. AOHC May 2015.

Kowalski M, Pandalai S, Schulte P, **McKenzie J**: Conceptual Models to Evaluate Opioid and Benzodiazepine Medication Use in the Workplace. AOHC May 2015.

Isakari M, **McKenzie J**: A Lean Approach to California Worker Compensation Documentation. AOHC May 2015.

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Tables

Table 1. Academic Training Report Since Beginning of Project Period¹
Submit one report per academic program. Fill in header.

Degree Awarded	How Does Degree Read?	Total # Applicants to Degree Program	Total # Applicants Admitted to Degree Program	Total # Under Represented Minority Applicants Admitted	# Full-Time Students Enrolled²	# Full-Time NIOSH-Supported Trainees	# Part-Time Students Enrolled²	# Part-Time NIOSH-Supported Trainees	# Trainees Graduated During Reporting Period
Bachelor's degree									
Master's degrees ³									
Doctorate degree									
Post-doctoral									
	Preventive Medicine-Occupational Medicine	140	37	9	0	7	0	0	36
Certificate Program									

¹ Reporting period for renewals is from the start date of prior competing award. New applicants should report past five years.

² Full-time and part-time students should include all students in approved programs, regardless of source of support.

³ OM residents may be double-counted under Masters degree training and post-doctoral training.

Table 2. Trainees and Graduates Supported Since Beginning of Project Period¹

Submit one report per academic program. Fill in header.

Trainees				Graduates				
Trainee ID, Year of Entry, Prior Degree & Institution, (Current Academic Advisor or Mentor and Department). Identify Under Represented Minority with (URM).	OM Trainees: Previous Residency Training Specialty	Title of Research Project or Research Topic	Degree Program (BS, MS, MPH, PhD, DrPH, DNP, etc.)	Date Degree or Certificate Awarded (mm/yyyy)	Date of Certificate for OM (mm/yyyy)	Employed in OSH Field or in OSH Advanced Study (Y/N)	Current Employer	Current Position
Michele Kowalski, MD, MPH; Entry Year 2013; Temple University School of Medicine (MD)	Family Medicine	Conceptual Models to Evaluate Opioid and Benzodiazepine Medication Use in the Workplace	N/A	N/A	06/30/2015	Y	University of California San Diego	Associate Physician Diplomat
Xianling Liu, MD, PhD, MSPH; Entry Year 2014; Fourth Military Medical University (PhD)	Preventive Medicine	Utility of 18F-2-fluoro-2-D-deoxyglucose-positron emission tomography/computed tomography (FDG-PET/CT) in differentially assessing metabolic activity in organs of	N/A	N/A	06/30/2016	Y	Navy Health Clinic	Physician

		chronic smokers vs. non smokers						
James Bencivenga, MD, MPH; Entry Year 2015; Medical College of Wisconsin (MD)	Pediatrics	Evaluation of a Diabetes Incentive Program for Diabetic Employees of a Multispecialty Medical Group	N/A	N/A	06/30/2017	Y	Aurora Medical Group	Physician
Krystal A. Franklin, MD, MBA; Entry Year 2016; Ross University School of Medicine (MD); URM	General Surgery	Outcomes of the Implementation of a Diabetes Prevention Program Pilot at an Academic Medical Center	N/A	N/A	06/30/2018	N	Agape Pain Management Fellowship, New Mexico	Fellow
Vernon Jon Williams, MD, MPH; Entry Year 2016; Medical College of Ohio (MD)	General Surgery	Accuracy of Mallampati Scoring by Occupational Medicine Practitioners: Outcomes of an Educational Intervention.	N/A	N/A	06/30/2018	Y	Banner Medical Group	Physician
Parvathi Somasundaram, MD; Entry Year 2017; Kings College London (MBBS)	Family Medicine	Factors associated with Burnout in Occupational	N/A	N/A	06/30/2019	Y	Bayhealth Medical Center	Physician

		Medicine Physicians						
Jarrold D. Matthei, MD, MPH; Entry Year 2018; Icahn School of Medicine at Mount Sinai (MPH); URM	General Preventive Medicine	Factors Affecting Return to Work in US Diplomats Exposed to Uncharacterized Environmental Exposures	N/A	N/A	N/A	N/A	OEM Resident	Physician

¹ List all NIOSH supported trainees and graduates by year of entry. Reporting period for renewals is from start date of prior competing award. New applicants should report last five years.

² Indicate certificate trainees with (Certificate).