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Central Appalachian Regional Education and Research Center

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LIST OF ABBREVIATIONS

AAOHN	American Association of Occupational Health Nurses
AgSH	Agricultural Safety and Health
CARERC	Central Appalachian Regional Education Research Center
CPH	College of Public Health
CE	Continuing Education
DrPH	Doctor of Public Health
EKU	Eastern Kentucky University
FFA	Future Farmers of America
GPA	Grade Point Average
KMI	Kentucky Mining Institute
K-PHAST	Kentucky Public Health Assistance and Support Team
KY	Kentucky
MineSH	Mining Engineering Safety and Health
MPH	Master of Public Health
MS	Master of Science
NSF	National Science Foundation
OEHN	Occupational Health Nursing
OS	Occupational Safety
OSHA	Occupational Safety and Health Administration
PhD	Doctor of Philosophy
PRP	Pilot Research Program
REU	Research Experience for Undergraduates
SOUTHON	Southeastern States Occupational Network
SUPAGRO	French Agricultural University
UK	University of Kentucky
USDA	United States Department of Agriculture

ABSTRACT

The Central Appalachian Region Education and Research Center (CARERC), the newest of the NIOSH-funded ERCs and funded since 2012, serves eastern Kentucky, western North Carolina, western Virginia, eastern Tennessee, and southern West Virginia. (Figure 1 pg 22) The rugged hills and mountains of Appalachia constitute a distinct region within the U.S., with populations generally having low income, poor health, inadequate housing, and below standard education levels. The Appalachian Regional Commission, a federal-state agency that administers an economic development program for the region, defines “Appalachia” as selected counties in 12 states and all counties in West Virginia (ARC, 2009). Central Appalachia has consistently experienced higher poverty rates and greater social health problems than the rest of the region. Rates of occupational injuries and fatalities continue to be elevated compared to the nation, due in large part to the primary regional industries: mining, transportation, construction, and agriculture and forestry. While Central Appalachia has witnessed economic progress over the past several decades, systematic attention to the safety and health concerns of its work force has been limited. CARERC has combined the academic resources of three colleges on the University of Kentucky (UK) campus as well as one college from Eastern Kentucky University (EKU) to create a cohesive, fully equipped and recognized resource for occupational safety and health research and training in Central Appalachia. CARERC provides interdisciplinary graduate education for students and health and safety professionals in four programs:

- Agricultural Safety and Health (AgSH)
- Mining Engineering Safety and Health (MineSH)
- Occupational Health Nursing (OEHN)
- Occupational Safety (OS)

The primary objectives of CARERC are to:

1. Provide interdisciplinary occupational safety and health education for graduate students.
2. Deliver continuing education, consultation and outreach to address environmental and occupational safety and health concerns.
3. Encourage and conduct interdisciplinary research on a variety of occupational diseases and injuries.

Our faculty members are national and international leaders in their respective fields and graduates of these programs are employed in industry, government, academia, and consulting. The UK and ECU campuses are only 25 miles apart. The establishment of our integrated multi-disciplinary Education and Research Center has united the academic programs and pooled resources for applied research within a framework that has been increasing regional learning opportunities, catalyzing translational research, and extending outreach.

In addition to preparing graduates in the four occupational safety and health disciplines, CARERC has encouraged interdisciplinary research through its Pilot Research Program (PRP). The Pilot Research Program has made available small research grants, following a process of competitive review, to encourage students and faculty to develop innovative projects targeted to regional industries and their work safety and health concerns. The Continuing Education program has been working with a wide variety of regional partners to encourage course offerings in occupational safety and health and has collaborated on a highly visible regional conference on mining safety and health in our 5-state region of Central Appalachia.

SECTION 1. PROGRAM HIGHLIGHTS AND SIGNIFICANT RESULTS

From its funding start two years ago, CARERC has been successful in recruiting quality students across the 4 core disciplines. Table 1 (pg 23) displays the recruitment of students by core and year. A comparison of year 1 to year 2 shows consistent growth in student recruitment across all the cores with gender and minority representation. Course offerings across the disciplines have been developed (Table 2, pg 24) and well received according to student evaluations. CARERC faculty have worked to develop the required core classes in occupational health, (CPH 620) and the Occupational Health and Safety seminar (CPH 699). Of particular note is the Field Studies course (CPH 698) that is offered in the spring semester. This unique course especially designed for the CARERC program features site visits to industries specific to our region, including visits to a working underground coal mine operation in eastern Kentucky; Oakridge National Laboratory in Tennessee; working dairy farm and working bourbon distillery. The Occupational Safety and Health seminar launched in fall 2012 included presentations from NIOSH investigators and collaborators from Cincinnati, changing venues across the participating campuses. Students are progressing well throughout the program with 5 students graduating, 3 of these now employed in relevant jobs, 2 pursuing further advanced degrees.

In addition to training students to become new professionals in the occupational safety and health field, CARERC's mission is also to provide continuing education of interest to the current occupational health and safety workforce in our region. The Continuing Education core has been flourishing since it launched in 2012. Table 3 (pg 25) displays the continuing education courses offered and the associated attendance hours. During its first year, CARERC hosted the very successful Mining Health and Safety Conference, attracting 135 professionals and continuing to serve as an educational resource with the online offering of the symposium presentations (<http://www.cecentral.com/node/1024>). Plans are underway for CARERC to host a Radiation Safety workshop (fall 2014) taught by Oakridge National Laboratory radiation specialists as well as the SouthOn conference (spring 2015). An online needs assessment survey of professionals across the industry cores in our 5 state region has been developed and is currently underway that will allow us to target future continuing education efforts towards the most relevant topic areas and audiences.

The Pilot Project funding program, designed to support innovative research projects relating to occupational health and safety has had a strong start and continues to expand. Table 4 (pg 26) displays the pilot projects awarded from each of the 2 years. CARERC's deliberate effort to develop professional networks across the research institutions in our 5 state region have allowed us to expand our collaborative relationships throughout the University of Kentucky, with other universities in our region, and in other countries as well as with government agencies.

Through activities in these three main project areas CARERC is developing an extensive professional network among academics, industry, government and the community and is establishing itself as a recognized support for occupational health and safety addressing the unique needs of the Appalachian region.

OUTCOMES/RELEVANCE/IMPACT

During year 2 CARERC administration added faculty and staff support to evaluate the Center's impact. The evaluation team of Dr. Cardarelli and Ms. Susan Westneat provide the structure to document the measurable impact of CARERC. Ms. Christin Kane provides evaluation of the CARERC financial accounts, ensuring money is spent as proposed in the budget plan.

Student recruitment, retention and progress as shown in Table 1 (pg 23) indicates real numbers of future occupational health and safety professionals being trained and entering the workforce with training specific to support industries of the Appalachian region. The consistent increase in student enrollment across all 4 core program areas yields a total of 21 trainees to date. Among the students enrolled to date we have attracted students from across 6 different states including Kentucky, Ohio, Virginia, Florida, Missouri and Idaho. Three trainees completed internships and 5 have graduated, 3 with jobs in relevant fields and 2 pursuing higher education degrees. The newly created field studies course with multi-state site visits to a variety of industries in addition to disseminating safety information through the visits has also generated industry-wide collaboration networks. Student attendance at national and regional conferences presenting their research project results provides further dissemination and impact (See individual core reports in Section 2 Technical Report).

Continuing education efforts have shown measurable impact with the number of attendees and credit hours earned. (Table 3, pg 25) CE offerings are varied and extend across the 4 core programs with sustained enrollment. The "Interdisciplinary Update of Miner Safety and Health" Conference organized and hosted by CARERC and held concurrently with the 74th Annual Meeting of the Kentucky Mining Institute in August 2013 was designed for the benefit of coal miners, coal mine operators, and the health and safety personnel who support them, and focused on scientific and policy developments of 1) the current science documenting the risk for respiratory diseases among coal miners; 2) state of the art tools and techniques for measuring coal dust; 3) the current status for exposure limits; and 4) the need for periodic health surveillance of coal workers. This conference drew 135 participants from throughout the region and received extensive press coverage (both print and television/radio). Impact of the conference was furthered when Dr. Sanderson presented highlights of the conference at the University of Cincinnati's ERC symposium in fall 2013. Using the results from our regional needs assessment survey (to date have over 300 responses) to guide our future continuing education offerings will ensure we offer training that will have maximum impact and relevance.

Pilot projects show the spreading influence of the CARERC within UK, at neighboring universities, foreign universities and government agencies with the support of research projects involving collaborations with varied personnel.

CARERC has had a staff and student presence at booths at several national conferences in the last 2 years including the national FFA convention (over 200 students reached), the Governor's Safety Council (100 reached) and the National Farm Machinery Show. Occupational health and safety materials were distributed at each conference reaching an estimated total of 300 contacts. Email contact lists of interested professionals in attendance at these conferences were also developed. Social media (Facebook and Twitter) has been designed and marketed to

generate a real audience of occupational health and safety professionals as well as the general public. A total of 114 Facebook page “likes” have been recorded to date.

Efforts of the CARERC core faculty have also had an impact regionally and nationally.

- Dr. Deborah Reed (Nursing Core) was named a 2013 Fellow of the American Association of Occupational Health Nurses. Dr. Reed's was the first in the AAOHN history to highlight the agricultural industry.
- Dr. David Mannino (future Occupational Epidemiology Core) was listed as Top Specialist in Chronic Obstructive Pulmonary Disease in the United States (Nov 2013).
- Dr. Mannino also received the COPD Foundation Award for Development of the Pocket Consultant Guide, 2013.
- In May 2013, Dr. Wayne Sanderson (Agricultural Safety and Health Core) received the Lila Albin Award for the best Indoor Environmental Quality paper of 2012.
- Dr. Joseph Sottile (Mining Safety and Health Core) was awarded the Stephen McCann Memorial Education Excellent Award (2012)

CARERC content was widely disseminated through a variety of YouTube videos creating a sizeable impact in just the 2 years of project funding:

- Dr. Reed's YouTube video describing Occupational Health Nursing: <https://www.youtube.com/watch?v=VfYlX4eJ0fk>. This video has had 385 views to date.
- Dr. Ellen Hahn (Nursing Core) also created YouTube videos including a video assessing the health and safety of electronic cigarettes as a quit method to reduce cigarette smoking. The content of this video is directly applicable to workplace tobacco use policy decisions. YouTube: <https://www.youtube.com/watch?v=ulZ2glhwDxM>. This video has had 3,811 views to date.
- Dr. Hahn's YouTube video on “vaping”: Vapelink Episode 30 launched on 4/22/2013 was presented at the Smoke Free Policy Conference in spring 2013. <https://www.youtube.com/watch?v=iPMgpQGig-Q>

SECTION 2: TECHNICAL REPORT

The Central Appalachian Region Education and Research Center (CARERC), the newest of the NIOSH-funded ERCs and funded since 2012, serves eastern Kentucky, western North Carolina, western Virginia, eastern Tennessee, and southern West Virginia. (Figure 1, pg 22) The rugged hills and mountains of Appalachia constitute a distinct region within the U.S., with populations generally having low income, poor health, inadequate housing, and below standard education levels. Central Appalachia has consistently experienced higher poverty rates and greater social health problems than the rest of the region. Rates of occupational injuries and fatalities continue to be elevated compared to the nation, due in large part to the primary regional industries: mining, transportation, construction, and agriculture and forestry. The establishment of the integrated multi-disciplinary CARERC has united academic programs across colleges at University of Kentucky and Eastern Kentucky University and pooled resources for applied research within a framework that has been increasing regional learning opportunities, catalyzing translational research, and extending outreach to the underserved area of Central Appalachia.

The details presented below for each of the four core training programs document the success CARERC has had in its primary aim of recruiting, training and graduating top quality new professionals in occupational health and safety. CARERC recruitment has been incorporated into the broader recruitment efforts of each of the core colleges resulting in increasing numbers of high quality graduate students (See Table 1, pg 23 and Figure 2, pg 27). CARERC students have developed very novel student research projects in just the two years of funding. Selected projects by core appear below:

Mining Safety and Health

Program Director: Joseph Sottile

Selected projects include:

Project Title: Automating Fan Ventilation and Measurement as a Means of Ensuring Proper Air Flow in Coal Mining Operations

Summary of project:

Coal mines are required to be ventilated. Not only does ventilation bring fresh air to the workers but also removed contaminants such as coal and silica dust, methane, and diesel particulates which are harmful to workers. The proposed project will involve automating a fan and measurements along a ventilation network at the ventilation lab in UK's Mining and Mineral Resources Building. Then, using computer software, create an algorithm that can adjust the fan for highest efficiency/performance at various ventilation network conditions. In a full scale mine, this work has the potential to allow fans to adjust to changes in the mine environment in order to ensure proper air flow to the workers.

Project Title: Lean in Mining

Summary of project:

This research will apply lean principles to the mining industry. The research will focus on safety, quality, productivity, cost, and cross training. There will be a focus on behavioral based audits and 5S audits that proactively prevent injury by encouraging the right behavior and ensuring the work area is clear of potential hazards.

Project Title: Minimizing Dust Exposure to Miners
Summary of project:

To develop a mechanical device that would minimize the dust exposure to miners working in the face of the mine. A similar device is being used at Toyota in Georgetown, KY within the painting department.

Employment/Internships:

A trainee completed a summer internship at the Patriot Coal Company in the safety department of the Paint Creek Complex and Kanawha Eagle. Duties included: Inspection, violation, and accident tracking and stints on the surface, underground, and at a coal preparation plant/loadout.

Faculty highlights:

Dr. Sottile presentation at 2013 Industry Applications Society Annual Meeting: "An electrical mine monitoring system utilizing the IEC 61850 standard was published in the meeting proceedings. Doi: 10.1109/IAS.2013.6682565.

Novak, Thomas, and PE Joseph Sottile. "Respirable Dust Study for Kentucky Coal Mines." (2013). Final report submitted to Kentucky Department for Energy Development and Independence.

Dr. Sottile was awarded the Stephen McCann Memorial Education Excellent Award (2012)

Occupational/Environmental Health Nursing

Program Director: Debra Anderson

Selected projects include:

Project Title: Effects of Obesity on the Work and Safety of Farmers

This project describes the relationship between obesity and work ability, work productivity, and work-related injuries in farmers. The project team will conduct anthropometric measurements and administer the work ability index (WAI) survey and work limitations questionnaire (WLQ) among farmers attending the National Farm Machinery Show, North American Livestock Expo, and other events (n > 394). The WAI and WLQ were developed by the Finnish Institute of Occupational Health and Tufts Medical Center, respectively, and have established reliability.

Project Title: Tobacco Use Workplace Policies in Kentucky Manufacturing Facilities

The objectives of this secondary data analysis from the study entitled Community Partnerships for Tobacco Use, Prevention & Control are to: 1) examine the presence of tobacco use-related workplace policies in Kentucky manufacturing facilities and changes in these policies over time; and 2) examine the factors associated with the presence of tobacco use-related workplace policies. These factors include county-level middle and high school tobacco-free policies, population size, income, education, adult smoking rates, and pounds of tobacco produced.

Project Title: Predictors of Psychological Well-Being in African-American Registered Nurses

This research will focus on reducing health disparities in the African-American community through diversification of the health care workforce. Nurses comprise the largest proportion of the health care workforce, and modifying the demographic composition of registered nurses by focusing on retention of qualified and diverse registered nurses has the potential to reduce health inequities. Nursing is a highly stressful, demanding, and taxing profession and increased job stress is linked to poor psychological health outcomes. In addition to the inherent stress of being a nurse, African-American registered nurses may experience bias and discrimination in the workplace that may create additional stressors. The goals of this study are, using a web based survey of nurses recruited from the National Black Nurses Association, (1) evaluation the mental health of African-American registered nurses, and (2) identify predictors of psychological well-being in African-American registered nurses. Such data will bring together important themes, highlighting and synthesizing the complex relationship between stress, discrimination, its impact of psychological well-being and its effect on retention of a diverse registered nurse workforce.

Trainee presentations:

Brandford, A. (2013, October). Future of Nursing: Transforming Education. Podium presentation at the biannual Jonas Nurse Leader Scholarship Conference, Washington DC

Brandford, A. (2014, April). The Current State of Kentucky's Registered Nurse Workforce: Poster Presentation at the University of Kentucky Student Scholarship Showcase

Brandford, A. (2014, May). Findings from a Recent Kentucky RN Capacity Survey. Podium Presentation at the 10th Annual Faculty Development Workshop, University of Kentucky.

Trainee grant submissions:

Brandford, A. "Predictors of Psychological Well-Being in African-American Registered Nurses" Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral Fellowship (Parent F31) in review.

Faculty highlights:

- Dr. Deborah Reed was named a 2013 Fellow of the American Association of Occupational Health Nurses. Dr. Reed's was the first in the AAOHN history to highlight the agricultural industry.

Faculty and Staff presentations:

Reed, D.B., Jones, M.S., Honaker, A. (2014, June). An agricultural health nursing course designed for distance education. International Society for Agricultural Safety and Health (ISASH) 2014 Conference, International Society for Agricultural Safety and Health, Omaha, NE.

Reed, D.B., Claunch, D.T. (2014, June). Protecting ourselves from harm: Voices of aging Farmers. 2014 Annual Conference of the International Society for Agricultural Safety and Health, International Society for Agricultural Safety and Health, Omaha, NE.

Reed, D.B., Jones, M.S., Honaker, A. (2014, May). An agricultural health nursing course designed for distance education. 2014 Kentucky League for Nursing (KLN) Conference, Kentucky League for Nursing, Louisville, KY.

Reed, D.B. (2014, April). Aging, farming, and ten tips. Pennsylvania Farm Bureau District 14 Annual Meeting, Pennsylvania Farm Bureau, Erie, PA.

Reed, D.B. (2014, April). Aging and Farming: Understanding "Normal". 2014 ArgaAbility National Training Workshop, Lexington, KY.

Reed, D.B. (2014, March). Clinical considerations in caring for aging farmers: unique challenges and opportunities. 18th Annual Primary Care Conference, East Tennessee State, Johnson City, TN.

Reed, D.B. (2014, March). Farm Safety: Mitigating the risk. Kentucky Farm Bureau Women's Leadership Conference, Kentucky Farm Bureau, Lexington, KY.

Reed, D.B., Jones, M.S., Honaker, A., Claunch, D.T. (2013). Caring for the Farm Community – the Heartbeat of America: Nurses Utilizing Research, Service, Education and Practice (NURSE-AP). 2013 Annual Conference of the International Society for Agricultural Safety and Health, Sandusky, OH.

Swanburg, J., Clouser, J.M., Walsh, M., Westneat, S., Reed, D.B. (2013, November). What's experienced, what's reported: A mixed-methods description of injuries on horse breeding farms. 141st Annual Meeting American Public Health Association, American Public Health Association, Boston, MS.

Reed, D.B. (2013, October). Pathways along the journey. Epsilon Sigma Chapter of Sigma Theta Tau, East TN State University, Johnson City, TN.

Reed, D.B. (2013, September). Listen, Learn, Consult and Coach: Strategies to Change farm Work Behavior. Ky Lake Region AAOHN 7th Annual State Conference, Bowling Green, KY.

Reed, D.B. (2013, July). Getting older, getting wiser: Tips on healthy and safe aging in farming. 10th Annual Summer Institute in Assistive Technology, Kentucky AgrAbility Summer Workshop, Frankfort, KY.

Jones, M.S., Honaker, A., Reed, D.B. (2013, May). Research to Practice Education using a Modular Distance Learning Approach. Rural Nurse Educator Conference 2013, Branson, MO.

Reed, D.B. (2013, April). Older Farmers: Assessing Risk. 2013 Farm Bureau National Women's Leadership Conference, Farm Bureau National, Las Vegas, NV.

Jones, M.S., Reed, D.B., Lovan, S., Lashley, D., Claunch, D.T. (2012, August). Infusing occupational health in undergraduate nursing education . American Association of Occupational Health Nurses (AAOHN) Annual Conference, American Association of Occupational Health Nurses Inc, Nashville, TN.

Hahn, E.J. (2014, May). Smoke-free Policy and Health of Eastern Kentucky. Young Professionals of Eastern Kentucky, YPEK, Pikeville, KY.

Hahn, E.J. (2014, April). Policy Development and Breathing Healthy Air. Kentucky Public Health Association, Louisville, KY.

Butler, K.M., Hahn, E.J. (2013, April). Integrating community engagement into public health research. 8th Annual Clinical and Translational Science Spring Conference, UK Center for Clinical and Translational Science , Lexington, KY.

Hahn, Ellen J., et al. "Indoor Air Quality in Livingston, Lyon and Trigg Counties, Kentucky Workplace Venues, 2011-12." (2013). Report.

Occupational Safety

Program Director: Scotty Dunlap

Selected projects include:

Project Title: Exploration of the effect of worker age on worker compensation return to work programs and the impact on companies' financial status.

Project Title: Revisiting Heinrich: A Statistical Analysis of Bureau of Labor Statistics Severity Data Across Industry Categories

Project Title: Researching predictive analysis concepts to reduce injuries

Project Title: Investigation of occupational safety strategies to protect those who act as first responders during national disasters

Project Title: Investigation of the application of domestic terrorism strategies to the occupational safety risks of those who work in places of public assembly

Graduation/Employment/Internships:

Trainee served as environmental safety intern at Marathon Petroleum

Trainee graduate hired as safety manager at Marathon Petroleum in the Corporate Safety group and is currently stationed at the refinery in Galveston Bay. He travels among refineries to assist in turnaround safety and providing corporate safety guidance.

Trainee graduate hired as corporate safety specialist at Toyota Tsusho. He provides support for 23 of Toyota Tsusho's subsidiaries throughout the Eastern US and Canada. When there is an injury, he reviews their investigation, including the root cause analysis, corrective actions, and the employee's status. He also helps conduct safety audits on the facilities once per year to ensure compliance. He directs the Safety Supervisor Development Program, which is held via teleconference once every two weeks. They discuss ways to make facilities safer and he provides them background on how certain laws and policies that apply have evolved.

Trainee graduate hired as Corporate Safety Director for Prestress Services Industries

Trainee presentations:

Henning, JB., Culbertson, SS., Simmons, MJ., Kennedy, C., & Dunlap ES. (April 2013). The Influence of Individual and Contextual Factors on Safety Performance. Society for Industrial and Organizational Psychology, Houston, TX. (Conference poster accepted for presentation based on ongoing research)

Faculty highlights:

Program Director Dr. Scotty Dunlap promoted to Associate Professor Eastern Kentucky University in recognition of his leadership in graduate education in occupational safety.

Agricultural Safety and Health

Program Director: Wayne T. Sanderson

Selected projects include:

Project Title: Critical Violations Identified from Routine Public Swimming Pool Inspections and Their Water Quality

Summary of project:

The objective of this study was to identify critical pool-safety violations ranked by prevalence, identify trends, and offer recommendations for the Northern Kentucky Health Department's pool inspection program. 2011-2013 data pertaining to swimming pool inspections and specific to counties in the Northern Kentucky District was obtained from the Health Department's Division of Environmental Health and Safety. Data was analyzed to determine: 1) the rate of inspection failures for lifeguarded facilities, hotel and motel facilities, and apartment and homeowner association facilities at the time of their last full regular inspection, monthly water quality inspection, and follow-up inspections due to an initial failure; 2) if there were any differences in critical violations marked among these pool groupings; 3) if these results determine different outcomes by controlling the type of pool, seasons (fall/winter, spring/summer), and years.

Project Title: Barn exposures and associated respiratory symptoms in Latino horse workers

Summary of project:

Latino horse workers are a vulnerable worker population with a potential high risk of exposure to respiratory hazards found in horse barns. Although the respiratory health of Latino workers in other sectors of agriculture has been studied, to our knowledge no studies have investigated the respiratory health of Latino horse workers. We performed a cross-sectional study that examined exposure to barn related respiratory hazards and the respiratory health of 80 Latino participants currently working in the horse breeding industry. Spirometry tests of lung function and participant self-reported measures of exposure and respiratory symptoms were conducted by trained Spanish speaking promotoras. In addition to publication submissions, research findings will be shared with industry and community advisory councils, and organized into a series of issue briefs to be distributed to farm representatives.

Graduation/Employment/Internships:

Three trainees graduated; 1 has employment in relevant field; 2 are pursuing higher education degrees.

Faculty highlights:

Program Director Dr. Wayne Sanderson in May 2013 was awarded the Lila Albin Award for the best IEQ paper of 2012.

In October 2012, Dr. Sanderson was inducted as an honorary member in the University of Central Missouri Safety Sciences Rho Sigma Kappa Honor Society

Occupational Epidemiology

Program Directors: David Mannino/Steven Browning

David Mannino, MD, and Steven Browning, PhD, from the College of Public Health at the University of Kentucky, received funding for the Occupational Epidemiology program for the upcoming year. 3 doctoral (DrPH) and one master's (MPH) student have been recruited into this new core. All come with excellent academic backgrounds (GPAs all over 3.5); prestigious academic awards (Environmental Health Departmental Award) and impressive extern/internship/work experience (work with state health department in the area of hospital acquired infections).

Continuing Education

Program Director: Steven Browning/Lynda Charles

Another major aim of the CARERC is to support occupational health and safety professionals across the 4 cores throughout our 5 state region. Continuing Education efforts in the future will be greatly enhanced with the hiring of a dedicated Continuing Education program coordinator. A planning committee, composed of the core directors and key staff, has been formed for developing an annual training plan. An online needs assessment survey of health and safety professionals has been designed and is currently underway that will allow us to identify topics of greatest importance and interest. To date over 300 responses have been received across our entire region and from a wide variety of professionals. The online survey has an added benefit of providing us with an updated email contact list for ongoing networking and outreach. These data and feedback from meetings with our stakeholders, will direct our focus on safety and health concerns in mining, agriculture, forestry, transportation, and the health care industry, all industries with elevated rates of occupational illness, injuries and fatalities in our Appalachian region.

CARERC offered "An Interdisciplinary Update of Miner Safety and Health" Conference held concurrently with the 74th Annual Meeting of the Kentucky Mining Institute in August 2013. Our conference, designed for the benefit of coal miners, coal mine operators, and the health and safety personnel who support them, focused on scientific and policy developments of 1) the current science documenting the risk for respiratory diseases among coal miners; 2) state of the art tools and techniques for measuring coal dust; 3) the current status for exposure limits; and 4) the need for periodic health surveillance of coal workers. This conference drew 135 participants from throughout the region and received extensive press coverage (both print and television/radio). Figure 3 (pg 28) displays the extensive and varied list of speakers from this event. Conference materials were developed into online continuing education training and continuing education credits awarded for completion. The lasting impact of the conference is shown through continued activity in the year since the conference was held. Beyond the developing and hosting the Mining conference, CARERC has partnered with the OSHA Training Institute at Eastern Kentucky University in the marketing and advertising of our course offerings

and has subcontracted with OSHA TI to provide additional courses to the campus at the University of Kentucky to facilitate access to safety and health classes for our students and partners.

Dr. Reed developed and taught 3 new CE offerings, and also conducted a 90 minute session at the annual conference of the American Association of Occupational Health Nurses (AAOHN) in May 2014. Dr. Reed's was the first in the AAOHN history to highlight the agricultural industry.

In January 2014, colleagues from the Kentucky Department of Public Health (KDPH) provided Kentucky Public Health Assistance and Support Team (K-PHAST) training to CARERC students. K-PHAST is a team of volunteers trained to respond to public health emergencies and assist with special projects at the state and local levels.

To date, a total of 8832 person hours of contact for 12 distinct courses/events have been completed in the project period.

Pilot Research Training Program

Program Director: Wayne T. Sanderson

Report on 2012-2013 pilot awards:

Project Title: Effectiveness of insecticide-treated clothing to prevent tick and mosquito exposure in foresters

PI: Stephanie Richards, East Carolina University, Department of Health Education and Promotion

Summary of Project:

Outdoor workers in the forestry and logging industries often face occupational health hazards such as insect bites and the extent to which exposures are linked to vector borne disease is not fully understood. These workers are exposed to potential pathogen vectors such as mosquitoes and ticks in wooded habitats. In North Carolina, ticks and mosquitoes are known to transmit pathogens that causes diseases such as Rocky Mountain spotted fever (tick), Lyme Disease (tick), West Nile fever (mosquito), and Eastern equine encephalitis (mosquito). While spray-and/or lotion-based repellants can be applied directly to skin and/or clothing, repellant/insecticide-treated clothing is also available. The primary objective of this study is to assess risk and develop actionable prevention/intervention strategies aimed at mitigating exposure to biological hazards. Ticks and mosquitoes will be collected at study sites, identified to species, frozen for future pathogen analysis. Participants will receive instructions about reporting exposure and be asked to submit personal work uniforms to be professionally treated with insecticide/repellant. This approach will provide baseline information on occupational exposure to biological hazards in western North Carolina and data necessary for large-scale studies mitigating the effects of these hazards.

Report on 2013-2014 pilot awards:

With the development of the contact list and email network, CARERC was able to more widely distribute the announcement of its pilot money availability. During the 2nd year of funding, the following inter-disciplinary projects were awarded pilot money:

Project Title: Avian-livestock links in the demography of zoonotic bacteria and their implications for farm-worker health

PI: David Westneat, University of Kentucky, Morgan School of Biological Sciences

Summary of Project:

In addition to Dr. Westneat, 4 other researchers were involved including Dr. Michael Flythe of the USDA, 2 PhD students and a visiting undergraduate intern from the SupAgro University in France. The goal was to sample livestock and house sparrows living nearby screening for three types of bacteria commonly pathogenic in humans (Salmonella, E. coli, and Corynebacteria). We collected 50 samples over 10 weeks in the spring from each of goats, horses, and cows, and a total of 158 samples from house sparrows.

Preliminary analyses of the data will be presented publicly at the program-ending Presentation Day of the NSF-REU "Suburban Ecology and Invasive Species" in August 2014.

Data from this project will be used to support a follow up grant to be submitted in fall 2014.

Project Title: Appalachian Firefighters Exposure to and Perception of Risk

PI: Joan Mazur/Bill Goetz, University of Kentucky, College of Education

Summary of Project:

Numerous articles have identified the known and recognizable health and safety issues that paid professional firefighters encounter when responding to a fire, however, there has not been a robust survey focused solely on volunteer firefighters and what they perceive and recognize as risks and hazards to their own safety and health. There is also scant reporting of "near miss" incidents where the firefighter narrowly escapes injury during a fire. In Kentucky all 54 counties served by the CARERC region have primarily volunteer fire services with only 10 departments listed as paid professional services. There are 8,845 volunteer firefighters in total working in 324 fire services in these counties. The Kentucky Firefighter Information & Experience Inventory was sent to the chiefs of all of those 324 fire services for distribution to all volunteer firefighters in February through May 2014. Over fourteen hundred volunteer firefighters (1,413) responded to the 35-item survey.

Project title: Proposal to Conduct Exposure Assessments and Evaluate and Implement an Oncology Nurse Communication and Training Program at the University of Tennessee Medical Cancer Center

PI: Martin Barrie, PhD, Oak Ridge Associated Universities

Summary of Project:

Two sampling methodologies were used at UPMC to assess antineoplastic surface and air contamination: 1) Surface wipe samples, and 2) Representative personnel breathing zone air samples. Statistically determined and sufficiently large numbers of participants and samples were taken for both sampling methodologies to obtain statistically significant results. All samples will be analyzed by a laboratory with appropriate certifications and best practices.

Project title: Developing a web-based application to generate automated access routes from timber harvesting sites to emergency personnel locations

PI: Jeff Stringer, College of Forestry, University of Kentucky

Summary of Project:

In the process of developing a web-based application (that has the ability to be used with a mobile interface and/or developed into an App for smartphone use) to automatically generate least travel time routes from user-defined logging sites to the closest EPLs. This application will rely on the extensive base maps available in Google maps (road locations, lengths, speed limits, and traffic level), be implemented as a website using the Google application programming interface (API), and made available for public use. In addition to generating optimized access routes from logging sites to EPLs, our web-based application will store all requested access routes and expected harvesting duration to maintain online spatial dataset displaying active logging sites and associated access routes to EPLs at any given time. This offers the potential to reduce crucial estimate travel time for emergency personnel in case of injuries, facilitate compliance with OSHA regulations, and maintain an online database accessible by emergency personnel.

Project title: Development of a Culturally Effective Educational Program in the Prevention of Heat Stress Among Spanish Speaking Hispanic Farm Workers in Rural East Tennessee

PI: Sharon Loury, East Tennessee State University

Summary of Project:

This inter-professional pilot study uses a community-based participatory research approach to develop and evaluate a culturally effective method of educate Spanish speaking Hispanic farm workers about the prevention of heat stress, an occupational health concern identified through an assessment of Hispanic farm workers recently conducted in Tennessee.

PUBLICATIONS

Trainee publications:

Allen-Bryant, K.T. (2013, February). *Putting wellness into occupational safety and health*. Annual Worksite Wellness Conference, Lexington, KY.

Warshawsky, N., Lake, S., & Brandford, A. (2013). Nurse Managers and Their Practice Environments. *Nursing Administration Quarterly* (37) 4:317-325. Doi: 10.1097/NAQ.0b013e3182a2f9c3.

Reed, D.B., Allen-Bryant, K., & Hunsucker, S. (2014). Worker demographics and implications for the OEHN. In Moore, R., & Moore, P.V. *Core Curriculum for Occupational and Environmental Health Nursing*. Pensacola, FL: AAOHN.

Turner, Michael. An Examination of the Day of Week and Sampling on Injury Occurrence. Capstone May 2014.

Selected Faculty and Staff Publications:

Poplin, G., Miller, H., Sottile, J., Hu, C., Hill, J., Burgess, J. (Dec 2012). Enhancing severe injury surveillance: The association between severe injury events and fatalities in US coal mines. *Journal of Safety Research*, 44, 31-35. Doi: 10.1016/j.jsr.2012.11.002

Liang, Rui, Joseph Sottile, and Zheng Jin. Fault Location in Power Distribution Based on Travelling Wave Time-Domain and Frequency-Domain Analysis to Identify the Wave Front. *International Review of Electrical Engineering* 7.5 (2012).

Diaz-Guzman E, Aryal S, Mannino DM. Occupational chronic obstructive pulmonary disease: an update. *Clin Chest Med*. 2012 Dec; 33(4): 625-36.

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Dunlap, S., Dudak, B., and Konty, M. (2012). A synthesized model for integrating principles of adult learning in the higher education classroom. *Kentucky Journal of Excellent in College Teaching and Learning*, Volume 10, 19-35.

Dunlap, S. (Ed). (2012). *The comprehensive handbook of school safety*. CRC Press: Boca Raton. (editor, contributor of nine chapters, and co-contributor of one chapter).

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Maciuba, S. A., Westneat, S. C., Reed, D. B. (2013). Active coping, personal satisfaction, and attachment to land in African-American farmers. *Issues in Mental Health Nursing*, 34 (5), 335-343.

Browning, S. R., Westneat, S. C., Sanderson, W. T., Reed, D. B. (2013). Cattle-related injuries and farm management practices on Kentucky beef cattle farms. *Journal of Agricultural Safety and Health*, 19 (1), 37-49.

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Humann M, Sanderson W, Donham K, Kelly K. (2013): Task-Based Exposures for Farmers Involved in Grain Production. *J Agricul Safety Health* 19(2): 101-113.

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Hahn, E.J., Rayens, M.K., Adkins, S., Simpson, N., Frazier, S.K., Mannino, D. M. (2014). Fewer hospitalizations for chronic obstructive pulmonary disease in communities with smoke-free public policies. *American Journal of Public Health*, 104 (6), 1059-1065.

Appendix

Figure 1. Map of the Region Covered by the Central Appalachian Regional Education and Resource Center. Note: Figure is based on the Appalachian Designation of counties used by the Appalachian Regional Commission (ARC).

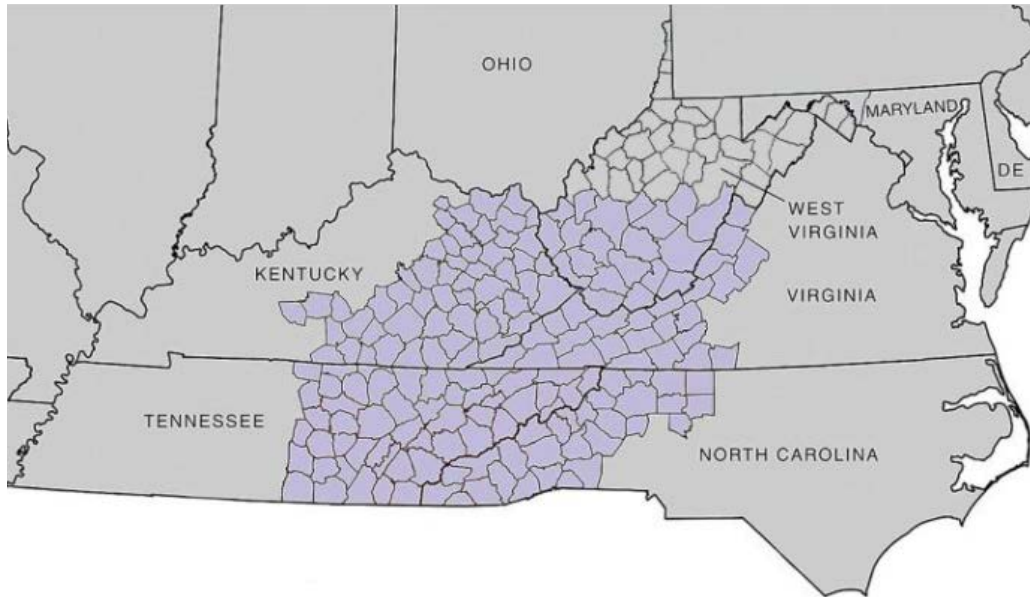


Table 1. CARERC Trainee Enrollment and Progress by Core and Year

Core	Start of CARERC trainees: Year 1	New trainees: Year 2	To date	Internships	Graduation	Employment/Further Education*
Ag SH	5	3	8		3	3
OEHN	3	1	4			
MineSH	1	3	4	1		
OS	4	1	5	2	2	2
Total:	13	8	21	3	5	5

*2 trainees in Occupational Safety and 1 in the Ag Safety and Health cores graduated and are in relevant jobs. 2 trainees in the Agricultural Health and Safety core graduated and are pursuing further advanced degrees.

Table 2. CARERC Required and Elective Course Offerings

Course Number	Course Title	Instructors	Semester Hours	Description
Required Courses for All CARERC Students				
CPH 620	Occupational Health		3	Introduction to occupational health and safety including, evaluation, and control of workplace hazards; screening and disease prevention; principles of industrial hygiene, occupational medicine, safety, nursing and ergonomics; regulatory issues; ethics; and special populations at risk.
CPH 699	Occupational Safety and Health Seminar		0 – 1	Weekly seminar including presentations from faculty, staff, students, or invited speakers with professional expertise in occupational health and safety. Offered 1x yr
CPH 698	Occupational Safety and Health Field Surveys		3	Field survey course of a wide cross-section of occupational exposures in worksites in the Central Appalachian Region.
Selective Courses for CARERC Students				
CPH 601	Environmental Health		3	Theory and practice of assessing, controlling, and preventing environmental hazards that may adversely affect health.
CPH 610	Injury Epidemiology and Control		3	The epidemiologic basis for understanding the distribution and determinants of injuries and poisonings. EPI is a pre-req
	Special Topics: Injury Prevention and Control			No Epi pre-req
CPH 617	Occupational and Environmental Epidemiology		3	Basic course on occupational and environmental epidemiology methodology, including study design and interpretation of data.
CPH 622	Toxic Agent Implications in Public Health		3	An overview of chemical agents within the environment, their interaction with the human organism, and resultant public health implications.
CPH 729	Special Topics: Health of Agricultural Populations		3	Analysis and discussion of selected topics in agricultural health and safety.
CPH 718	Scientific Report Writing for the Health Professional		1	Introduction to the essential elements of grant writing, journal publication, and scholarly reporting.
SOC 534	Sociology of Appalachia		3	A sociological study of social issues facing Appalachian communities including political, economic, and cultural issues.
EOH 570	Environmental and Occupational Health Policy		3	Knowledge of major federal occupational and environ'l health statutes; examples of state and local statutes.
SSE 865	Auditing for Safety, Security, and Emergency Management		3	Theory and application of auditing in safety, fire, security and emergency management settings. Study of risk/threat exposure and assessment.

Table 3: Areas of Continuing Education Course Offerings For the Project Period August 2012--June 2014.

	Course/Seminar Title	Course Completion Date	Program Area	Total # Trainees	Contact Hours	Total Person Hours	# Trainees by Profession				
							MD	NURS	HYG	SAFETY	OTHER
1	Mining Health and Safety Conference	8/22/2013	Other	135	8.00	1080.00	15	20		50	50
2	Mining Health and Safety Online	6/30/2014*	Other	10	8.00	80.00					10
3	Monthly ERC seminar	4/30/2014**	Other	25	16.00	400.00		5		12	8
4	Introduction to Environmental and Occupational Health Nursing	6/30/2014*	OHN/OEHN	10	8.00	80.00		10			
5	Kentucky Mining Institutes meeting	8/24/2013	Other	450	8.00	3600.00				50	400
6	Underground Mine Ventilation	4/20/2014	OS/OSE	58	8.00	464.00					58
7	Occupational Safety and Health Course ²	5/30/2014	OS/OSE	148	16.00	2368.00				148	
8	Public Health Preparedness	1/22/2014	Epidemiology	30	4.00	120.00					30
9	SouthOn conference	10/18/2013	Injury prevention	45	8.00	360.00				20	25
10	Workplace Violence	10/15/2013	OHN/OEHN	4	8.00	32.00		4			
11	Occupational Nursing (AAOHN)	5/4/2014	OHN/OEHN	30	1.50	45.00		30			
12	Clinical Considerations in Caring for Older Farmers	3/27/2014	OHN/OEHN	135	1.5	202.5		135			
	Totals			1080	95.0	8832	15	204	0	280	581

* Online class available for duration of reporting period

** Monthly seminar is given 4 times/semester at 2 hours per time for two semesters for a total of 8 seminars with spring semester ending 4/30/2014

2. Partial sponsorship with the OSHA TI in Richmond

Table 4- Pilot Grants- CARERC

University	PI	Title of Project	Dates	Funding Amount
East Carolina University	Stephanie Richards	Effectiveness of insecticide-treated clothing to prevent tick and mosquito exposure in foresters and loggers in Western North Carolina	11/14/12-6/30/13	\$9,992
East Tennessee State University	Sharon Loury	Development of a Culturally Effective Educational Program in the Prevention of Heat Stress Among Spanish Speaking Hispanic Farm Workers in Rural East Tennessee	2/5/14-6/30/14	\$10,000
University of Kentucky	Joan Mazur (Goetz)	Appalachian Firefighters' Exposure to and Perception of Risk	2/5/14-6/30/14	\$9,752
ORAU	Martin Barrie	A Proposal to Conduct Exposure Assessments and Evaluate and Implement an Oncology Nurse Communication and Training Program at the University of Tennessee Medical Center	2/5/14-6/30/14	\$9,996
University of Kentucky	Jeff Stringer	Developing a web-based application to generate automated access routes from timber harvesting sites to emergency personnel locations	2/5/14-6/30/14	\$9,638
University of Kentucky	David Westneat	Avian-livestock links in the demography of zoonotic bacteria and their implications for farm-worker health	2/5/14-6/30/14	\$12,940

Figure 2.

**New
in
2012**

Central Appalachian Regional Education and Research Center

Lexington & Richmond, Kentucky


The Central Appalachian Regional Education and Research Center (CARERC) is the newest of only 18 such university-based occupational safety and health training programs in the United States. Funded by the Centers for Disease Control and Prevention and its National Institute for Occupational Safety and Health (CDC/NIOSH), ERCs


- Conduct interdisciplinary research & education in worker safety and health;
- Provide graduate-level academic programs and continuing education (CE) in occupational safety, occupational and environmental health, occupational health nursing, occupational medicine, and other key disciplines;
- Develop control technologies, workplace interventions and other solutions designed to protect workers and prevent injury-related costs to businesses, communities, and families.

We exist to train professionals who are well equipped to identify and help resolve threats to our nation's workforce and reduce the high costs of work-related injuries, illnesses, and deaths (<http://niosh-erc.org/>). We serve as a resource for industry, labor, government agencies, and other stakeholders while, at the same time, preparing men and women for rewarding careers in research, education, service, and policy development. CARERC was established in 2012 to serve 177 high-need counties in eastern Kentucky, eastern Tennessee, western North Carolina, West Virginia, and Virginia.

Scholarships are available for master's and doctoral students in

- Mining Safety & Health (MS, PhD)
- Occupational/Environmental Health Nursing (PhD)
- Occupational Safety (MS)
- Agricultural Safety & Health (MPH)
i.e., production agriculture, forestry, commercial fishing and aquaculture





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Website in progress

Funding for Master's and Doctoral Students

Full-time students are eligible for tuition, stipends, and support for research-related travel and professional and scientific conferences. Part-time students can receive tuition and research-travel support.

Valuable Field Experience

Field seminars, site surveys, and research symposia will be offered throughout the Central Appalachian region: *e.g.*, mines, manufacturing facilities, and other work sites throughout eastern Kentucky, western North Carolina, east Tennessee, West Virginia, and southwestern Virginia.

Enrollment

CARERC courses are offered on the campuses of both the University of Kentucky and Eastern Kentucky University (EKU). Students at UK and EKU may enroll through their respective institutions. Continuing education opportunities are available to practitioners in the field and may be available in-person and/or online.

A partnership of the University of Kentucky and Eastern Kentucky University

Funded by NIOSH award 1 T42OH010278-01

Figure 3. Agenda

8:00AM – 9:00AM: Registration/Mid-Morning Breakfast

9:00AM – 9:15AM: Welcome and Opening Remarks

CARERC Faculty (Sanderson and Dean Wyatt; Browning)

9:15AM -9:45AM: Dust Control Research and Its Impact in Underground Coal Mines

*Jay Colinet – Office of Mine Safety and Health, National Institute for Occupational Safety and Health

9:45AM – 10:15AM: Assessment of Coal Mine Dust Exposure Levels

*Jon Volkwein – Formerly of National Institute for Occupational Safety and Health

10:15AM – 10:45AM: Break

10:45AM – 11:15AM: Characterizing Variability of Dust Measurements Taken in Underground Coal Mines

*J. Sottile – University of Kentucky

11:15AM – 11:45AM: Alpha Foundation: Past, Present and Future

*Keith Heasley, PhD. – Alpha Foundation for the Improvement of Mine Safety and Health

11:45AM – 12:15PM: Adjourn to Lunch

12:15PM – 1:00PM: Keynote Address: Joe Main

*Joseph A. Main – Assistant Secretary for Mine Safety and Health Administration (Invited) Introduced by Rick Honaker, Chair of Mining Engineering

1:00PM – 1:15PM: Break and Return to Conference Room

1:15PM – 1:45PM: Remarks by Congressman Andy Barr, 6th District Representative

Introduced by Dean Wyatt

1:45PM – 2:15PM: Respirable Coal Mine Dust: The Industry Perspective on the Needs for New Regulations

*Bruce Watzman – National Mining Association

2:15PM – 2:30PM: Break

2:30PM – 3:00PM: Recent Findings from U.S. coal miner health surveillance

*Lee Petsonk, MD – National Institute for Occupational Safety and Health

Figure 3. Agenda continued

3:00PM – 3:45PM: Coal Workers Pneumoconiosis: Surgical Management of an End Stage Regional Disease

*Charles Hoopes, MD, Jason Alexander Gill Professor in Thoracic Surgery, University of Kentucky College of Medicine and guests

3:45PM – 4:30PM: Diagnosis and Progression of Pneumoconiosis

*Dr. David Mannino and *Sharon Hunsucker – University of Kentucky

4:30PM – 4:45PM: Break

4:45PM – 5:30PM: Panel Discussion with light hors d'oeuvres

(Sanderson, moderator, Rajkovich, Petsonk, Volkwein, Sottiles, Watzman)

5:30PM – 5:45PM: Evaluation and Adjournment

Closing Remarks: Sanderson/Browning