



**The University of Iowa
Heartland Center
for Occupational Health & Safety**

**Final Progress Report
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**HEARTLAND CENTER FOR OCCUPATIONAL HEALTH AND SAFETY
FINAL PROGRESS REPORT**

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LIST OF TERMS AND ABBREVIATIONS

AAOHN – American Association of Occupational Health Nurses

ABET, Inc. – formerly the “Accreditation Board for Engineering and Technology”

ACGME - Accreditation Council for Graduate Medical Education

ABPM - American Board of Preventive Medicine

ASH – Agricultural Safety and Health

asynchronous (learning) – use of online resources for student-centered learning that is not constrained by time or place

CE – Continuing Education

CPH – College of Public Health

EAB – External Advisory Board

ERC – Education and Research Center

ETP – Ergonomics Training Program

ICN – Iowa Communications Network

IH – Industrial Hygiene

ISU – Iowa State University

NIAOHN – Northeast Iowa Association of Occupational Health Nurses

OE – Occupational Epidemiology

OEH – Occupational and Environmental Health (Department of)

OHN – Occupational Health Nursing

OIP – Occupational Injury Prevention

OMR – Occupational Medicine Residency

OSH – occupational safety and health

preceptorship – a period of practical experience and training (under a preceptor)

UCM – University of Central Missouri

UI - University of Iowa

UIHC – University of Iowa Hospitals and Clinics

WSI – WORKSAFE IOWA

HEARTLAND CENTER FOR OCCUPATIONAL HEALTH AND SAFETY FINAL PROGRESS REPORT (JULY 1, 2003 THROUGH JUNE 30, 2008)

ABSTRACT

The Heartland Center for Occupational Health and Safety, based at the University of Iowa (UI), has served Federal Region VII (Iowa, Kansas, Missouri, and Nebraska) since 2000 as a center of excellence in interdisciplinary training, education and research. Region VII, the last region in the US to be served by a NIOSH-funded Education and Research Center (ERC), is characterized by higher-than-national-average rates of occupational illness and injury and lower-than-national-average rates of trained OSH professionals.

Since its inception the Heartland Center has grown from 3 academic training programs and a continuing education/outreach program to 7 nationally recognized academic training programs, a strong administrative structure, and dynamic regional continuing education and outreach programs. The Center's work was supported by the National Institute for Occupational Safety and Health (NIOSH); the University of Iowa, the University of Iowa Hospitals and Clinics; and the Deere Foundation.

During the reporting period, the Heartland Center offered training

- at the master's and doctoral levels in an ABET-accredited Industrial Hygiene program
- at the master's level in Occupational Health Nursing and Occupational Epidemiology
- in an ACGME-accredited Occupational Medicine Residency program
- at the master's and doctoral levels in Ergonomics
- at the doctoral level in Occupational Injury Prevention research training
- in Agricultural Safety and Health as a secondary emphasis available to trainees in the other Center programs

Highlights of the Center's regional and national impact during the reporting period include:

- 96% of program graduates are currently active in occupational health and safety, either in industry and clinical practice settings that serve thousands of workers or in more advanced training
- Trainees in the 7 Heartland Center training programs increased from 40 (2003-04) to 53 (2007-08)
- Diversity improved from 3% of total trainees (US citizens) identified as underrepresented minorities at the beginning of the reporting period (2002-03) to 15% at the end (2007-08), with a high of 17% (2005-06, 2006-07)
- Continuing Education (CE) offerings grew from 31 (2003-04) to 48 (2007-08) reaching a total of 6,805 trainees during the 5-year funding period; the number of CE participants increased 81%, from 861 in 2003-04 to 1561 in 2007-08
- OSH information was disseminated through a "Health and Safety Bulletin" with an estimated readership of 12,000 employers who employ 400,000 workers
- The Center successfully integrated distance learning technologies into its training, as well as its continuing education and outreach services
- 29 pilot projects were funded through the Center's Pilot/Small Projects Program

During this reporting period, the Heartland Center completed the NIOSH competitive renewal process for the Center as a whole and was awarded 5 years of funding for all program areas. The reviewers' summary noted that "there is significant need in the region for trained OSH professionals and this Center fills the gap very well... There is good balance between research and applied practice... Overall this Center is clearly more than the sum of its parts."

HEARTLAND CENTER FOR OCCUPATIONAL HEALTH AND SAFETY FINAL PROGRESS REPORT

HIGHLIGHTS

During the 2003-2008 NIOSH Education and Research Center (ERC) grant cycle, the standing and impact of the Heartland Center for Occupational Health and Safety at the University of Iowa (UI) grew significantly. Six training programs had been established between 2000, when the Center was founded, and 2003: the original core programs of Occupational Medicine (OM), Industrial Hygiene (IH), and Occupational Health Nursing (OHN) training, plus programs in Occupational Injury Prevention, Ergonomics, and Agricultural Safety and Health (all added in 2001). During this five-year reporting period, one more program was added, in Occupational Epidemiology (2005). Continuing education and outreach services, already strong, expanded to serve thousands of professionals, practitioners, workers, managers, and others across the region.

The following examples of Center development highlight the multi-faceted, interdisciplinary activities of this maturing ERC between July 1, 2003, and June 30, 2008:

- Trainees in the seven Heartland Center training programs increased from 40 (2003-04) to 53 (2007-08)
- Two training programs achieved successful re-accreditation by their respective accrediting bodies: the Occupational Medicine Residency program (full five-year accreditation by the Accreditation Council for Graduate Medical Education) and the Industrial Hygiene program (full five-year accreditation by ABET, Inc.)
- NIOSH funding (supplemental NORA funds) helped build research training infrastructure, including an aerosol science laboratory, a ventilation control laboratory, an ergonomics exposure assessment laboratory, and enhanced capabilities in exposure assessment for noise and bioaerosols.
- Continuing Education (CE) offerings grew from 31 (2003-04) to 48 (2007-08) reaching at total of 6,805 trainees during the 5-year funding period; the number of CE participants increased 81%, from 861 in 2003-04 to 1561 in 2007-08.
- The Center successfully integrated distance learning technologies into its training, as well as its continuing education and outreach services.
- 29 pilot projects were funded through the Center's Pilot/Small Projects Program

TRANSLATION

The specific Center achievements listed above translate to a significant impact on training and practice in occupational safety and health (OSH).

Training. Expanding the Heartland Center training programs with excellent faculty and expanded, improved training facilities have attracted increasing numbers of graduate students and clinical residents who are of exceptional quality. Since 2003, 11 Industrial Hygiene trainees have been awarded the Iowa Governor's Safety and Health Scholarship for academic achievement, and an IH trainee won Best Student Poster at the 2005 American Industrial Hygiene Conference. Three OHN trainees competed successfully for OSHA Nursing Internship Awards. In the National Awards for

Clinical Posters given by the American Association of Occupational Health Nurses (AAOHN), Heartland Center trainees have placed first (2006) and second (2005), and an OHN trainee won the Texas State Scholarship Award for leadership in the field. Another OHN trainee was elected to the AAOHN Board of Directors and was selected as a Fellow in AAOHN. Four OMR trainees have competed successfully for the Occupational Physician Scholarship Fund award, a nationally competitive program that provides support for only five or six new awardees each year. Another significant achievement of the OMR trainees is their performance on the American Board of Preventive Medicine (APBM) certification exam in occupational medicine; all passed with median scores above the US average. An Occupational Epidemiology trainee is a University of Iowa Presidential Scholar, the first student in the College of Public Health to receive that prestigious institutional honor.

An important long-term contribution of the Center is training graduates who can educate the next generation of occupational safety and health professionals and researchers and who can successfully conduct the research needed for future safety and health interventions. Graduates during this reporting period went on to junior faculty positions at the University of Utah, Southeastern Oklahoma State University, Trinity College of Nursing and Health Sciences, Briar Cliff University, Western Kentucky University, and East Tennessee State University. A 2007 graduate secured a position with the CDC Epidemic Intelligence Service, and a 2006 graduate is working in the NIOSH Division of Safety Research.

Publications from 2003 to 2008 with trainee authors totaled 85, and trainees have also disseminated research results directly to workers and employers through trade journals, newsletters, and presentations. An example is the work of an IH faculty member and his doctoral trainee who studied construction workers engaged in tuckpointing and demonstrated that workers' hazardous dust exposures could be reduced with a tool-mounted industrial vacuum cleaner and specific practices in the use of that technology. This research not only helped support a California OSHA standard that requires control measures for construction tasks but it also received national distribution through a NIOSH "Workplace Solutions" report (Publication No. 2008-126, online at www.cdc.gov/niosh/docs/wp-solutions/2008-126/). Word has also been received that the guidelines resulting from this research may be incorporated in a silica hazard identification matrix being developed by an OSHA advisory work group.

CE and Outreach. Attendance at Heartland Center CE offerings have continually surpassed projected goals, attracting physicians, nurses, industrial hygienists, workers and their representatives, safety engineers, agricultural health specialists, paraprofessionals such as Emergency Medical Technicians and Certified Medical Assistants, and members of labor-management health and safety committees. Not only have the courses reviewed well in trainee evaluations, but trainees continue to demonstrate their satisfaction by returning repeatedly to attend additional offerings.

Involvement of the Heartland Center in distance education dates back further than the current reporting period. At the Center's founding, the available technology was the Iowa Communications Network (ICN), a fiber-optic network with more than 750 classroom sites across the state (most in libraries, schools, or government buildings). This technology has continued to be useful for CE offerings to local AAOHN chapters. In 2001, the Department of Occupational and Environmental Health (OEH), the institutional home of the Heartland Center, invested in an interactive video system (PolyCom) linked via the internet to other PolyCom sites throughout the world. Given the expense, the Center made only limited use of that system. However, starting in 2005, the Center was in the forefront of the University of Iowa's successful trial of Elluminate Live, distance education software that creates an internet-based "virtual classroom" using inexpensive, low-level internet connectivity. This software, which allows participants at as many as 100 computer work stations to view and hear a real-time, graphics-based presentation, works well for live sessions of short duration (1-2 hours). It has also been used to make

CE and training program presentations simultaneously to trainees in a traditional classroom at remote sites. For asynchronous learning (intended to be completed on the individual trainee's schedule), CE offerings are now being designed using the University's ICON platform, which is based on Desire2Learn software.

One effective means of translating research to practice has been a multidisciplinary outreach program, based in the Department of OEH, known as WORKSAFE IOWA. Through this coalition of 10 hospital-based occupational medicine clinics, the Center provides education and consultation services to occupational health and safety professionals, employers, and workers. In 2005, the quarterly, print newsletter published by the Center for WORKSAFE IOWA was changed, at their request, to a monthly electronic "bulletin." Each month that "Health & Safety Report" links to the Heartland Center CE web page, providing information on current offerings to small and large employers across Iowa and in bordering states.

Pilot/Small Projects Program. This program, which began in 2001, was intended to provide funding for OSH research development in National Occupational Research Agenda (NORA) research priority areas. During the 2003-2008 reporting period, the Center held five rounds of application submissions with funding decisions. All applications from trainees or post-doctoral fellows have involved collaboration with a faculty member who can provide guidance on research focus and activities, human and animal subject issues, and budgetary management. Applications have been accepted from institutions across Region VII, including the University of Nebraska and Wichita State University.

OUTCOMES

The following accomplishments reflect the impact of the Heartland Center programs on the health and safety of workers in Region VII and beyond:

Center-wide Activities

- 96% of program graduates are currently active in occupational health and safety, either in industry or clinical practice settings that serve thousands of workers or in more advanced training
- Diversity improved from 3% of total trainees (US citizens) identified as underrepresented minorities at the beginning of the reporting period (2002-03) to 15% at the end (2007-08), with a high of 17% (2005-06, 2006-07)
- Information dissemination through a "Health and Safety Bulletin" with an estimated readership of 12,000 employers who employ 400,000 workers
- Successful creation of a new training program in Occupational Epidemiology
- Creation of an applied statistics course developed specifically to meet the data analysis needs of Heartland Center trainees

Industrial Hygiene Training Program

- Graduation of 17 trainees (11 MS, 6 PhD); 35% of graduates were female, an underrepresented group in the industrial hygiene field
- Graduates went on to employment in the CDC, the US Army, academic institutions, state government and public university services, industry, and private consulting

- Completion of internships or preceptorships with government or industry partners by 12 graduates (9 MS and 3 PhD)
- Pilot/small project grants received by 10 IH trainees and their mentors; small-project funding from other sources secured for research projects of 12 IH trainees and their mentors
- Program accreditation by ABET, Inc., involving extensive review of the master's-level curriculum in 2006, resulted in full accreditation through 2012.

Occupational Medicine Residency training program

- Graduation of 15 trainees (residents)
- 100% of graduates achieved American Board of Preventive Medicine (ABPM) certification, with examination scores higher than the national averages
- Graduates have secured prestigious positions in which they can make contributions to their field, e.g., Physician, Dept. of Psychiatry & Psychology, Mayo Clinic; Occupational Physician, City of Keflavik, Iceland (and researcher for Iceland's OSHA equivalent); Medical Director, Iowa Methodist Occupational Medicine; Associate Professor, Dept. of Internal Medicine, Loyola University

Occupational Health Nursing Training Program

- Graduation of 13 trainees (MSN)
- Employment of all graduates in the Midwest or the national marketplace, in industry, occupational health clinics, public university services, county health systems, and academic institutions
- Presentation on older workers by OHN faculty to occupational health nurses and human resource managers in the Quad Cities (Dubuque, Davenport, Moline, and Bettendorf) was covered as a feature newspaper article and sparked business community discussion
- The number of certified, MSN-prepared nurses in Region VII increased by 57% since the beginning of the OHN training program (as reported by the American Board for Occupational Health Nurses, Inc.)

Agricultural Safety and Health Training Program

- Graduation of 11 trainees (8 MS, 3 PhD)
- Establishment of 3 new occupational health clinics in Iowa and 1 in Missouri as a result of outreach to the Agrisafe Network, a coalition of occupational health clinics and health professionals who provide services to farmers and their families
- Publication of a major textbook written by the ASH training program director (*Agricultural Medicine: Occupational and Environmental Health for Rural Health Professionals*, 2006) and used by at least 10 US and 4 foreign universities

Ergonomics Training Program

- Graduation of 5 trainees (3 MS, 2 PhD); 73% of trainees belonging to a minority or underrepresented group (female or disabled).
- 1 trainee obtained the Certified Professional Ergonomist (CPE) credential from the Board of Certification in Professional Ergonomics (recognized as the field's premier credentialing body in the field) and a 2nd received the Associate Ergonomics Professional (AEP) credential
- 4 trainees researched and wrote ergonomics content (targeted to masonry and sheet metal workers, owners, and contractors) for the "Construction Solutions" database, an online source of information on health hazards and practical control measures
- 1 trainee, in conjunction with a faculty member, performed ergonomics awareness training for workers and health/safety teams and a product design evaluation for a heavy equipment manufacturer

Occupational Injury Prevention Training Program

- Graduation of 4 trainees (PhD)
- Addition of three new faculty
- Production of 12 publications, and 12 presentations at scientific meetings

Occupational Epidemiology Training Program

- Graduation of first trainee (1 MS)
- Enrollment of the first College of Public Health student to be awarded a University of Iowa Presidential Graduate Fellowship

Continuing Education

- A total of 6,805 practicing occupational safety and health professionals reached by Heartland Center CE programs during the 2003-2008 grant cycle
- Increase in the number of continuing education offerings from 31 in 2003-04 to 48 in 2007-08
- Increase of 81% in CE participants, from 861 in 2003-04 to 1561 in 2007-08
- Increase of 61% in person-days spent in CE offerings, from 963 in 2003-04 to 1546 in 2007-08 (person-days defined as length of program divided by 8 hrs x # of participants)
- Interdisciplinary programs attracted physicians, nurses, industrial hygienists, workers and their representatives, safety engineers, agricultural health specialists, paraprofessionals such as Emergency Medical Technicians and Certified Medical Assistants, and members of labor-management health and safety committees.

In summary, the Heartland Center for Occupational Health and Safety grew significantly in the five years between 2003 and 2008, serving regional and national needs for well-trained researchers, practitioners, and professionals in OSH specialties. The follow sections provide additional details on the activities of the various Heartland Center programs.

CENTER-WIDE ACTIVITIES

Between 2003 and 2007 the administrative functions of the Center, outreach, and the pilot/small project program were at various times categorized separately by the NIOSH ERC program. After 2007 the activities in five categories were placed together as "Center-wide activities:" administration, outreach, diversity recruitment, interdisciplinary interaction, and the pilot/small projects program. Each of those areas is discussed below.

Overall, Heartland Center administrators tracked the following performance indicators as measures of Center effectiveness:

- In each one-year reporting period, had at least 5 trainees in each of the program areas of IH, OHN, and OMR
- In each one-year reporting period, had at least 30 trainees total in Heartland Center training programs
- Reached more than 400 occupational safety and health professionals through CE courses
- Achieved a rate of at least 90% of Heartland Center trainees who take positions as OSH professionals or doctoral/post-doctoral trainees upon graduation
- Received at least 20% of pilot grant applications from regional institutions outside the University of Iowa
- Each year focused recruitment efforts on at least 2 institutions that serve underrepresented minority students
- Maintained at least 2 occupational health and safety courses required of all ERC trainees (to enhance interdisciplinary interaction and training)
- Offered at least 2 postgraduate courses in each program area of IH, OHN and OM annually
- Offered at least one postgraduate course annually in Occupational Safety (includes Ergonomics and Agricultural Health and Safety)
- Surveyed at least 90% of graduates one year following graduation to assess how well their education prepared them for their professional or post-graduate training positions
- Achieved at least a 90% participation rate in the needs assessment and Center evaluation process

Outcome evaluation was also conducted during the reporting period (which combined output measures with intermediate outcome measures, consistent with recommendations of the NIOSH-AUPOSH Task Force 3; ERCs in the 21st Century' October 13, 2005). Information and data were collected on trainees' post-graduation employment in the OSH field; graduates' assessment of the quality of their overall preparation for their future work in OSH; graduates' assessment of the quality of faculty, courses and instruction and their rating the interdisciplinary aspects of their training. Since 2004, the Center scored in the 4 to 5 range (on a scale of 1 to 5, where 5 is the best) in all these areas.

Administration. During the five-year reporting period, leadership of a number of the Center's training programs changed. Smooth transitions were made to new leadership of four existing programs—Ergonomics (Dr Dan Anton - 2003; Dr. Tom Cook - 2008), Industrial Hygiene (Dr. Wayne Sanderson - 2004), Occupational Injury Prevention (Dr. Corinne Peek-Asa - 2004), and Occupational Medicine Residency training (Dr. Fred Gerr - 2007). In addition, a new training program was created in 2005 in Occupational Epidemiology (directed by Dr. R. William Field). All of these directors successfully led their programs through competing renewal processes by 2008, and their programs were assessed as excellent or outstanding by peer reviewers.

By the end of the reporting period, the leadership of the Center itself was in transition with the retirement of the founding Center Director, Dr. Nancy Sprince. She was succeeded by Dr. Craig Zwerling, professor of Occupational and Environmental Health, of Internal Medicine, and of Epidemiology, whose extensive experience as a researcher, teacher, and academic leader had prepared him to lead the Heartland Center. For the next grant cycle, the Center Deputy Director would

also change, from Dr. William Heitbrink (faculty, IH training program) to Dr. Patrick O'Shaughnessy, who had been on the Industrial Hygiene program faculty. He had been appointed Associate Head for Student Affairs and Curriculum in the Department of Occupational and Environmental Health in 2002 and in that role had been coordinating all academic matters related to Heartland Center trainees. Dr. O'Shaughnessy was also given responsibility for the Center's pilot/small project program which had been managed by Dr. Sprince. The other key member of the management team between 2003 and 2008 was a Center coordinator, Mr. David Asa, who took the lead in overseeing trainee recruitment and served as liaison between trainees and Center administration. He also developed and implemented a diversity recruitment plan and was responsible for data gathering on measures of effectiveness, training program outcomes, and pilot grant decisions.

Throughout the 2003-2008 reporting period, the Center leadership maintained an administrative structure composed of an Internal Advisory Board that identified opportunities for programmatic integration and coordination, for recruitment, and for outreach, and an External Advisory Board of occupational health and safety professionals representing the four states of Region VII. The Internal Advisory Board, which met at least annually, was made up of all training program directors, a Center coordinator, and student representatives from each program. An example of the Board's input was their identification of trainees' need for additional methodologic training in biostatistics, which resulted in the creation of an applied statistics course developed and taught by Dr. O'Shaughnessy starting in 2008. This course focuses on the data analysis needs of ERC trainees, especially those who collect environmental samples as part of their thesis or dissertation work.

The 12-member External Advisory Board (EAB), which met at least annually by conference call, assessed Center effectiveness and productivity from their regional perspective. It was chaired during the 2003-2008 grant cycle by J. Frederic Green, MD, past-president of the American College of Occupational and Environmental Medicine. The management team received valuable advice and encouragement from the EAB regarding the regional need for an Occupational Epidemiology training program. Assured by their positive feedback, the Center successfully competed for this new training program. The External Advisory Board also provided valuable feedback concerning curriculum changes in the Industrial Hygiene master's program and further influenced the curriculum by recommending that more continuing education and outreach be offered through distance modalities. Explorations and piloting led to several CE and outreach offerings during the grant cycle that used distance education technology: Workplace Wellness, Fundamentals of Ergonomics, Depression in the Workplace, and Bringing Research to Practice (offerings that reached more than 350 professionals across the region).

Outreach. During the reporting period, Heartland Center faculty and staff have worked directly with numerous OSH practitioners. They have collaborated with the (only) NIOSH-funded Training Program Grantee in Region VII, have assisted other institutions with the integration of OSH curricula, and have made many presentations to interdisciplinary audiences and community groups. Through consultation to large and small employers and their workers, they have translated research findings into practical information for the work environment.

Several developments during the reporting period positively impacted outreach efforts. First, the changes in training program leadership and additions to program faculty between 2003 and 2005 meant that more individuals, with more varied research interests, were available to deliver outreach services. Second, the University of Iowa (UI) College of Public Health launched an "Outreach Database for Community Engagement," in which Heartland Center outreach activities were logged. Creation of the database was the result of an institution-wide emphasis on outreach, and Heartland Center activities represented a leading edge of this initiative. For example, in one CPH report (2005), the Department of Occupational and Environmental Health (OEH) engaged in 507 outreach activities,

which comprised the bulk of the collegiate total of 659. Of that OEH total, 447 activities were performed by Heartland Center faculty and staff.

Center faculty and staff involvement with the WORKSAFE IOWA (WSI) Occupational Medicine Associate Network directly impacted the practice of occupational health professionals. The WSI network grew during the reporting period from nine to 10 occupational health clinics that serve employers in Iowa, Nebraska, Illinois and Wisconsin. In addition, national employers with workers in Kansas and Missouri looked to this network for information, referrals and other occupational health-related services. Center outreach to this group included organizing biannual meetings of the Associates, distributing an electronic newsletter and informational listserv, provided educational programming for Associates as well as a discount for select CE offerings, and assisting Associates with information searches.

OSH-related information was disseminated effectively through the WSI network whose members in late 2004 requested a change from the biannual print newsletter they had been receiving from the Center. They expressed a desire for more frequent contact and an electronic format, so an electronic "Health and Safety Bulletin" was developed (the first issue was produced in January 2005). A monthly, one-page publication, the bulletin incorporates OSH-related topics in a summary format with internet links for readers who want more detail on a specific topic. It is customized for and distributed to each WSI Associate who in turn sends it out to employers and workers in their catchment area, thereby reaching an estimated readership of 12,000 employers who employ 400,000 workers.

Technical assistance with curriculum and educational development impacted 1) other units within the University of Iowa: Colleges of Engineering, Law; Medicine; UI Labor Center; Health Protection Office; 2) other institutions within Region VII: University of Central Missouri (home of the NIOSH-funded TPG), University of Nebraska (Lincoln), University of Missouri, Iowa State University, Clarkson College (Omaha, Nebraska), Allen College (Waterloo, Iowa); and 3) professional associations: Central States Occupational Medicine Association (CSOMA), American Association of Occupational Health Nurses (AAOHN), American Industrial Hygiene Association (AIHA), and American Society of Safety Engineers (ASSE).

Heartland Center faculty and staff shared their knowledge in a wide variety of presentation formats across the region, given to practitioners, business leaders, labor and labor-representatives and community groups. An array of consultative services for employers and OSH practitioners was provided by faculty and staff of every Heartland Center training program.

Heartland Center outreach focused on the special minority population of American Indians, assisted by Dr. Joe Coulter, who in 2005 was the College of Public Health's Associate Dean for Diversity. Initial contacts in 2005 with the Aberdeen Area Indian Health Service resulted in the Center providing a speaker at a tribal conference who presented information on strategies to prevent mold exposure. Those initial steps were followed by data-gathering that identified the information needs of tribal physicians, nurses, community health representatives and workers related to NORA topics (e.g., indoor environments, musculoskeletal disorders, traumatic injury). The needs assessment led to a 2-day conference in 2006 on asthma education.

Diversity Recruitment. Population statistics for Federal Region VII show relatively small numbers of minorities in our region, with the exception of Missouri, where African Americans are slightly over 11% of the total population. Consequently, improving representation of trainees from underrepresented populations who are interested in OSH graduate studies at the University of Iowa (UI) required a broad effort on the part of Center leadership and program directors. During the reporting period, they were assisted by Dr. Joe Coulter, who was then Associate Dean for Diversity for the College of Public

Health. He chaired the College's Diversity Committee, which was involved in identifying effective practices for recruitment and retention of minority students and improving resources to promote diversity.

Various recruitment strategies increased the proportion of Heartland Center minority trainees to a high of 17% in 2006-2007 (from 3% in spring 2003). Activities included direct communication with minority candidates, participation in University of Iowa (UI) programs designed to promote diversity, and outreach to minority-serving institutions, professional organizations, and community groups.

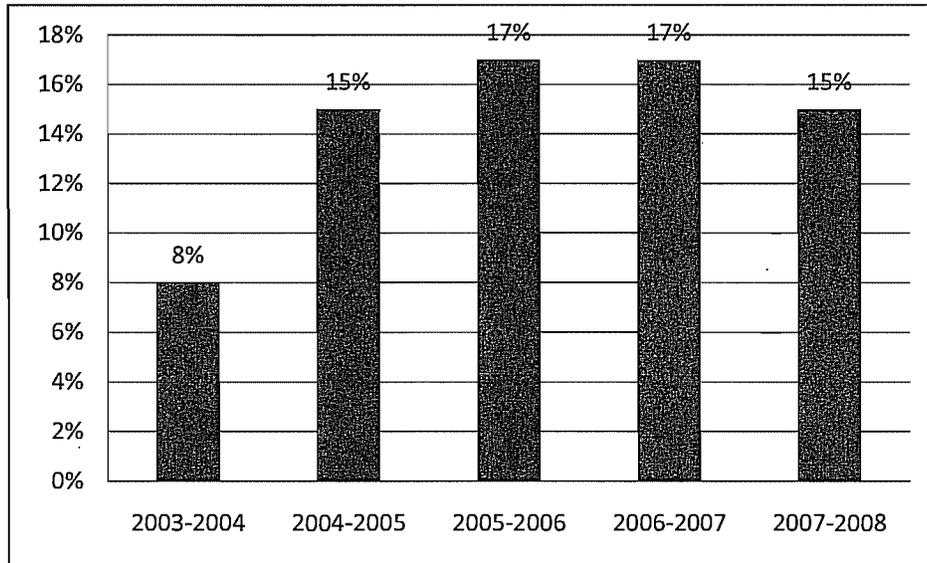


Figure 1. Underrepresented minority trainees as a percentage of all US trainees in the Heartland Center 2003-2008

Interdisciplinary Coordination. After this aspect of the Heartland Center was reviewed in spring 2003, Center leaders and faculty focused significant attention on further strengthening interdisciplinary coordination through modifications of coursework and new experiences outside the classroom. From its beginning, the Heartland Center had required two major interdisciplinary courses of all trainees, and these were continued (with improvements) through 2008. Occupational Health is a three-semester-hour course that provides a broad knowledge base and includes three projects involving interdisciplinary group problem solving. The first activity teaches them how to use OEH data sources to research an occupational health topic of their choosing. The second is a detailed occupational history taken by a trainee from a relative or acquaintance outside of class and then reviewed by a trainee from another discipline. The third project involves small, interdisciplinary groups of trainees planning and reporting on plant walk-throughs. They give special attention to the issues raised by each core discipline during the walk-throughs, in subsequent write-ups, and in class presentations of their findings. In response to reviewers' comments, the course content of Occupational Health was modified with expanded IH content designed to help all Heartland Center trainees learn the fundamentals of industrial hygiene. The introductory content is now the equivalent of a 1.5-credit course in Industrial Hygiene. Occupational Health was taught by Dr. Nancy Sprince, Center director, from 2003-2006; in the fall of 2007, anticipating Dr. Sprince's coming retirement, Drs. Craig Zwerling and Tom Peters (an occupational physician and an industrial hygienist) assumed joint responsibility for teaching the course. The other didactic experience required of all trainees is the Occupational and Environmental Health Seminar, a semester-long series of weekly presentations on current OSH topics by experts from within and outside of the UI (including international speakers who present via distance education technology).

New developments during the reporting period included an annual colloquium created for pilot grant recipients to present and discuss their research and open to all trainees. This event is enhanced with distance education technology that also allows off-site participants from other universities or in the field to join via the internet. Also, a trainee poster presentation session was built into the Center's main continuing education program, the annual Occupational Health Symposium. This interdisciplinary venue offers ERC trainees an opportunity to present their research, clinical project or practicum experience to practicing OSH professionals.

Pilot/Small Projects Program. This program successfully achieved its objectives of providing initial support for junior investigators establishing new areas of research on NORA topics, reaching out to regional institutions to build research capacity, promoting scholarly contributions to the literature that have practical applications, and helping to provide skills and data to build on for larger grant applications. During the 2003-2008 reporting period, the Pilot/Small Projects Program had five rounds of application submissions (annually in the spring). In those rounds, 51 grants were submitted and 29 accepted for funding with 2 of the funded grants receiving supplemental funds in a second year. Supported projects represented a wide variety of novel research topics that were responsive to the National Occupational Research Agenda (NORA).

Consistent with the goal of the program to provide training in NORA-related research to new investigators and trainees, nearly all recipients of pilot project funding were doctoral candidates and junior faculty members. By utilizing contacts with other academic institutions, External Advisory Board members, professional organizations, and others, efforts to increase applicants from regional institutions were successful (including the University of Nebraska, Wichita State University, and South Dakota State University).

INDUSTRIAL HYGIENE TRAINING PROGRAM

One of the original programs of the Heartland Center, the Industrial Hygiene (IH) program has been significantly strengthened since 2003 by changes in leadership, by growth in partnerships with industry, and by the expanding impact of trainees' success at disseminating their research findings and securing employment.

Leadership and Administration. In 2004 Dr. Wayne Sanderson (who had joined the Department of OEH faculty in 2002), assumed the training program director's position from Dr. William Heitbrink (who had arrived at the UI in 2001). Between them, Drs. Sanderson and Heitbrink had spent 24 and 30 years respectively conducting research for the National Institute for Occupational Safety and Health (NIOSH), but neither had developed an academic training and research program. Dr. Sanderson was awarded the rank of tenured Associate Professor in 2005, and as he and Dr. Heitbrink gained experience, the program was strengthened accordingly. With a College of Public Health commitment to further strengthen and stabilize the program, a third tenure-track IH faculty member was hired in 2004. The addition of Dr. Thomas Peters dramatically improved the program in the areas of aerosol technology, ventilation control, and exposure assessment. He has worked in aerosol research for 15 years and was involved in the development of EPA's National Ambient Air Quality Standard for particulate matter under 2.5 μm (PM_{2.5}); during that time, he was responsible for developing and testing PM_{2.5} sampling hardware, conducting field tests, and drafting portions of the Code of Federal Regulations. The fourth primary faculty member is Dr. Patrick O'Shaughnessy, a tenured Associate Professor with a PhD in Environmental Engineering. He brings expertise in the implications and applications of nanoparticles in the environment and had helped develop curriculum in particle science and technology and evaluating exposures to agricultural dusts.

During the reporting period, these four faculty members have served as the Executive Committee of the IH training program. They have been ably assisted by external advisors. In 2003, four certified industrial hygienists (CIH's) were added to the Center's External Advisory Board (for a total of five). In response to a recommendation of the ABET reviewers', a 10-member advisory committee solely for the IH program was created in 2007, made up of practitioners from private industry, labor, government, and academia. They are providing valuable guidance on recruitment, curriculum development, and job placement, as well as helping trainees obtain internships and preceptorships.

Two other faculty members who joined the Department of OEH in 2003 strengthened the ranks of secondary IH program faculty. Dr. Risto Rautiainen is an engineer with expertise in agricultural safety research. He teaches Occupational Safety. Dr. R. William Field, a UI graduate with extensive research and mentoring experience in health physics, provides training and research support for work on physical agents and occupational epidemiology. He directs the Heartland Center's Occupational Epidemiology training program.

The fact that the Department of OEH faculty grew from 11 to 18 members between 2003 and 2008 has meant a larger pool of advisors and research committee members for MS- and PhD-level IH trainees. The increase in the amount of externally funded grants and contracts obtained by the faculty—from \$6.7 million (FY02) to \$12.1 million (FY08)—has directly benefited IH trainees through the acquisition of new equipment, improvements in facilities, and increased opportunities to participate in research studies.

Program Structure/Curriculum. The training program's curriculum was comprehensively restructured between 2003 and 2005. The revision process, which included input from current trainees, alumni, and external advisors, resulted in the former structure of 3 core courses (Industrial Hygiene I, II, and III - Recognition, Evaluation, and Control) being replaced with 5 new core courses: 1) Industrial Hygiene Fundamentals, 2) Aerosol Technology, 3) Assessing Physical Agent Hazards, 4) Controlling Occupational Hazards, and 5) Occupational and Environmental Epidemiology and Exposure Assessment.

In addition, a new "Professional" Option for obtaining the MS degree was created in 2005. This option is identical to the MS Research Option except that instead of producing a research thesis, trainees complete a preceptorship—a practical experience that employs industrial hygiene principles in the workplace. This experience involves a minimum of 120 contact hours and defense of a written and oral report on the work performed. Providing this option has helped with recruiting of MS trainees who want to work as practicing industrial hygienists.

During the reporting period, we also made great strides in partnering with local industries so that our trainees would have preceptorship opportunities and could conduct real-world hazard evaluations as part of their courses (as a side benefit, the partners have provided funding to our IH Student Association for these evaluations). Examples of industry and other partners include the Center to Protect Workers Rights, Veterans Administration, the McWane Corp., Genecor, EMC Insurance Companies, and Honeywell.

A significant curricular change that affected all OEH students was the revamping of the Occupational Health (175:230) course so that 45% of it (about 1.5 semester hour credit) is dedicated to basic IH instruction. Since this course is required of OEH students, the changes now allow trainees from medicine, nursing, ergonomics, and environmental health to have a better understanding of the IH discipline and how industrial hygienists interact with other health professionals. The course now covers the principal IH rubrics and includes hazard evaluations in local industries.

Program accreditation by ABET, Inc. involved extensive review of the master's-level training in 2006, which resulted in accreditation through 2012.

Facilities. The program made excellent use of supplemental NIOSH funding that was available during this grant cycle for NORA-related research training activities. The funds were used to equip an Aerosol Sciences Laboratory with aerosol monitoring devices, aerosol dosimeters, and a polarized-light microscope connected to a digital camera and computer. The supplemental funding also purchased noise dosimeters used for training in monitoring of worker noise exposure and used in trainee research on the effectiveness of interventions to control noise exposure in agricultural and industrial worksites. Our research and instructional capabilities in the area of bioaerosol exposure and indoor air quality has been enhanced with funds for faculty development in fungi identification and the purchase of equipment (stereomicroscope, non-polarizing microscope connected to a projection digital camera and computer, and spore trap 24 hour sampler) for identifying classes of fungi. These resources will be important for future research on bioaerosols in the agricultural and other workplace environments. NIOSH support also supplied the equipment needed to build a Ventilation Control Laboratory, which has been crucial for instruction in Industrial Hygiene and holds promise for future research. This laboratory includes an industrial fan, duct work, a variety of hoods, and flow monitoring devices. This Laboratory has been used for ventilation control training and to study methods of controlling exposures in automobile manufacturing plants and other workplace environments.

CE and Outreach. Given the needs of OSH professionals in Region VII for IH information, program faculty have taken an active role in the Heartland Center's CE and outreach activities. Since 2003, they have developed and presented 17 CE courses for 786 participants, covering such topics as evaluation and control of mold contamination, respiratory protection and respirator fit testing, industrial hygiene responsibilities in bioterrorism events; and occupational epidemiology.

Outreach in the form of curriculum development was provided for two institutions: Clarkson College (Omaha, NE), which was developing training on the safety and health needs of Hispanic workers in agriculture; and the University of Kwazulu-Natal (Durban, South Africa) which was developing an undergraduate industrial hygiene curriculum for universities in southern Africa. Training program director Dr. Wayne Sanderson also served as a resource for both the University of Central Missouri (UCM), which houses the only NIOSH-funded Training Program Grant (TPG) in Region VII, and the University of Nebraska (Lincoln), which has formed a new School of Public Health. Dr. Sanderson collaborated with John Zey, MS, Director of the UCM TPG, on curriculum development and student research, providing technical and financial support for UCM students' MS theses. In the fall of 2005, Dr. Sanderson traveled to UCM to give a presentation on "Unusual Exposures" at a two-day safety conference.

Trainees. Program enrollment was stable, with 12-15 trainees enrolled each year (approximately two-thirds MS and one third PhD). To achieve and maintain that stability, recruiting efforts were intensified in this grant cycle. A new website was developed in 2006 that describes the training program and the job opportunities for graduates (<http://www.public-health.uiowa.edu/oeh/ih/index.htm>). Through lectures and presentations, IH faculty and trainees have recruited candidates from other science and engineering departments within the UI and at other colleges and universities. IH faculty participate in an undergraduate course at the University of Iowa entitled Work and Environment (175:101), designed to expose undergraduate students to occupational and environmental health, and a course called Careers in Science at Drake University. Career Day events at the UI and local colleges and universities are also valuable venues for presenting program information, and faculty often interacted with potential PhD candidates at the American Industrial Hygiene Conference and Exposition (AIHCE) and other professional conferences.

During the reporting period, IH trainees had 17 peer-reviewed manuscripts published or in press with five more under review. In addition, trainees made presentations at national or international conferences and gave many others at local conferences and meetings. Trainees have been recognized for their performance and achievements with the following awards and scholarships:

- Milford E. Barnes Award (UI College of Public Health) – 2003
- Clyde Berry Endowed Scholarship (American Industrial Hygiene Foundation) – 2004, 2006, 2007
- Delta Omega Honorary Public Health Society (UI College of Public Health) – 2004
- Best Graduate Student Poster (AIHCE meeting) – 2005
- Ken Dillon Memorial Award for Best Biosafety & Environmental Microbiology Paper (AIHCE) – 2005
- Stanley Fellowship for Graduate Student Research Abroad (UI) - 2005
- Best Gas and Vapor Sampling Poster (AIHCE meeting) – 2007
- Iowa Governor's Safety Conference Scholarship (IA Workforce Development) – 2007, 2008

OCCUPATIONAL MEDICINE RESIDENCY TRAINING PROGRAM

Occupational medicine residency (OMR) training was one of the initial programs of the Heartland Center for Occupational Health and Safety when it was established in 2000. Among the program's achievements between 2003 and 2008 were recruitment of high-quality residents, outstanding academic performance of residents in MPH courses, successful completion of the program by all entering residents, and placement of all graduates in positions in occupational medicine (OM). In addition, the training program in 2006 achieved five-year re-accreditation from the Accreditation Council for Graduate Medical Education (ACGME), an especially notable accomplishment in the current climate of decreasing numbers of active, accredited OM residency training programs in the US.

Leadership and Administration. From July 2003 through June 2007, the program was directed by Dr. Nancy Sprince (who was also director of the Heartland Center). On July 1, 2007, OMR program leadership was assumed by Dr. Fred Gerr, in anticipation of Dr. Sprince's retirement from the University of Iowa (UI) that fall. To smooth the leadership transition, Dr. Sprince has continued to serve as a consultant to the program as needed and as a member of the Residency Advisory Committee. Dr. Gerr is a professor of Occupational and Environmental Health in the Department of Occupational and Environmental Health (OEH) in the UI College of Public Health and professor of Pulmonary, Critical Care and Occupational Medicine in the Department of Internal Medicine in the UI Carver College of Medicine. He is Board Certified in Occupational Medicine (1992) and Internal Medicine (1985). He served as Associate Director (1992-1997) and then Director (1997-2002) of the NIOSH-funded and ACGME-accredited Occupational and Environmental Medicine Residency training program at the Rollins College of Public Health of Emory University (Atlanta, GA) before joining the UI faculty in 2002.

The OMR program director has been formally advised by a Residency Advisory Committee, a group of occupational medicine physicians and other professionals in related fields, who met twice a year and were also available on an *ad hoc* basis. Additional oversight was provided by the Graduate Medical Education (GME) Office of the University of Iowa Hospitals and Clinics, which oversees all residencies. For guidance concerning OMR program operations, Drs. Sprince and Gerr were able to consult with either the Designated Institutional Officer or the Assistant Director for GME.

Eleven individuals constituted the faculty of the training program (five core, six supporting faculty). All five members of the core faculty were Board Certified in Occupational Medicine.

Program Structure/Curriculum. The OMR training program at the University of Iowa has been accredited by the ACGME since 1987. It is the only OMR training program in Region VII. Support from

the University of Iowa (1.5 resident stipends) and from the Deere Foundation (up to \$45,000 annually) demonstrates both the institutional enthusiasm for the program and the residency program's importance to a major industrial stakeholder (John Deere). The overall purpose of the 24-month residency program has remained the same: to train physicians for the comprehensive practice of occupational medicine in a variety of employment sectors where they can make important contributions.

The structure of the program is a two-year experience with a traditional academic year followed by a practicum year. By the end of the program, all residents must have completed the MPH degree. In the academic year, residents complete most of the course requirements for the MPH in occupational and environmental health. In the practicum year, they spend four to six months in rotations at specific industrial sites or comprehensive OM clinics. In the academic year and, when possible, during the practicum year, residents spend a half-day per week in the Occupational Medicine Clinic of the University of Iowa Hospitals and Clinics (UIHC). To stimulate interaction and sharing of clinical experiences among residents, one afternoon each week was reserved, in both academic and practicum years, for either joint classes, discussion or a seminar for all residents. A capstone experience, which residents complete at the end of their training, is intended to help residents integrate and apply the knowledge and skills they have acquired. Designed as an academic course, it allows residents to choose a practicum project and receive faculty guidance in addressing the problem, using a research approach: defining the question or hypothesis, reviewing background data and information leading to the specific question or hypothesis, addressing the methods that will be used, and using relevant analytic approaches.

During the reporting period, practicum rotations were added at Rockwell Collins (in Coralville, Iowa), directed by an occupational health nurse, to ensure increased exposure to practical aspects of occupational health nursing, and with the NIOSH Health Hazard and Surveillance Branch (Cincinnati, OH) and the OM Department of OSHA (Washington, DC) to increase residents' exposure to research, policy, and regulatory issues in occupational medicine. In addition, a special rotation was created in ergonomics, which combines research experience with on-site ergonomics preventive consultations at the University of Iowa.

Opportunities for trainees' interaction across Heartland Center disciplines continued to be built into the required coursework, and residents in their practicum rotations worked with specialists from many other disciplines. Starting in 2003, residents' training in the principles and practices of industrial hygiene (IH) was addressed in two ways: first, by incorporating information that is the equivalent of a 1.5-semester-hour introductory IH course into Occupational Health, the overview course required of all Heartland Center trainees and second, by adding a half-day didactic seminar on respiratory protection to the OMR curriculum. In both courses, residents and trainees from all the ERC disciplines participate in discussions and in group projects that require the combined expertise of all trainee participants.

The number of courses (semester hrs) required of OM residents increased during the reporting period from approximately 30 to 39 semester hours and then in fall 2007 to 42 semester hours. Courses that were added to strengthen the breadth and depth of OM training included:

- "Advanced Topics in OM" - provides in-depth knowledge on prevention, diagnosis and treatment of occupational diseases and injuries.
- "Occupational and Environmental Health Research Seminar" - provides residents with the tools needed to critically assess published OEH scientific research reports from a methodological perspective.
- "Clinical case studies in OM" - provides the residents with the opportunity to work with OM faculty to prepare, present and discuss complex patients from the Occupational Medicine Clinic or from clinical practicum rotations.

- “Responsible Conduct in Research” - provides case-based discussions of research-related issues involving ethics, misconduct and fraud, proper handling of data, responsible authorship, conflict of interest, research on animals and human subjects, confidentiality of patient information, and informed consent.
- Elective or independent study - allows residents to choose from a variety of elective courses. A frequently chosen elective is Rural Health & Agricultural Medicine. Others have chosen Agricultural Safety, Corporate Financing, Design and Analysis in Biomedical Science, and Statistical Methods in Epidemiology. Independent study topics have included revising a chapter on agricultural lung diseases for a textbook of OEM and developing a CD of reference information to guide OM residents taking rotations in outpatient pulmonary medicine.

Finally, residents from 2003-2008 participated in research that resulted in the six articles in peer-reviewed journals and two case reports for the Iowa Fatality Assessment and Control Evaluation (FACE) program.

CE and Outreach. Faculty members in OMR have an excellent record of participation and program development in continuing education (CE) and outreach. An ongoing partnership with CSOMA brings multiple CE opportunities to regional physicians and providers annually. OMR faculty are also engaged in outreach through consultation to the Associates of WORKSAFE IOWA, a UI program that supports a community based network of occupational medicine clinics in Iowa. Consultation has also been provided regionally, as in a surveillance project on lung disease in popcorn manufacturing facilities across Region VII.

Trainees. The quality of the Heartland Center OM residents was excellent. Six of the residents came to the Heartland Center program after completing doctoral degrees, residencies or fellowships in other fields, including Epidemiology, Neurosciences, Internal Medicine, Pulmonary and Critical Care Medicine, Psychiatry, Family Medicine, and Pathology. Two residents were awarded full stipend support from the Occupational Physician’s Scholarship Fund, which a national committee awards to only about six OM residents in the entire US. Another resident received a US Air Force scholarship, also awarded to a very limited number of candidates, that provided stipend support for a civilian residency training program. Other awards and honors received by OMR trainees included induction in the Delta Omega Public Health Honorary Society and the UI College of Public Health’s Milford Barnes award for excellence in academic performance.

OMR graduates had a 100% pass rate (on initial testing) for the American Board of Preventive Medicine (ABPM) certification examination. Nine of the ten graduates who have taken the ABPM examination since 2003 have exceeded national average scores in both the Core examination (focusing on General Preventive Medicine) and in the Specialty component in Occupational Medicine.

OCCUPATIONAL HEALTH NURSING TRAINING PROGRAM

The strength of the Heartland Center’s Occupational Health Nursing (OHN) training program, which was one of the original Heartland Center programs, continued between 2003 and 2008 to be reflected by increasing enrollment and the success of OHN graduates in finding employment. The Occupational Health Nursing (OHN) program in the University of Iowa (UI) College of Nursing remains the only OHN graduate program in Region VII (and is accredited by the Commission on Collegiate Nursing Education (CCNE) through December 31, 2009).

Leadership and Administration. The OHN training program has been directed since its inception by Kenneth Culp, RN, PhD, FAAN. Dr. Culp was inducted as a fellow into the American Academy of Nursing in 2005 and promoted to full Professor in 2007. In 2006 he was appointed a fellow in the

Gerontological Society of America, an interdisciplinary organization devoted to research with older adults. His primary research interest is the older worker and aging workforce trends, particularly in the healthcare workforce.

OHN clinical faculty member, Kerri Rupe, ARNP, DNP, FNP-C, COHN-S, FAANP, completed her Doctor of Nursing Practice (DNP) in 2008. Dr. Rupe has clinical expertise in the areas of post-offer physical assessments in the workplace, application of the Americans with Disability Act (ADA), and work-related injury diagnosis and treatment. She also provides consulting and on-site occupational health services to business and industry through a CON faculty practice.

During the reporting period, the UI College of Nursing successfully recruited an occupational and environmental health faculty member, Sandra Ramey, PhD, RN (Assistant Professor on tenure track). Dr. Ramey came to the UI in the fall of 2006 with over 10 years of baccalaureate nursing teaching experience at Grandview College in Des Moines, Iowa, and Marquette University College of Nursing in Milwaukee. Her research focus is risk factors for cardiovascular disease in law enforcement officers. Her background was valuable to practicum students working on risk-reduction interventions with a Des Moines, Iowa, police department cohort.

Curriculum. The program's MSN curriculum is 33-40 semester hours, includes 200 contact hours of practicum (eight hours per week for two semesters), and requires two years of full-time study. All curriculum objectives are derived from the "Core Curriculum for Occupational & Environmental Health Nursing" published by AAOHN (Salazar, 2001); in addition the Heartland Center program distinguishes competencies by level of educational preparation.

The MSN curriculum can be completed using distance education technologies (web-based instruction with Desire2Learn and Elluminate) that support videotaped lectures, interactive quizzes, and sound files. Trainees within driving distance of Iowa City, Iowa, attend classes on the UI campus as well. During the reporting period, all trainees were required to attend some on-campus activities: the group project (interdisciplinary workplace assessment) in the Occupational Health course required of all Heartland Center trainees and a respiratory protection lecture and lab in Occupational Health Nursing II (96:258). Both these experiences involve OHN trainees with trainees from the other Center disciplines. OHN trainees were also required to attend the Center's annual Occupational Health Symposium, and those individuals enrolled in Occupational Health Nursing II presented their practicum projects at either this regional conference or the AAOHN conference the following month. All trainees were encouraged to attend the Symposium to learn about the types of projects being presented by their peers.

Facilities. The College of Nursing (CON) supported the Heartland Center with classroom space, computer equipment, state-of-the-art multimedia equipment and user support for web-based teaching technologies. Student computer laboratories were available in the College of Nursing (40 workstations) and the Department of Occupational and Environmental Health (OEH) (12 workstations). OHN trainees also made use of the Information Resource Center (IRC), housed in the Department of OEH and staffed by an Information Specialist with an MA in Library and Information Science. The IRC currently has a collection of nearly 900 monographs, 50 journals, and five newsletters focusing on the areas of occupational and agricultural medicine, environmental health, ergonomics, toxicology and injury prevention. Numerous online bibliographic databases are available to IRC users, including MEDLINE, CINAHL, NIOSHTIC-2, AGRICOLA, the Science Citation Index, and TOXLINE. In addition, the Hardin Health Science library is a five-minute walk from the CON. The library provides books, journals, study facilities and computer literature searching services. It has more than 373,000 books, and subscriptions to over 14,400 electronic journals. Both the Hardin and IRC collections include the AAOHN Journal.

CE and Outreach. OHN faculty members, while fewer in number than some of the Center's other training programs, have contributed significantly to the CE program and outreach activities. For example, their presentation to the Quad Cities (Dubuque, Davenport, Moline, and Bettendorf) area occupational health nurses and human resource managers on older workers was covered as a feature newspaper article and sparked business community discussion. Dr. Culp conducted numerous presentations around the region on the aging workforce and injury prevention. He also spoke at area community colleges on occupational health topics and used distance education technology (the fiber optic Iowa Communications Network) to provide information on research and other OSH topics to the members of the Northeast Iowa Association of Occupational Health Nurses (NIAOHN).

An outreach focus of particular interest to Dr. Culp has been the meatpacking industry. He has consulted with safety and occupational health nurses at two regional employers, helping them understand the issues related to injury reporting with minority and international workers. Dr. Ramey presented regional health promotion workshops to municipal police departments in Milwaukee and Des Moines. Both Drs. Rupe and Culp participated in the annual Occupational Health Symposium and national AAOHN conference.

Trainees. The training program had an enrollment of five trainees in 2003, reached 14 in 2007, and ended 2008 with 10 enrollees. OHN trainees have been recognized for their performance and achievements with the following internships, awards, and recognitions:

- 3 trainees competed successfully for OSHA Internships (8-week onsite internship in Washington DC)
- 2 trainees received AAOHN Poster awards: 1st place - clinical screening of older farmers (2006); 2nd place - traumatic injuries in meat processing (2005)
- 1 trainee was elected, and re-elected, to the AAOHN Board of Directors (through a national peer election process) (2005, 2008)
- 1 trainee was selected as a Fellow in the American Association of Occupational Health Nurses (2008)

AGRICULTURAL SAFETY AND HEALTH TRAINING PROGRAM

The principal aim for this training program during the reporting period (July 1, 2003, to June 30, 2008) was to further advance agricultural safety and health (ASH) as a recognized field of didactic training, research, and professional employment. Two accomplishments significantly promoted that aim. The first was the publication and distribution in 2006 of *Agricultural Medicine: Occupational and Environmental Health for Rural Health Professionals* (Donham and Thelin, Blackwell Inc.), a major textbook written by the ASH training program director, Dr. Kelley Donham. The book, which delineates a core curriculum of health and safety hazards, treatment and prevention, is being used by at least 10 US universities and agricultural health programs, in four foreign universities, and is accepted as the text of choice by the Agricultural Scientific Committee of the International Commission on Occupational Health.

The second development was the maturing of the ASH program to the point of achieving approval from the University of Iowa (UI) for formal degree programs in ASH. This accomplishment was the outcome of a rigorous programmatic review, which involved appraisal of program quality at six levels, from the Department of Occupational and Environmental Health (OEH) faculty up to the State's Board of Regents. Suggestions and revisions at each step improved the program, until it was approved in the spring of 2007, making the formally approved MS and PhD programs in Agricultural Safety and Health the first such stand-alone graduate degree programs in the nation.

The changes submitted to NIOSH in the summer of 2007 (which were approved for the 2008-2013 grant cycle) will have MS and PhD trainees in ASH complete a core curriculum of required courses, research training through coursework and mentoring, a field experience through a preceptorship, and a thesis (MS) or dissertation (PhD). The new degree programs are highly integrated with other Heartland Center programs, in that ASH trainees also select an elective focus from among Industrial Hygiene, Ergonomics, Occupational Epidemiology, Occupational Injury Prevention, or Occupational and Environmental Health (the general degree program in the Department of OEH).

Leadership and Administration. The ASH training program continued to be directed by Kelley Donham, MS, DVM, who is in his 34th year as Professor of Occupational and Environmental Health at the UI. He also directs Iowa's Center for Agricultural Safety and Health (I-CASH) and serves on the executive committee of the Great Plains Center for Agricultural Health (a NIOSH Agricultural Center). He was assisted by an Internal Advisory Board composed of the program's two other principal faculty and three staff. The Internal Advisory Board met once a month to review curriculum development and program design, formative evaluation, and integration of findings into practice.

An 11-member ASH External Advisory Committee was also available for face-to-face or ad hoc telephone conferences. They provided regional perspectives on trends and special issues related to occupational health and consulted on curriculum content, CE and outreach activities, needs assessment, and program evaluation. They also helped with recruitment of trainee candidates.

Program Structure/Curriculum. Between 2003 and 2008, Heartland Center trainees graduated under the original program structure, by which they received ASH training supplemental to their degrees in the other Center programs. Several curriculum modifications, however, that were part of the redesign for the degree programs were adopted. The primary modification was a stronger emphasis on preventive interventions. Thus emphasis was supported in part by the publication of Dr. Donham's textbook, which contains a 30-page chapter on "Prevention of Illness and Injury in Agricultural Populations." Prevention and intervention were incorporated in the basic ASH course Rural Health and Agricultural Medicine (175:209), as well as in Agricultural Safety: Theories and Practice (175:196) and Current Issues in Agricultural Health (175:210). Cultural considerations in interventions have also been more strongly emphasized in the training with the development of the "Iowa Integrated Model of Prevention Programming."

Interaction with other Heartland Center trainees occurred most formally through the basic ASH course, Rural Health and Agricultural Medicine (175:209), which brings together ASH trainees with trainees in the other Center disciplines and with health and occupational health practitioners who take the course for their continuing education. In a typical class the individuals may be working toward degrees in occupational health nursing, industrial hygiene, occupational epidemiology, occupational and other fields of medicine (including physician assistants and nurse practitioners), injury prevention, environmental health, and pharmacy. Further interaction among Center trainees occurred in two required courses: Occupational Health and Occupational and Environmental Health seminar. The former includes required group projects that introduce trainees to the cross-disciplinary teamwork needed to evaluate and solve occupational health problems. The Seminar series offers weekly presentations on current OSH topics by experts from within and outside of the UI (including international speakers who present via distance education technology).

Five new preceptorship sites were developed for agricultural health trainees, one of them in Africa where trainees' can be exposed to international ASH concerns. ASH trainees gained opportunities for field experience at 1) the Amana Society Farm (a 25,000-acre farm); 2) Swine Graphics (a large pork producing farm); 3) the National Pork Board (producer's organization with worker health training for members); 4) the AgriSafe Network (a national agricultural occupational health NGO); and at 5) The

Gambia College (the national college of that West African country that is developing an interest in agricultural health).

As the program grew over the five years of the reporting period and attracted trainees with varied backgrounds and interests, it broadened the research focus of the Department of OEH. Research projects that were launched in new areas or with new populations include agricultural ergonomics, engineering controls for air quality in livestock buildings, noise exposures and abatement in livestock buildings, zoonotic influenza viruses as occupational risks, Anabaptist farming populations, and elderly farmers.

Institutional collaboration between the UI and Iowa State University (ISU) that increased significantly during the reporting period has also had an impact on ASH training. Dr. Donham had held a faculty appointment at the ISU Veterinary College, and two faculty from the ISU Veterinary College have received appointments in the UI College of Public Health. The CPH launched a joint degree program with ISU in 2003, and the DVM-MPH students now take the basic Agricultural Medicine course (175:209), further increasing the interdisciplinary interaction of ASH trainees with this new group of professional students. This group also provides a small but significant pool of trainee candidates; one graduate of the DVM-MPH program entered the Department of OEH as a doctoral student.

Formal assessment of the need for the ASH training program was conducted in 2007. It involved a survey distributed by mail to 158 persons who represented NIOSH Agricultural Health Centers, County health departments, rural health care providers and educators, ASH organizations, State agricultural extension, and agri-business. Among other questions, the survey asked for the professionals' estimates of the numbers of graduates with ASH training that they thought were needed in their regions for several categories of work (direct health care, research etc.). Responses, which were received from five federal regions (IV, V, VII, IX, and X), indicated a need for master's-level ASH graduates in the fields of consulting (62% of respondents), education and outreach (57%), direct health care (57%), and health and safety management (92%). PhD graduates were seen by 75% of the respondents as being needed in research and teaching.

CE and Outreach. During the reporting period, the ASH program successfully met its objective to develop strong participation in the CE and outreach programs of the Heartland Center. A comprehensive 40-hour course, the Agricultural Occupational Health Certificate Program has been the centerpiece of ASH continuing education since the training program was established in 2001. During the reporting period, course content was improved in several ways. The section on "Noise-induced Hearing Loss" was expanded and renamed "Physical Factors Affecting Health" (which added material on vibration injuries and disorders related to heat and cold). A new presentation by Farm Safety4Just Kids was added to address the special risk population of youth on farms. The course was presented in a classroom setting six times (five times at the University of Iowa and once at the University of Illinois) to a total of 214 attendees, all of whom successfully passed the course's comprehensive examination. The participants' diverse mix of backgrounds—nurses, physicians, physician assistants (practitioners and students), veterinarians (practitioners and students), and other health and safety professionals—creates a robust learning environment in every course offering.

From 2004 on, the internet-based distance learning software adopted by the Heartland Center (Elluminate Live) enabled expanded delivery of the course to participants across Region VII, including members of the AgriSafe Network, a coalition of health professionals who provide services to farmers and their families, and UI physician assistant students in rotations throughout the region. Participants have also joined from NIOSH Agricultural Health Centers in Illinois, Kentucky, Wisconsin, New York, and North Carolina, and an international audience of occupational safety and health professionals has participated from Canada, Ireland, Norway, Australia, and South Korea.

The ripple effect of this CE training has been significant, and participants' initiation of their own ASH training efforts has been supported with outreach activities. A course attendee from the University of Illinois successfully received funding support to incorporate agricultural health training in the ERC at the University of Illinois. Dr. Donham participated in the first two years of their new agricultural health course via distance learning technology. Four faculty members from the University of Kentucky took their CE course experience and have developed an agricultural health focus in their sociology track.

Besides the comprehensive 40-hour course, ASH information of an introductory nature was provided to a wide variety of health professionals. Lectures, tours, and problem-solving activities in scenario-based training format have been delivered to family medicine residencies, UI Family Medicine residents and faculty, UI Emergency Medicine residents and faculty, Marshfield Medical Center physicians and residents, and National Institute for Farm Safety professionals. Another venue for the sharing of interdisciplinary information among researchers, practitioners, medical professionals and agricultural producers was the annual Midwest Rural Agricultural Safety and Health Forum, a one-and-a-half-day event co-sponsored by the Heartland Center. It has covered numerous occupational safety and health topics related to research, interventions, risk management, social and behavioral change, and policy making.

The AgriSafe Network, which was initiated in 1987 by Iowa's Center for Agricultural Safety and Health, a program of the Department of OEH, became its own non-profit organization in 2003 (www.agrisafe.org). From 2003-2008 ASH training program faculty and staff facilitated expansion of the AgriSafe Network by providing training and consulting services to the health professionals who establish and operate these clinical programs. Three new clinics have been established in Iowa and one in Missouri, and the program was extended beyond Region VII with new clinics in Illinois, North Dakota, Wisconsin, Mississippi, Ohio, and Alaska.

Trainees. The program continued to attract trainees with education and/or personal backgrounds related to agriculture and who consequently possessed a strong motivation to seek out professional positions in this field and to develop research programs in the organizations they join. Recruitment methods included advertising the training program in journals such as the Journal of Agricultural Safety and Health, the Journal of Agromedicine, and the Journal of Extension. ASH faculty and staff attended regional college and university "job fairs," concentrating on agricultural colleges within the region and on students with backgrounds in general agricultural studies, agricultural engineering, health education, veterinary medicine, biology, industrial hygiene and safety. A segment of the Department of OEH website was devoted to the ASH program. To communicate the requirements of the ASH degree programs to trainees (and prospective trainees), a new website, program brochure, and detailed study plan describing program requirements were prepared in 2008.

ERGONOMICS TRAINING PROGRAM

Since its creation in 2001, this program has attracted exceptional trainees whose research-to-practice perspective has involved them in numerous projects with regional and national benefits to workers in industry.

Leadership and Administration. The program was led by its founding director, Dr. Thomas Cook, from its inception in 2001 through the fall of 2005. At that time, Dr. Dan Anton, Department of OEH faculty member since 2003 and UI graduate with a doctorate in physical therapy, assumed ETP leadership with Dr. Cook providing support as Assistant Director. Dr. Anton had already been actively assisting Dr. Cook with all aspects of the ETP, including recruiting, mentoring, and directing courses for ETP trainees. When Dr. Anton accepted a position at Eastern Washington University starting in the

summer of 2007, Dr. Cook resumed the Director's position. An internationally recognized leader in the field, Dr. Cook has been involved in ergonomics research, training and outreach activities in the US and in several Central and Eastern European countries for the past 26 years.

Program Structure/Curriculum. During the reporting period, the Ergonomics Training Program (ETP) of the Heartland Center provided trainees with multi-disciplinary experiences by combining expertise in ergonomics/human factors from three departments of the University of Iowa: the Department of Occupational and Environmental Health (in the College of Public Health) and the Departments of Biomedical Engineering and Industrial Engineering (in the College of Engineering). This interdisciplinary experience makes the ETP unique in the region, as does its base in the University of Iowa College of Public Health (only two other programs are structured in this way). The theoretical basis for the ETP has been the Ergonomist Formation Model adopted by the International Ergonomics Association, which is considered the essential content of the ergonomics/human factors discipline nationally and internationally.

Facilities. The ETP continued to benefit from access to high-quality institutional resources. The primary research laboratories devoted to ergonomics/human factors are the Biomechanics and Ergonomics Facility, the Jolt/Vibration/Seating Laboratory, the Center for Computer Aided Design, the Cognitive Systems Laboratory, the National Advanced Driving Simulator, the Operator Performance Laboratory, and the Biomechanics Laboratory.

CE and Outreach. The ETP faculty shared their knowledge in a variety of presentation formats given to practitioners, business leaders, labor and labor-representatives. Examples of CE offerings in this program area include: Fundamental of Ergonomics for Health Professionals; Construction Ergonomics; and Ergonomics of Hand-Arm and Whole-Body Vibration. The ETP faculty led the transition to distance-based CE offerings using Poly-com and Elluminate during this grant cycle.

Trainees. All ETP trainees performed well academically: all passed their Qualifying (BME, IE only), Comprehensive (PhD), and Final Examinations (MS thesis defense, MPH Practicum presentation, or PhD dissertation defense) on their first attempt. In addition, 100% of ergonomics trainees obtained funding for all or part of their research projects. Trainees' special achievements have been recognized with the following awards and funding support:

- Dean's Graduate Fellowship (UI) – 2004-2007
- Honorable Mention - US Environmental Protection Agency P3 Program – 2006
- Milford E. Barnes Award (UI College of Public Health) – 2006
- Best Student Paper - Communications Technical Group (Human Factors and Ergonomics Society - 50th Annual Meeting) – 2006
- Best Poster - Industrial Engineering (UI College of Engineering- Research Open House) - 2006
- Dwight D. Eisenhower Transportation Fellow (National Highway Institute) – 2006-2007
- Liberty Mutual Safety Research Fellow (American Society of Safety Engineers) – 2007
- Iowa Governor's Safety Conference Scholarship (Iowa Workforce Development) – 2007
- Delta Omega Public Health Honor Society-Alpha Phi Chapter - 2007
- Gilbreth Memorial Fellowship (Institute of Industrial Engineering) - 2007-2008

OCCUPATIONAL INJURY PREVENTION TRAINING PROGRAM

Since its establishment in 2001, the Occupational Injury Prevention (OIP) training program has been recognized by NIOSH reviewers for its strong curriculum and opportunities for research, features that were further strengthened during the 2003-2008 grant cycle.

Leadership and Administration. The OIP training program was established under the leadership of Dr. Craig Zwerling, Professor in the Department of Occupational and Environmental Health (OEH). Dr. Corinne Peek-Asa, Professor of OEH and Epidemiology (who had joined the OEH faculty in 2001) took over as training program Director in 2004. During the reporting period, the program grew significantly with the addition of three more faculty: Dr. Risto Rautiainen (2003-OEH), himself a graduate of the OIP; Dr. Jingzhen Yang (2004-Department of Community and Behavioral Health); and Dr. Marizen Ramirez (2007-OEH).

Program Structure/Curriculum. Development of the OIP curriculum in the first few years of the program attracted many new students to the courses and stimulated a growing interest in injury control training. The multidisciplinary curriculum includes three full-credit courses that focus exclusively on injury prevention and control, one a full-credit course in occupational injury epidemiology. Enrollment in all OIP courses has increased an average of 20% each year, and interest in research experiences in the field has grown equally. The Occupational and Environmental Health Seminar is required for all OIP and other Heartland Center trainees, which allow them to interact and learn about each others' fields. Recruitment of new faculty who specialize in injury control also led to an increase in the number of lectures devoted to injury prevention that are given in classes beyond the Department of OEH.

The presence of a strong occupational injury prevention program has influenced the research directions of faculty, both within and outside of the Heartland Center. In 2007, for example, a faculty member in the Department of Community and Behavioral Health applied for an NIH grant to study health behaviors and safety in an occupational setting, and Dr. Yang, whose focus is primarily on sports injury prevention, has included an occupational focus to her work.

CE and Outreach. The translation of research to practice is just one of the ways OIP faculty contribute to CE and outreach. Information on and ideas for prevention of workplace violence was provided at the Occupational Health Symposium. Additionally Dr. Peek-Asa worked with Ms. Gordon to create a "Foundation Block" - a publication on workplace violence for AAOHN (2004).

Trainees. In line with the program's primary goal of developing trainees' research skills, OIP graduates conducted mentored and independent research on the following topics:

- rural transportation injuries
- occupational hearing loss and injury in rural agricultural populations (dissertation topic)
- sleepiness and injury risk
- occupational and agricultural injury coding
- occupational Injuries to EMS workers in the US (dissertation topic)
- effects of injury early in a military career on re-injury, disability, and discharge in the US Army (dissertation topic)
- rural risk for non-fatal injury
- workplace violence in hospitals
- occupational burns from cement

Among the research skills developed through OIP training is dissemination of research findings. During the reporting period, OIP trainees had 12 publications printed, in press, or in revision and gave 12 presentations at local and national scientific meetings.

OIP trainees have also been successful in competing for peer-reviewed grants and other support, including a Delta Omega Public Health Honor Society research award (2005), two Heartland Center Pilot Grants (2005), a Research Fellowship from the National Library of Medicine (2006), and a University of Iowa Presidential Scholarship (2007).

OCCUPATIONAL EPIDEMIOLOGY TRAINING PROGRAM

Established in 2005, the Occupational Epidemiology (OE) training program was the newest program of the Heartland Center. In its first three years, the program steadily developed its infrastructure and recruited well-qualified trainees.

Leadership and Administration. The training program was directed from its inception by Dr. R. William Field, Professor in the Departments of Epidemiology and Occupational and Environmental Health (OEH). Dr. Field is internationally known for developing novel methods to improve retrospective exposure assessment for epidemiologic investigations. The program is supported by seven core faculty, including Dr. Field, and five supporting faculty. Three of the core faculty and two of the supporting faculty have academic appointments in both the Departments of OEH and Epidemiology.

Program Structure/Curriculum. The core Occupational Epidemiology course was developed and taught for the first time in the spring of 2006 and was well received. A sample comment from the student evaluations was "This is a great class. The focus on exposure assessment is excellent and is rarely covered in other courses." Besides being the foundation course for the OE training program, the Occupational Epidemiology course was made a requirement for all industrial hygiene majors in the Department of Occupational and Environmental Health (OEH). The mix of future occupational epidemiologists and industrial hygienists created a classroom dynamic wherein the strengths of both disciplines are combined in discussions and problem-solving activities on various topics (e.g. calculation of dose, healthy worker effect, biomonitoring, etc.). The concepts presented in class were further strengthened in other required courses like Occupational Health and the Occupational and Environmental Health Seminar, in which interaction among students from various departments is encouraged. The program's research direction has been multi-faceted, reflecting trainee interests and availability of funding. Trainees were encouraged to examine NORA priorities and consider a priority area that matches their area of focus.

NIOSH funds also allowed three trainees and the OE Program Director to attend a 2006 American Statistical Association meeting and a comprehensive National Cancer Institute-sponsored radiation epidemiology training course in 2007.

CE and Outreach. Initial efforts were directed toward development of a needs assessment website, similar to the NIOSH ERC website (<http://niosh-erc.org/needs/needs.asp>), to facilitate data collection on regional training needs. The other major CE effort during the reporting period involved Dr. Field starting work with Ms. Karen Allnutt-Steelman, the Center's distance education consultant, in 2008 to create a distance education course on "Risk Assessment for Practitioners."

A technical assistance opportunity arose in 2005, when the National Chimney Sweep Guild and the Chimney Sweep Safety Institute of America contacted the Heartland Center about an epidemiologic study of the adverse health outcomes related to their industry. While discussions clarified that such a study was in fact outside the expertise of their safety institute, the contact did lead to a 20-year-old chimney sweep registry being moved to the Heartland Center where an OE trainee has been coordinating data entry and providing recommendations for further development of the registry.

Trainees. Nine trainees were enrolled during the reporting period, five from the Department of Epidemiology and four from the Department of Occupational and Environmental Health (OEH). The first graduated in May 2007, and all others have passed their academic milestones (comprehensive exams, qualifying exams, etc.) as planned and are on schedule to graduate. The exceptional quality of these trainees is well illustrated by the one who received grants from the National Cancer Institute for several

radon-related cancer studies, as well as two contracts with the US EPA. She published a "Field Comparison of Commercially Available Radon Detectors" in a 2006 issue of *Health Physics*.

CONTINUING EDUCATION

The Continuing Education (CE) program of the Heartland Center has provided interdisciplinary continuing education for occupational safety and health professionals in Region VII since the Center's founding in 2000, while successfully confronting the special constraints of this region: a relatively small number of OSH professionals, relative to the number of workers, dispersed over a large and predominantly rural region, and the region's relatively slow economic growth, which influences employers' willingness to support CE for their employees.

Leadership and Administration. The Heartland Center's CE Program is directed by Kimberly Gordon, MSN, MA, RN, COHN-S, FAAOHN, who has been involved with the CE and Outreach program areas since their inception (2000) and has directed the programs since spring 2001. Her personal commitment to continued education in occupational health and safety is evidenced by her completion of a Master of Science in Nursing degree with a specialty in occupational health nursing in December 2007. She took advantage of the distance education opportunities of the Heartland Center program at the University of Iowa (UI) to complete this advanced degree. Her graduate-level course work has enhanced Ms. Gordon's knowledge of and experience with distance education technology and given her practical experience that is valuable in the advancement of the Center's CE program. Ms. Gordon also holds leadership roles in professional organizations. She is a member of the Board of Directors of the American Association of Occupational Health Nurses (AAOHN) and in 2008 was selected as a Fellow of AAOHN and appointed to the AAOHN Foundation Board of Trustees. She was previously Treasurer of the NIAOHN, and became Secretary in 2008. Ms. Gordon's primary advisor is Craig Zwerling, MD, PhD, MPH, director of the Heartland Center.

Both administrative planning and daily management of our CE program were significantly enhanced by the hiring of Colleen Gross-Advani, BBA, in 2003. Initially a half-time support staff person, she was increased to three-quarter time in 2006 and full-time in 2007. Ms. Gross-Advani brought to this position a background in human resource management, computer experience, and project coordination, including administration of an employee health and safety program at a local employer for over five years.

Several other individuals played key supporting roles in the administration of our CE program. Kellee Thorburn McCrory, MPH, currently an Evaluation Project Director in the UI School of Social Work, provided technical assistance with evaluation of the CE program. Karen Alnutt-Steelman, MA, MS, distance education consultant, provided technical assistance with planning and instructional design of distance education offerings from 2006 on.

A five-member CE Advisory Committee was created during this reporting period. By design, this is a small group of practicing OSH professionals from Region VII who have oversight of worker health and safety programs and/or are recognized leaders in their discipline. The committee has guided the advancement of the CE program.

Program Structure and Planning. The need for our program is related to the fact that relative to the rest of the nation, smaller numbers of OSH practitioners in Region VII confront a comparatively high occupational disease and injury burden. The planning for—and the success of—the Center's CE program is based on careful assessment of the CE needs of those practitioners. Needs data are considered at every level of our planning, from overall strategic program planning to the development of individual CE offerings. Stakeholders indicated their preference for face-to-face, short (one to three days), interdisciplinary courses, but also for discipline-specific offerings as well.

The CE program incorporates each discipline of the Heartland Center, plus occupational safety. Academic faculty and staff actively participate; their duties can range from planning committee to speaker to course director. Program planners felt the high rate of returning trainees was evidence that some courses should be repeated. A representative sample of repeated courses includes

- Agricultural Occupational Health Training Certification – Session I and II (summer)
CE trainees taking both sessions I and II have the option to take a certification examination created by the faculty of the Heartland Center ASH training program (to our knowledge, no other such ASH certification exists nationally)
- Case Management: Care of Work-Related Injuries Conference(fall)
- Ergonomics of Hand-Arm and Whole Body Vibration
- Midwest Rural Agricultural Safety and Health Forum (fall)
- NIOSH-approved Spirometry Training for Workers Screening (April, July and November)
- Occupational Epidemiology for the Industrial Hygienist (spring)
- Occupational Health Nursing Conference with NIAOHN (fall)
- Occupational Health Symposium (spring)
- Occupational Hearing Conservationist Certification and Recertification (spring and fall)
- Occupational Medicine Conference with CSOMA (fall and spring)
- Safety Best Practices Conference with UI Facilities Services Group
- WORKSAFE IOWA Occupational Medicine Associates Meeting/Seminar (fall and spring)

Ms. Gross-Advani obtains the appropriate continuing education credit for the offerings, including continuing medical education credits (CME) for physicians, physician assistants and nurse practitioners; nursing continuing education units (CEUs); certification maintenance points for industrial hygienists; general CEUs for safety, ergonomics and other OSH professionals. At the request of the Board of Governors of the Central States Occupational Medicine Association (CSOMA), the Heartland Center sought approval from the American Board of Preventive Medicine (ABPM) to provide EPIQ (Enhancing Professional Improvement and Quality) credits, also known as MOC (Maintenance of Certification), at the 2007 Spring CSOMA conference. According to ABPM, the Heartland Center was one of the first non-national medical organizations to request this approval, which was received for the period January 1, 2007 – January 31, 2012. Ms. Gross-Advani was instrumental in obtaining this approval, completing the record-keeping requirements and working with the ABPM-certified physicians who were requesting the EPIQ credits.

Distance Education. During the reporting period, the CE director, assisted by the distance education consultant, began the process of converting one course and creating a second in a distance-based format. "Respirators: What You Need to Know to Protect Workers" was attended (as face-to-face offering) by Ms. Allnut-Steelman before she began translating it with Desire2Learn software. The instructors Dr. Wayne Sanderson (director, Industrial Hygiene training program) and Ms. Stephanie Leonard (senior industrial hygienist, WORKSAFE IOWA), had input into the translation process. Dr. Bill Field (director, Occupational Epidemiology training program) began working with Ms. Allnut-Steelman in 2008 to create a distance education course on "Risk Assessment for Practitioners," also utilizing the Desire2Learn format.

Partnerships. Increasing competition in the CE field posed more of a challenge over the reporting period, as more professional associations and other groups regionally and nationally offered continuing education services (including distance education). Program leaders and advisors felt it made less sense to compete with these groups for the same trainees than to collaborate on presenting higher-quality, better-attended programs. That strategy was successfully implemented by cultivating alliances with two regional associations, the NIAOHN and the well-recognized CSOMA, which covers an area

that extends into two of our Region VII states (Iowa, Missouri) and includes other regional states (Illinois, Indiana, Wisconsin, Minnesota and North Dakota). This collaboration has increased attendance of nurses at CSOMA seminars and increased physician attendance at Heartland Center programs. Spirometry course attendance has also increased as CSOMA physicians often send their staff to the Heartland Center course.

Program Evaluation. Overall quality of the program, as well as the impact of individual courses and speakers, was measured during the reporting period. The program director devoted considerable effort to designing and implementing course evaluation methods, since so much valuable information for program planning comes from the participants. In 2006 the course evaluation form was refined to support calculation of an overall rating for each offering, thereby facilitating comparison among offerings. One change was from a five-point scale (1-strongly disagree; 3-agree; and 5-strongly agree), used from 2003 to 2006, to a three-point scale (1-expectations not met; 2-expectations met; and 3-expectations exceeded) recommended by Ms. McCrory. Using the first system, the mean score of the overall program 4.62, and the satisfaction score for the 2007-2008 offerings was 2.5. Also added in 2003 were items that queried participants on their perceptions of the training's applicability and, most specifically, any changes they intend to implement as a result of the program.

Follow-up surveys of participants, to determine the impact of Heartland Center offerings on their practice, were implemented in 2005. Using an online survey tool developed by Ms. McCrory, we contact trainees approximately six months after Heartland Center offerings. A representative example is the impact survey sent via email to 79 participants who attended the October 2005 Case Management: Care of Work-Related Injuries conference. The 22 respondents indicated the following uses or relevance of their training:

- More alert to legal aspects of documentation
- Have been able to discuss options with employees with chronic pain and those facing back surgery
- Instead of having the injured pursue conservative care, set up appointments for more aggressive (surgical) treatment if the injury qualifies for surgery
- Updated referral list for medical providers
- Revised pre-placement health assessment form
- Changed my approach with physician
- Utilized information in my approach to cases
- Chronic pain protocols

Program Participants. During the 2003-2008 grant cycle, the CE program attracted far more than the annual minimum of 400 trainees required by NIOSH, and the multi-disciplinary offerings were attended by representatives of private business and industry, governmental agencies, and educational institutions from all four states in Federal Region VII and beyond.

Trainees by Discipline	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
Physicians	196	302	308	467	452
Nurses	306	451	369	385	359
Hygiene	50	46	68	105	159
Safety	63	182	395	113	241
Other includes ASH	246	248	240	287	350
Trainees by Employer	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
Private Industry	529	846	811	839	1049
Federal Government	19	19	25	26	20
State Government	13	11	19	9	40
Local Government	20	28	54	83	61
Foreign Country	17	7	2	15	10
Academic	214	301	408	318	324
Other	49	17	61	67	57
Total Trainees	861	1229	1380	1357	1561
Total Person Days	963	1339	1613	1567	1546

Figure 2. CE trainees by discipline and employer type (2003 to 2008)

PUBLICATIONS

Since its creation in 2000, the Heartland Center has been committed to the importance of involving trainees in faculty research projects. As a result, we have an extensive list of trainee/faculty peer-reviewed papers published or in press during this grant cycle (2003 to 2008). All of the following trainee and faculty publications are in areas that are relevant to National Occupational Research Agenda priorities and sectors.

(Student authors are in **bold** type)

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