

**GRADUATE TRAINING IN OCCUPATIONAL
HEALTH NURSING**

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LIST OF ABBREVIATIONS

ERC	Education and Research Center
FAAN	Fellow, American Academy of Nursing
GPA	Grade Point Average
GRE	Graduate Record Examination
IOM	Institute of Medicine
NIEHS	National Institute of Environmental Health Sciences
NIH	National Institutes of Health
NIOSH	National Institute of Occupational Safety and Health
NRSA	National Research Service Award
OEHN	Occupational Environmental Health Nursing
OHN	Occupational Health Nursing
OHS	Occupational Health Science
OSH	Occupational Safety and Health
SON	School of Nursing

ABSTRACT

This final technical report describes the major accomplishments of the Occupational Environmental Health Nursing (OEHN) at the master's and doctoral level at the University of Pennsylvania during the funding period of 2002-2007. The program played a crucial role in meeting the regional needs for advanced practice nurses to meet the needs of the workforce. Also the program leveraged its national reputation in nursing science to educate PhD nurses with the scientific skills needed to address research priorities in occupational health. The goals of the program were to: 1) Continue to integrate OEHN nurse specialist training at the master's level into the University of Pennsylvania's nationally recognized advanced practice nurse training programs; 2) Contribute to the preparation of the next generation of scientists in occupational and environmental health nursing; 3) Increase the numbers of minority nurses prepared to meet the occupational health and safety needs of an increasingly diverse workplace; and 4) Increase the capacity of all undergraduate and graduate students at the University of Pennsylvania to understand the importance of the occupational and environmental health of our working populations. Our master's OEHN specialty program is housed within our nationally ranked primary care nursing and nursing administration programs and a wide range of occupational sites are available for clinical courses. Our OEHN research training takes advantage of the portfolio of nationally recognized research projects in occupational and environmental health within the Penn School of Nursing. These studies include issues such as immigrant workers, environmental exposures among children, shift work and fatigue, needle stick injuries in health care workers, chemical exposures, biomarkers of exposures and health effects and management of chronic diseases in the workplace.. Our program is committed to the recruitment of minorities into advanced practice and PhD study. In addition, this training program presents the opportunity to integrate occupational and environmental health into a number of interdisciplinary, undergraduate and graduate educational programs.

A. BACKGROUND

Overview

The School of Nursing (SON) at the University of Pennsylvania admitted its first enrollee in the master's level OHN program/option in 1986 and has a history of graduating 69 advanced practice nurses. These nurses have played a crucial role in meeting the regional needs for OEHNs in the huge industrial base of Pennsylvania, New Jersey, and Delaware. In 2005, a doctoral training supplement was added to this successful training program. This supplement was added to take advantage of the strong research training environment in the School of Nursing at the University of Pennsylvania. Both of these programs are aligned with the NIOSH goal of ensuring safer and healthier work environments for Americans through information dissemination, knowledge transfer, and training.

The master's level training in occupational health nursing at the University of Pennsylvania has the overall goal of educating and graduating highly qualified occupational-environmental health nursing practitioners and leaders. The OEHN option prepares master's level advanced practice occupational health nurses with advanced nurse practitioner skills in primary care or advanced skills in administration and leadership. The OEHN option is available for all students who are admitted into the School of Nursing Primary Care Practitioner or Administration/Leadership Programs. This framework allows a wide range of advanced-practice nursing students to take advantage of training in occupational safety and health and allows the NIOSH training program to take advantage of the strong existing nursing programs at Penn. The Penn School of Nursing Master's Adult Practitioner program was ranked number one in the United States in the most recent *US News and World Report* survey. Our Master's Nursing Administration Program was ranked second in the US and our Family Nurse Practitioner Programs was ranked third nationally in the same survey. These nationally-ranked and accredited programs provide an outstanding basis upon which we offer the specialty option of coursework in occupational/environmental health nursing. The OEHN option is designed as an additional sequence of courses available for students admitted to our existing accredited graduate nursing programs in the School of Nursing. Students do not apply directly to OEHN. Student who opt to complete the OEHN option interact with students from other disciplines across the University of Pennsylvania, including environmental science, medicine, bioethics, and public health. The field of occupational and environmental health is growing steadily and the master's OEHN option addresses the need for well-educated professionals in the workplace to provide direct care, develop creative health care approaches and prevention programming, and administer occupational environmental business. The course of study is diverse and the curriculum stresses the multidisciplinary, independent, and innovative nature of OEHN. A strong clinical focus provides up to four semesters of precepted practice in corporate and plant settings, community practices, and entrepreneurial businesses. Students work with prominent business and health care executives, environmental science leaders, and occupational health business owners. Alumni are routinely sought by a wide variety of businesses and health care delivery systems to provide occupational health expertise. Students who complete the OEHN option, in addition to certifications available in their primary advanced practice nursing programs, are eligible for certification as occupational health nurses from the American Board of Occupational Health Nurses.

In 2005 we received funding from the National Institute for Occupational Health and Safety (NIOSH) to support nursing doctoral students interested in conducting research relevant to occupational and environmental health. This research training opportunity takes advantage of the portfolio of nationally recognized research projects in occupational and environmental health within the Penn School of Nursing. These studies include issues such as immigrant workers, environmental exposures among children, shift work and fatigue, needle stick injuries in health care workers, violence in the workplace, chemical exposures, biomarkers of exposures and health effects and management of chronic diseases in the workplace. In the first two years of funding we have enrolled three doctoral students in this program and an additional student has been admitted to our MSN program with the intent of applying to the PhD program in December 2007.

The SON is one of 12 schools and colleges within the University of Pennsylvania. All of the 51 standing faculty are doctorally-prepared. Forty-five faculty members are fellows in the American Academy of Nursing, 6 are fellows in the Institute of Medicine, and 2 are members of the Royal College of Nursing. The doctoral program

in nursing was established in 1978 (Doctor of Nursing Science) and evolved to a PhD in 1984. The University of Pennsylvania is internationally recognized as a leading institution for graduate training in nursing. They rank fifth in NIH funding for nursing programs and first among nursing programs in private universities. The SON has six nursing research centers, (The Center for Gerontologic Nursing Science, Center for Health Outcomes and Policy Research, Center for the Study of the History of Nursing, The Biobehavioral Research Center, The Health Transitions Research Center and the Center for Health Disparities Research). These centers were established with a substantial external funding base and a critical mass of faculty conducting research around a common theme. Over one-third of the faculty in the SON has NIH-funded research grants. The SON has three NIH-funded institutional research training grants for pre-doctoral and post-doctoral nursing students (Research On Vulnerable Women Children And Families, Advanced Training in Nursing Outcomes Research, and Individualized Care of Older Adults). The SON is also a collaborator on an interdisciplinary postdoctoral training program, jointly funded by the NIH National Heart, Lung, and Blood Institute and the Institute for Nursing Research, focused on the neurobiology of sleep and sleep apnea.

Need for the Program

The OEHN training program at the University of Pennsylvania addresses three critical needs in OHS training: 1) overall shortage of nurses in the U.S., particularly nurses prepared to lead research and academic programs in the future, 2) the continuing need for advanced practice nurses (practitioners) to deliver direct care to working populations, and 3) the need for nurses to play strategic administrative and leadership roles in the design, implementation and evaluation of health programs for the U.S. workforce. In addition we are positioned to prepare professionals who will be able to meet the changing DSH needs of workers in the 21st century.

National Need: In 2000, a special Institute of Medicine Committee issued a report entitled “Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational Safety and Health Personnel” (IOM, 2000). This report summarized the need for occupational health and safety personnel in the U.S. and emphasized that in order to keep up with the growing demand for occupational safety and health (OSH) professionals and the resultant need for education and training at the worksite, more OSH professionals are needed at all levels of academic training and new skills are needed. The University of Pennsylvania has carefully considered the recommendations in this report and assessed to what extent our programs currently address the following recommendations or can develop emphasis areas in the future. The recommendations and our assessment are as follows:

Recommendation	SON Assessment
Add a new training initiative focused on prevention of occupational injuries	The SON has research training opportunities in injuries of health care workers related to the work environment and worker fatigue. Federal grants have focused on needle stick injury in hospital and home care settings.
Extend existing training programs to support individual Ph.D. candidates	The Penn SON has a strong research training environment and history of funding to support individual training applications (F31).
Encourage distance learning and other alternatives to traditional education and training programs	A goal for the next 5 year funding period is to develop a certificate program for nurses to obtain advanced training in OSH content.
Increase attention to special needs of older, female, and ethnic/cultural minority workers	Our current graduate programs emphasize the needs of ethnic/cultural minority workers. It is also a major research focus in the SON which has a Center for Research on Health Disparities.
Broaden graduate training support to include behavioral health science programs	Increasing numbers of nursing students are entering nursing with undergraduate degrees in other fields such as psychology, sociology, economics and communications. This trend in nursing programs offer outstanding opportunities to prepare nurses who bring different skills sets to complex work environments than what we have traditionally observed.

Nurses who are hired with undergraduate degrees as registered nurses deliver education and training to employees at the worksite in order to both comply with state or federal mandated programs or standards and

implement nursing care to minimize risk and exposure to hazards. Graduate programs in OEHN prepare graduates for entry-level positions as nurse practitioners or provide advance administration/management training for experienced OEHN. Master's prepared nurses are more likely to be work with managing health programs, nursing resources, and employees, while undergraduate nurses are more likely to be work with the anticipation, recognition, evaluation, and control of workplace hazards. OEHN nurses trained at the doctoral level are more likely to conduct and publish empirical studies designed to further our understanding of the antecedents of occupational illness and injuries as well as the relative effectiveness of either early detection strategies or of nursing intervention programs. In addition, doctoral-prepared nurses play a prominent role in OSH academic programs, including teaching, scholarship, and service. The training programs in occupational and environmental health nursing at the University of Pennsylvania clearly fit within this framework.

The need for occupational health nurses as part of the larger occupational health and safety workforce has been identified since the mid-1970's. Unfortunately the graduation of nurse specialists in this area has not kept up with the demand and indeed the need is more critical now than it has ever been given that many practicing occupational health nurses are nearing retirement age. The United States is in the midst of an unprecedented shortage of registered nurses as a result of the aging baby boomers, the aging nursing workforce, and the decline of interest in nursing as a career because of expanding opportunities for women in previously male-dominant professions (Auerbach, Buerhaus & Staiger, 2000)ⁱ. This shortage of nurses is a national trend and is currently present in all U.S. states.

The National Institute for Occupational Health and Safety remains the sole federal agency that targets specialized nursing training in the care of the U.S. and global workforce. However, recruitment of nurses who choose this specialty is still a challenge and employers often have to hire nurses with no special training or graduate degrees in occupational safety and health. The national health promotion and disease prevention objectives presented in Healthy People 2010 outline the need for primary prevention of disease and injury in the workplace. For several objectives related to work-related injury, death, and nonfatal injuries, the U.S. appears to be moving in the wrong direction (Healthy People 2010). Nurses play a crucial role in the objective of reducing work-related injuries resulting in medical treatment, lost time from work, or restricted work activity and are the largest group of health providers interfacing with the US workforce. They are a key component in the need to establish health care management strategies to recognize early indicators of illness/injury, to implement care as quickly as possible and manage return-to-work. Master's prepared nurses are prepared to develop, administer, and evaluate work site program health promotion programs. Studies have shown that OEHNs are professionals who can manage health care costs, develop programs and administer creative solutions for the health care requirements of the work force (Blizzard K, 2006; Denniston PL & Whelan P, 2005; Garrett LH, 2005; Matt SB & Butterfield B, 2006; Strasser PB et al, 2006; Wachs JE, 2005). Without appropriate education of occupational health professionals, the advancement of occupational health solutions and the national health agenda will be adversely affected. The current shortage of nurses is impacting all areas of nursing practice and scholarly activity. The nursing shortage will have a direct impact on the ability to attain the overall NIOSH goals of ensuring safer and healthier work environments for Americans through information dissemination, knowledge transfer, and training. There is a critical need for OHNs to deliver direct care to working populations and to design and manage work site occupational health and safety programs. In addition, the numbers of OHN faculty to teach in academic programs and conduct research have been insufficient since the 1970's.

One of the major reasons for the scarcity of occupational health nursing master's level specialty programs in the U.S. is the shortage of faculty to lead these programs. NIOSH has taken the lead in preparing nurses trained in occupational health and safety but the numbers remain insufficient and faculty positions to provide leadership for graduate programs in occupational health nursing are extremely difficult to fill. In the five year period between 1996 and 2000 there were only 12 reported PhD graduates from NIOSH-funded ERCs (NIEHS, 2003). Clearly the supply of nurse scientists remains insufficient to meet the needs of the largest group of health care providers in occupational safety and health.

Critical numbers of nurses are needed to collaborate on interdisciplinary research projects addressing the complex occupational health and safety issues facing the U.S. workforce. These shortages parallel the

shortage of nurse researchers and faculty in the profession in general, but are especially acute. There is an increasing deficit of doctorally-prepared nursing faculty and nurse researchers. The majority of nursing schools report unfilled faculty positions, and well over 50% of all nursing faculty are over the age of 50 (AACN, 2003). While there has been a trend towards increased enrollment in doctoral programs in nursing, there has not been an increase in graduation. This disparity is due in part to over half of the doctoral program trainees being enrolled part-time. Median time elapsed between entry in a master's program to completion of the doctorate in nursing is almost twice that of other fields, 15.9 and 8.5 years, respectively (National Opinion Center, 2001). The solutions to this manpower problem are complex, but include seeking sources of financial aid, including remuneration for lost pay while attending school and support for students from admission to graduation.

Regional Need: The need for advanced practice nurses in the United States is critical. The School of Nursing at the University of Pennsylvania is the only institution in Pennsylvania, Delaware, New Jersey, and New York offering educational programs with an emphasis on occupational/environmental health advanced nursing practice.

There are only two universities in the northeast offering doctoral Nursing training with an emphasis in occupational/environmental health—the University of Pennsylvania and Johns Hopkins University. Clearly if we are to continue to meet the need for advanced practice nurses with expertise in occupational health nursing, PhD programs for future nurse scientists, nurse faculty, and nurse leaders with occupational health and safety expertise are needed. Occupational health nursing positions are plentiful in Pennsylvania, Delaware, New Jersey, and throughout the northeastern regions of the United States. All graduates of the OEHN option at the University of Pennsylvania obtain employment in occupational health settings immediately upon graduation. An informal survey of need in Pennsylvania and the region revealed the following:

- An AAOHN survey estimates that 30% of practicing OHNs belong to their professional organizations. Using this proportion and membership numbers the OHN workforce in Pennsylvania is estimated to be approximately 1200, New Jersey 1000, and Delaware 200.
- Most recruitment for OHNs is conducted by search agencies due to the difficulty of filling these positions. In just the one month of July 2006, in the Philadelphia area, there were multiple posted positions within pharmaceutical companies; manufacturing, ambulatory settings posted by individual companies and nursing contract services.
- Employers often reach out to the SON directly or to professional organizations.
- In a recent communication with the head of occupational health at Merck & Co. Inc., the medical director stated that his need for nurse practitioners was so great that he would hire any nurse even without occupational health and safety training.
- Members of our advisory board consistently report that demand is exceeding the supply and recruitment begins usually before the student graduates.

This trend of increasing need and limited supply of nurses is not anticipated to decrease in the next decade. There is a national shortage of nursing in general, which ultimately affects the scarcity of individuals who are specialized in occupational health nursing. Employers, faced with the shortage of specialists in this area, are searching for adult and family nurse practitioners for open positions with the understanding that they, as the employer, will need to provide onsite training regarding the special health and safety needs of working populations.

The University of Pennsylvania is committed to training the next generation of leaders in occupational health nursing. This includes a critical number of master's prepared advanced practice nurses that can manage and lead worksite programs, including training other nursing personnel who lack formal specialty degrees in occupational health. In addition, the University of Pennsylvania has the research infrastructure to provide the nurse scientists and faculty who will be the future leaders in this field. It is important to note that the training of OEHNs supported by NIOSH has remained steady in the last decade with approximately 50 nurses prepared each year from graduate OEHN programs. This number approximates that of occupational medicine

specialists, although within the U.S. worksites, nurses are much more likely to be delivering direct care to workers.

B. SPECIFIC AIMS

The master's and doctoral level training in occupational health nursing at the University of Pennsylvania has the overall goal of educating and graduating highly qualified occupational-environmental health nursing practitioners, leaders, and nurse scientists. The program plays a crucial role in meeting the regional needs for advanced practice nurses to meet the needs of the workforce. Also the program leverages its national reputation in nursing science to educate PhD nurses with the scientific skills needed to address research priorities in occupational health.

The goals of the program are to: 1) Continue to integrate OEHN nurse specialist training at the master's level into the University of Pennsylvania's nationally recognized advanced practice nurse training programs; 2) Contribute to the preparation of the next generation of scientists in occupational and environmental health nursing; 3) Increase the numbers of minority nurses prepared to meet the occupational health and safety needs of an increasingly diverse workplace; and 4) Increase the capacity of all undergraduate and graduate students at the University of Pennsylvania to understand the importance of the occupational and environmental health of our working populations.

Our master's OEHN specialty program is housed within our nationally ranked primary care nursing and nursing administration programs and a wide range of occupational sites are available for clinical courses. Our OEHN research training takes advantage of the portfolio of nationally recognized research projects in occupational and environmental health within the Penn School of Nursing. These studies include issues such as immigrant workers, environmental exposures among children, shift work and fatigue, needle stick injuries in health care workers, chemical exposures, biomarkers of exposures and health effects and management of chronic diseases in the workplace. Our program is committed to the recruitment of minorities into advanced practice and PhD study. In addition, this training program presents the opportunity to integrate occupational and environmental health into a number of interdisciplinary, undergraduate and graduate educational programs.

C. PROCEDURES/METHODS

C.1 Program Administration

University and School Administration and Leadership

The SON is one of 12 schools and colleges within the University of Pennsylvania, and is led by Afaf I Meleis, PhD, DrPS(hon), FAAN, Dean of the School of Nursing. The Dean reports to the University Provost for academic and administrative matters. The mission of the School of Nursing is to contribute to the discipline of nursing by developing and strengthening the knowledge base for nursing practice through research, by providing excellence in the quality of the school's baccalaureate and graduate programs, and by developing leaders of the discipline among its faculty and graduates. Implicit in this mission is the identification of, and response to, long term societal needs for nursing. Dean Meleis is assisted by three Associate Deans, including Dr. Linda McCauley, who is Associate Dean for Research, Director of the Office of Nursing Research, and Program Director for this training program. Dr. Meleis has extended her strong and full support for occupational environmental health nursing education. Support has been long standing and clearly evidenced over the years. In addition, Dr. Meleis has committed her support to the interdisciplinary interaction of the School of Nursing with the University of Pennsylvania Master's in Public Health (MPH program). The strategic plan for the School of Nursing emphasizes the need for increased interdisciplinary collaboration in education, research, and practice—all of which are critical for training occupational health nurses. The strategic plan also emphasizes the need for a diverse faculty and student body and the delivery of culturally-competent care. The training program is housed in the Division of Family and Community Health, one of two Divisions in the SON.

Program Leadership

The training program has been under the leadership of Linda A. McCauley RN, PhD, FAAN since 2004. Dr. McCauley brings 20 years of research and academic experience in occupational health nursing to this position. She is a tenured full professor in the School of Nursing. She has been intricately involved in NIOSH-funded ERCs and other NIOSH-funded centers and has had substantive, progressive leadership responsibilities in program development and implementation in her career. She was the Director of the Occupational Health Nursing Program of the University of Cincinnati ERC from 1988-1994. During her tenure at the University of Cincinnati she revitalized a program that had suffered from a lack of faculty leadership and developed an OHN doctoral training component. In 1994, she moved to Oregon Health & Science University to assume a scientist position at the Center for Research on Occupational and Environmental Toxicology. She is a member of the advisory panel of the Portland State University NIOSH-funded program for doctoral training in Occupational Health Psychology. She currently is on the advisory board of the NIOSH-funded Childhood Agricultural Injury Center in Marshville Wisconsin, and chairs the external advisory panel of the NIOSH-funded University of North Carolina Education and Research Center. She was appointed to the NIOSH Board of Scientific Counselors in 2006.

In addition to her administrative responsibilities as the Associate Dean for Research, Dr. McCauley advises doctoral, master's, and undergraduate students. She is on the faculty of the MPH program at Penn, is an Associate Scholar in the Center for Epidemiology and Biostatistics in the School of Medicine and a member of the Center for Excellence in Environmental Toxicology at the University of Pennsylvania. Dr. McCauley lectures in doctoral level courses, directs the occupational health nursing courses described in this application and is also course director of the undergraduate community health nursing course that contains occupational and environmental nursing content. She serves on the Curriculum Committee for the MPH program, co-teaches Introduction to Public Health, and has developed two interdisciplinary occupational health and safety courses for MPH and nursing students. Dr. McCauley provides the leadership in the direction and evaluation is responsible for the development of courses, the activity of involved faculty, and the recruitment and advisement of students. She oversees the program evaluation and training outcomes and administers the financial management of the grant.

Administrative Collaborations

Master's students who are interested in completing specialty preparation in occupational/environmental health nursing (OEHN) are admitted into approved graduate programs within the School of Nursing. In other words, the student has to meet the admission requirements of existing academic programs in the school and then they have the option of completing the OEHN course of study in addition to the requirements set by the program granting admission. The students who choose the OEHN option take a prescribed series of courses in occupational health and safety, lengthening their course of study by approximately one semester. Likewise, OEHN doctoral students are admitted into the doctoral program within the school of nursing. Students interested in a focus on occupational/environmental nursing research complete the OEHN research training program and all requirements set by the doctoral program. In addition, they are expected to include significant occupational health and safety course content in their program of study. Given the integration of this NIOSH training program within an existing framework of curricular programs close coordination is needed with individuals who provide curriculum leadership. The following individuals have played key leadership roles in the implementation of the undergraduate, master's, and doctoral programs in the School of Nursing and were important in the overall administration of the OEHN option.

- **Kathleen McCauley, PhD, FAAN, RN, CS, Associate Dean for Academic Programs** provides leadership and vision to the School's academic programs. She is responsible for the development, coordination, maintenance, and evaluation of all academic programs in the SON. She works with Dr. McCauley in assuring that the financial aid packages for students are available to supplement the support that is available from NIOSH. She also works with other programs such as the MPH program to promote interdisciplinary course work and cross-listing of courses in the OEHN option. Her office is also responsible for conducting the school-wide program evaluation and obtaining program evaluation feedback from graduates and employers.

- **Julie A. Fairman, PhD, FAAN, RN, Director, Graduate Group School of Nursing** provides the leadership of the faculty group who develops school policies regarding the doctoral program. The charge of the graduate group includes assessing admission policies, progression and graduation policies. They provide the guidelines for all progression guidelines and approve mechanisms of financial support for doctoral students.
- **Val Cotter, MSN, CRNP, FAANP Program Director, Adult Nurse Practitioner Program** coordinates the clinical practicum courses for Adult Nurse Practitioner students who are completing the OEHN option, assuring that they have multiple semesters of placement in occupational health settings.
- **Ann O'Sullivan, PhD, FAAN, CRNP** is the **Program Director, Family Nurse Practitioner Program**. During the past three years, students enrolling in the Family Nurse Practitioner Program have frequently expressed an interest in completing the OEHN option. Dr. O'Sullivan has worked closely with Dr. McCauley to offer this option to the students.
- **Wendy Grube, MSN, CRNP, RH, Interim Program Director, Women's Health Practitioner Program** coordinates the clinical placements for Women's Health Nurse Practitioner students who are completing the OEHN option. Students who complete the OEHN option and this practitioner program have advanced practice skills in the health needs of women who make up a significant proportion of the U.S. workforce.
- **Kathleen Burke, PhD, RN, Program Director, Nursing Administration Master's Program** is responsible for the recruitment of students into this program and introducing them to the OEHN option.

Advisory Panel

We have a panel of advisors to assist us in our program planning and evaluation. **Dr. Edward Emmett** is the Program Director of the NIOSH-funded occupational medicine program at the University of Pennsylvania. He is also on the faculty of the MPH program at Penn. He and Dr. McCauley interact frequently in their role as curriculum committee members of the MPH program. **Dr. Sheila Fitzgerald** from the OHN program at Johns Hopkins University School of Public Health and an alumna of the Penn School of Nursing also advises program faculty. Dr. Fitzgerald has an accomplished track record both in doctoral education of OHNs and in research on vulnerable working populations. Because the University of Pennsylvania is in the region served by the Johns Hopkins ERC, the linkage between their program is an important one. **Dr. Judith Green-McKenzie**, Associate Professor, School of Medicine also advises the program faculty. She lectures in the OEHN core courses, and provides clinical sites for trainees. **Ms. Sharon R. Rainer**, RN, APN,C, CAE, Deputy Director of the New Jersey State Nurses Association advises Dr. McCauley on the practice issues for occupational health nurses, nationally and in the state of New Jersey. **Ms. Kim Olszewski** MSN, CRNP, COHN-S/CM, President of the Pennsylvania Association of Occupational Health Nurses also serves on our advisory group. In her professional role she has a vested interest in growing and mentoring the occupational health programs in Pennsylvania.

C.2 Program Faculty

Dr. McCauley has been Director of the University of Pennsylvania School of Nursing OEHN master's and doctoral option in the SON since June, 2004. Since coming to the School of Nursing in 2004 she has coordinated the OEHN core courses, redesigned required coursework in occupational safety, toxicology, and industrial hygiene, and recruited students to both the master's and the doctoral training options. She participates in the admissions committee for doctoral students and advises all master's and doctoral students completing the OEHN option. In addition to her administrative role as Associate Dean for Research and Director of the OEHN option she maintains an active program of funded research in occupational safety and health. Dr. McCauley is a senior, established research scientist in occupational and environmental health and safety and her research program serves as a superior base for the research training of doctoral students. She has previously and is currently mentoring students, post-doctoral fellows, and junior investigators in projects related to health effects from chemical exposure, vulnerable workers and health disparities, surveillance

methodology, biomarkers of exposure and health effects, and community-based participatory research methods. She engages undergraduates, master's, and doctoral students in her research programs.

Dr. McCauley's has been assisted by four individuals with wide expertise in occupational health and safety practice, administration, and leadership.

Maryellen O'Hara, MSN, APNC, COHN-S, served as the Associate Course Director for Nurs 679, Issues in Occupational and Environmental Health, and Nurs 680 Advanced Issues in Occupational and Environmental Health. She is an Adult Health Practitioner with certification as an occupational health nurse. Currently Ms. O'Hara is on leave and her responsibilities have been assumed by Dr. Victoria Dickson.

Victoria Dickson, PhD (c), CRNP, MSN, Director Employee Health, Cigna Corporation. Ms. Dickson is a 2007 graduate of the OEHN option in the doctoral program in the SON at Penn. She has assisted Ms. O'Hara and Dr. McCauley in lecturing in OEHN Core courses, precepting master's students, arranging clinical sites, and program evaluation. Her research is focused on the management of chronic disease among the aging workforce. In her role at Cigna Corporation, she interfaces with OHN leaders in the region and is very effective in providing advisement of needed content in the master's coursework. She is assisting Dr. McCauley in student recruitment and advisement and overall strategic planning of the program.

Ann E. Rogers PhD, RN, FAAN, tenured Associate Professor is nationally recognized for her research on the management of excessive daytime sleepiness and has over 15 years experience testing pharmacologic and non-pharmacologic measures to improve daytime alertness. She is studying the effect of 12-hour shifts among nurses in a random national sample and has documented the frequency in which nurses exceed 12 hours and work longer than their scheduled shifts. Her work also focuses on the association of accidents with shift-work and sleep deprivation and cognitive function.

Sean Clarke, RN, PhD, CRNP, CS, is the Associate Director of the Center for Health Outcomes and Policy Research in the School of Nursing. This center has focused on the investigation of the impact of managerial decision-making and resource allocation on a variety of patient and nurse outcomes. The employee outcomes that have been studied include job-related experiences that are predictive of nurse turnover, such as job satisfaction and burnout. The studies conducted in the Center since the early 1990's have included sharps injuries, because of the significance of blood borne pathogen transmission to nurses, their employers, and society at large. Papers published have explored risk factors for needle stick injuries including specific staffing and organizational variables, nurse experience, and the availability of safety-engineered equipment and the importance of work environments in hospitals in predicting sharps injuries.

C.3 Training Design

Master's Option in Occupational/Environmental Health Nursing

Overall Goal: Continue to integrate OEHN nurse specialist training at the master's level into the University of Pennsylvania's nationally recognized advanced practice nurse training programs.

Students can complete the OEHN option after admission into either the SON master's program in Nursing Administration or Primary Care Practitioner Programs (Adult, Family, and Women's Health). All applicants to these master's programs have to have earned a Bachelor of Science in Nursing from an accredited university and have a current valid registered nursing license. They must submit GRE scores, but if the applicant has an undergraduate GPA of 3.2 or higher, his/her GRE requirement may be waived. Non-native English speakers must submit TOEFL scores no more than two years old.

The core courses required for all master's students completing the OHN option include:

Nurs 679 Issues in Occupational Environmental Health: This course is designed as an introduction of concepts, issues, and content relevant to occupational environmental health, and is recommended in the first two semesters of study. This course introduces students to the history of occupational health nursing and regulation that frames worker health and safety programs. The student is introduced to ethical and legal issues in OEHN, health promotion and wellness programs, surveillance, and trends in the U.S. labor and global worksites.

Nurs 680 Advanced Practice in Occupational/Environmental Health: This course offers an opportunity for students to focus on more complex issues and practice in the occupational health setting, integrate course work, and experience the role of a provider/manager in occupational health in collaboration with an experienced preceptor. Students take this course in the second half of their program. A series of lectures are presented on the design, implementation and evaluation of occupational health services. The surveillance, treatment and management of serious occupational health problems such as hearing loss, musculoskeletal strains and sprains, slips and falls, pulmonary hazards, and biological hazards are presented. The emphasis is on primary, secondary and tertiary strategies to address these major workplace problems.

Nurs 677 Environmental Toxicology: Risk Assessment and Health Effects: This course presents general principals of toxicology and the disposition of toxins in the body. ATSDR case studies of the effects of environmental and occupational toxins on individuals are analyzed. This course is designed for students who desire a strong foundation in toxicological concepts and principals and provides an overview of major toxins in our environment and their association with human health. Content includes discussion of types of environmental toxins, risk assessment, controls and criteria used for determining recognition, screening and surveillance of physical, biological or chemical agents.

Nurs 678 Exposure Assessment and Safety in the Workplace: This course is designed to present an overview of the interdisciplinary nature of monitoring and controlling workplace hazards. A variety of practicing industrial hygiene, safety, and ergonomic professionals share information regarding the nature of his/her work and the primary hazards in his/her worksites. The interdisciplinary process of developing risk management and safety promotion programs in a variety of work settings is emphasized. The process of hazard recognition and the determination of biological/infectious, chemical, mechanical, physical, and psychological hazards are presented. Various work settings are visited to observe work processes, practices and control measures. Information is presented on how industrial hygienists determine exposure levels through ambient/environmental sampling and how worker complaints are investigated. Students have opportunity to complete exposure and safety survey checklists and develop priorities based on the potential to impact human health. The presence of effective control measures and personal protective equipment in the workplace are identified. Exposures that result in unnecessary injuries and deaths are emphasized such as electrical hazards, chemical safety, ventilation, and emergency planning. The importance of training and education of the workforce will be stressed. Ergonomic principles of matching work and job design to fit the capabilities of individuals to perform work are presented. Students have the opportunity to recognize ergonomic hazards in the workplace and evaluate interventions to reduce the disease burden associated with these exposures. They also become familiar with the history of the major regulatory bodies in the United States that develop exposure and safety guidelines for the work environment. This course is directed by Dr. McCauley with guest lectures from certified industrial hygienists, safety managers, and ergonomists at the University of Pennsylvania and surrounding companies/agencies.

Nurs 500 Introduction to Principles and Methods of Epidemiology: This course provides an introduction to epidemiological methods and an overview of the role of epidemiology in disease etiology and in the planning, delivery and evaluation of health services. The population-based approach to collection and analysis of health data will be emphasized throughout the course. Through textbook reading, class discussion and review of the recent literature, students will become acquainted with the basic designs of epidemiological studies in theory and in practice. Students will develop the basic skills necessary to use epidemiological knowledge and methods as the basis for scientific public health practice.

Clinical Placements and Preceptors: Critical to advanced practice master’s training programs is the availability of clinical placements that offer students supervised experiences with skilled preceptors. The present master’s nursing program in Health Care Administration has a total of 440 clinical/fieldwork practicum hours and there are 770 clinical/fieldwork practicum hours in Primary Care. The accrediting bodies for these graduate programs require the SON to carefully monitor the clinical sites and the number of hours of supervised practice each student. In addition to these training requirements students completing the OEHN option have an addition 160 hours in Nursing 680 Advanced Issues in Occupational and Environmental Health. In the 20 years that we have been preparing occupational health specialists, we have developed an array of clinical sites to meet individual student’s learning needs and special interests. These sites include hospital-affiliated occupational health clinics, health units within corporations, corporate level occupational health departments, federal and local OSHA offices, private practices and consulting firms.

The selection of preceptors is as important as the development of clinical sites. Preceptors are chosen on the basis of professional reputation, experience, interest in nursing education, and willingness to evaluate students. We look for preceptors who have the ability to deal with questions and delays in practice created by students, and who truly enjoy the student interaction. Our preceptors are eligible for adjunct faculty appointments in the School of Nursing if they are nurses with a master’s degree in nursing or a physician. Because of our large number of master’s degree programs we have developed institution-wide methods to assure continued support quality and participation of preceptors including : 1) preceptor training programs, 2) access to continuing education programs, 3) preceptor information packets for use by preceptors and students, 4) site visits and phone communication to maintain contact and a answer questions, 5) preceptor access to course work on campus, and 6) evaluation conferences with both students and preceptors. The task and ongoing monitoring of preceptor activity requires a great amount of faculty time to ensure quality of education.

OEHN Research Training

Overall Goal: Contribute to the preparation of the next generation of scientists in occupational and environmental health nursing

The Doctor of Philosophy program in the School of Nursing has been designed and is administered by the Graduate Group in Nursing to prepare nurse scholars for careers in research-intensive environments. Toward that end, student scholars work closely with faculty mentors who facilitate the attainment of mutual research goals. Our faculty believes that doctoral education represents advanced scholarly and research competence in the application of insights derived from a body of theoretical knowledge to nursing practice. We also believe that the future of nursing worldwide rests in part on the ability to produce imaginative and creative nurse scholars. The pre-doctoral training program in Occupational/Environmental Health Nursing shares the objectives of the doctoral program while allowing selected trainees to pursue a particular training and research focus on occupational and environmental health. Pre-doctoral education in OEHN follows the required core curriculum for Ph.D. study in nursing and the elective concentration concentrated in advanced courses in occupational and environmental health and safety.

Training Facilities and Resources: The PhD program in the SON has averaged a total enrollment of between 61-68 for the period from 2001-2007. Minorities represent approximately 12% of the total enrollment. The University of Pennsylvania is a research-intensive academic setting, and has consistently ranked in the top five schools of nursing for NIH funding. This training environment and the research support that we give our students contribute to their success as future researchers. The environment in the University of Pennsylvania School of Nursing provides rich opportunities for research training. The following table lists examples of the institutional grants and the projects of the core/associate faculty that support the research training of the OHN doctoral students:

Title of Project	PI	Funding Source
Advanced Training in Nursing Outcomes Research T32-NR-007104	Aiken	NIH
Beyond Quick Fixes: Evidence Based Policy Analysis #049530	Aiken	RWJ

Biomarkers of Pesticide Toxicity RO1 OH008057	McCauley	NIOSH
Center for Nursing Outcomes Research P30 NR 005043	Aiken	NIH
Changing Cafeteria Portion Sizes to Prevent Weight Gain R03 DK063991	Volpe	NIH
Genes and Environment: Education to Involve Communities R25 ES12089	McCauley	NIH
Hampton Penn Center to Reduce Health Disparities P20NR008361	Jemmott	NIH
Reducing Pesticide Exposure in Minority Families R01 ES08707	McCauley	NIH
Research on Vulnerable Women Children and Families T32NR07100	Deatrack	NIH
Staff Nurse Fatigue and Patient Safety R01HS11963	Rogers	NIH
Effects of Organizational Climate on Hospital Patient and Nurse Safety K01NR07895	Clarke	NIH
Nurse Staffing And Adverse Events On Inpatient Units	Lake	NIH
How Nursing Affects The Volume-Outcomes Relationship R01-NR-004513	Aiken	NIH
Initiative For Minority Students: Bridges To The Doctorate	Keane	NIH

The funding that we have received from NIOSH for students has been used to augment the funding that is currently available for our students and to encourage our outstanding doctoral students to pursue full time study and focus their scientific inquiry in areas relevant to worker safety and health. The SON is committed to fully funding each of its full time doctoral students for four years at the University of Pennsylvania. Each full time doctoral student receives a stipend and funding for course work. As students build their skills and move toward meeting their professional goals, the mechanisms used to fully fund doctoral students include research, educational and fellowship opportunities. We are proud to have three grants from the National Institute of Nursing Research that specifically provide funding (tuition and stipend) for pre and post doctoral students and provide a research intensive experience in the areas of Research on Vulnerable Women, Children, and Families, Sleep Disorders Specialized Center of Research, or Health Outcomes & Policy Research. Other sources of funding that are available for our doctoral students include university graduate fellowships, Fontaine Fellowship for minority students, Hartford Scholars, individual NRSA's, university research assistantships, American Cancer Society Fellowships and minority supplements on faculty R01 research grants.

All doctoral students complete 7 required nursing science courses, 6 other courses in nursing or other disciplines for a *concentration focus*, a Qualifying Examination, a Preliminary examination, a defense of the dissertation proposal, and a defense of the final dissertation. The length of time that most students take to complete coursework is from three to five years of full time study. Upon acceptance to the Doctoral Program each student is assigned an advisor from the Standing Faculty of the School of Nursing. The student and advisor develop individual plans of study. Brief descriptions of the 7 required courses follow.

Nurs 750 Inquiry and Nursing: This course explores the intellectual foundations of scholarly disciplines and the discipline of nursing specifically. Emphasis is placed on the process of knowledge development and on having students develop their particular intellectual approach to disciplinary inquiry and on formulating ideas for publications and presentations. As a component of this course, each student presents their area of research interest and at least two approaches to knowledge development in this area. In this first course in the doctoral curriculum, OHN trainees are able to explore different approaches to studying their interest area in occupational safety and health. This presentation is also developed into a paper suitable for publication, and represents the first opportunity for a scholarly product relevant to OHN practice.

Nurs 813 Qualitative Empiric Research: This course focuses on qualitative research approaches, including paradigms, designs, and methods. OHN trainees are given the opportunity to identify an OHN research problem that can be addressed through the use of a qualitative method and to write a research proposal to study that problem. This course includes a field experience in which the student gathers preliminary data regarding the proposal. OHN trainees are encouraged to focus their fieldwork on an occupational or environmental issue relevant to nursing research using a qualitative methodology.

Nurs 753 Evolving Nursing Science: This course presents the opportunity to identify and examine concepts, propositions, and theories from specific areas of nursing science. The adequacy of the existing knowledge is investigated and assumptions that underlie the knowledge are made explicit. Generalizability or transferability

of knowledge is addressed and an evaluation of the impact of knowledge on nursing practice and health policy is completed. Students have the opportunity to identify the areas of nursing science that are most relevant to OHN practice and to identify investigators who are developing nursing science through their programs of research. OHN trainees will be expected to focus their assignments in this course on the area of OHN research that they are interested in pursuing and to choose research areas that have been identified as priorities by either the National Occupational Research Agenda (NORA) or identified research priorities of the American Association of Occupational Health Nursing.

Nurs 754 Quantitative Research Designs and Methods: This course provides an overview of quantitative clinical research design and methods. Ethical and legal considerations in human subjects research, access to patient populations, sampling designs and power analysis, experimental and non-experimental designs, measurement of variables, data collection techniques, and data management are included. In this course the OHN trainee is given the first opportunity to write a research proposal on a research problem that can be addressed through the use of a quantitative design. OHN trainees are expected to focus on a research problem relevant to OHN. The guidelines for the proposal are drawn from the grant application guidelines of the National Institutes of Health. In addition to the research proposal, the trainee also writes a paper that discusses ethical problems that might occur in the implementation of their research procedures, and measures to insure representation of minorities, women, and/or children in their research protocols, how confidentiality will be maintained and how they will ensure that consent is informed. The paper produced for this course often serves as a template for an individual NRSA application.

Statistics Courses: Each doctoral student is required to complete 2 semesters of graduate level statistical coursework and may choose to take the course sequence from sociology, statistics psychology or epidemiology. OHN students are guided to enroll in the biostatistics courses in the School of Medicine. Syllabi of these courses are included in Appendix F of this application.

Nurs 800 Dissertation Seminar: Advance study and research in nursing leading to completion of the dissertation proposal. This seminar provides an opportunity to further develop the dissertation proposal and apply fundamentals of scientific writing and criticism to the development of research proposals.

Concentration Courses:

In addition to the 7 core courses, each OHN doctoral student is required to take at least 6 concentration courses. These courses are selected by the student in conjunction with the faculty advisor. Eligible courses must be taught by a member of a University Graduate Group, must be a graduate level course, and may be taken in any of the 12 colleges at the University of Pennsylvania. Continued support as a NIOSH supported trainee is contingent on approval of the plan of study by the Program Director.

There are several courses relevant to occupational health and safety that have been chosen by students in their concentration area. There are two OEHN courses in our master's curriculum (Nurs 679 Issues in Occupational Health Nursing and Nurs 680 Advanced Practice in Occupational/Environmental Health. Students without graduate degrees with an OEHN concentration or OHN experience are also advised to take Nurs 677 Environmental Toxicology Risk Assessment and Health Effects, and Nurs 678 Exposure Assessment and Safety in the Workplace. The interdisciplinary course PUBH 503 Environmental & Occupational Health (MPH course syllabi Appendix G) is also available. Students are advised to take *concentration courses* that will build their knowledge base of occupational safety and health and support their area of research focus.

To promote interdisciplinary training, the OHN doctoral students are required to participate in at least two semesters of the monthly Occupational Medicine Journal Club that is required of occupational medicine residents. The purpose of the Club is to critically review occupational, environmental and public health literature and to have informal discussions of methodological, regulatory, research, ethical, or health issues raised by reviewed articles. We have had three doctoral students participate in this series.

Additional Requirements for the Doctoral Program

Each doctoral student completes a one semester research residency. The purpose of this residency is to enhance socialization to the role of the researcher. It is a requirement of graduation. The student, with the help of the advisor/chairperson, identifies the semester during which they wish to complete their residency. Examples of activities that may occur during the residency include being a research assistant on a funded research project, preparing an individual NIH pre-doctoral training application and working with faculty on faculty research. NIOSH-supported trainees work with their advisors to design research residencies that support their goal of becoming independent researchers in the area of occupational health nursing.

Doctoral students also complete a one semester teaching residency to enhance socialization to the role of the educator. The student, with the help of the advisor/chairperson, identifies the semester during which they wish to complete their residency. Examples of activities that may occur during the residency include being a teaching assistant in an undergraduate/graduate course, working with faculty on faculty teaching projects and participating in University programs for teaching assistants. NIOSH-supported trainees work with their advisors to design teaching residencies that support their goal of advancing knowledge in the area of occupational health nursing. Opportunities are available for trainees to assist in the courses in the master's option in OHN and also to assist Dr. McCauley in integrating OHN content in undergraduate courses and presenting occupational and environmental health content in courses in the MPH program at the University of Pennsylvania.

Interdisciplinary Opportunities

Overall Goal: Increase the capacity of all undergraduate and graduate students at the University of Pennsylvania to understand the importance of the occupational and environmental health of our working populations.

The twelve schools and colleges at the University of Pennsylvania offer vast interdisciplinary opportunities. The Center for Health Outcomes and Policy Research conducts research on health care and workforce organization, financing, and outcomes, and on public policies that influence nursing and health care delivery in the U.S. and internationally. Dr. Clarke, a Core Faculty of the OEHN program, is the Associate Director of this Center. The Center is administratively located in the School of Nursing and physically housed in the School of Nursing, the Department of Sociology, and the Population Studies Center. Its faculty and students are drawn from nursing, sociology, demography, medicine, health management and policy, and health economics. Both its research and training programs are interdisciplinary.

We have joint undergraduate programs between nursing and the Wharton School of Business and have joint MSN programs between the SON and the Center for Bioethics. Students completing the Master's degree in Nursing Administration with the OEHN option take graduate course work with Wharton students. Both Dr. Clarke and Dr. Rogers are senior fellows in the Leonard Davis Institute for Health Economics at the University of Pennsylvania. Faculty hold joint appointments in Medicine, Sociology, and in the MPH program to name a few. Dr. McCauley is a faculty member of the MPH program and is also a member of the School of Medicine Center for Excellence in Environmental Toxicology. Dr. Rogers, Core Program faculty, is a member of the School of Medicine NIH-funded Center for Sleep and Neurorespiratory Biology. Students also benefit from the Institute for Environmental Studies at the University of Pennsylvania that is dedicated to improving the understanding of key scientific, economic and political issues that underlie environmental problems and their management. Dr. McCauley's research program on ethical, social and legal issues in gene-environment research includes faculty with appointments in the University of Pennsylvania Center for Bioethics. All of the University of Pennsylvania Schools and Centers are on one campus, facilitating collaborative endeavors that span basic and applied sciences, law, business, the social sciences, and the humanities. In summary, there is a rich array of opportunities for faculty and students in the SON to collaborate with faculty from other schools within the University and outside the University of Pennsylvania. In the current strategic plan for the SON, a goal has been set for increased interdisciplinary research for our students.

C.4 Results/Discussion

Training Candidates

In the last five years, we have had 14 MSN-OEHN students enter our program and 11 students have graduated having completed the master's OEHN option. The graduates of our MSN-OEHN have all either been offered jobs in occupational settings or are currently employed as advanced practice occupational health nurses.

In 2002, the master's curriculum was changed so that students do not apply into the master's level OEHN program directly, but are admitted into the basic Nursing Administration or Primary Care Practitioner Programs and then are eligible to complete the OEHN option. The Nursing Administration Program admits approximately 25 students per year and approximately the same number are admitted in the family nurse practitioner and adult practitioner program respectively. In the first two years after this curriculum change, enrollment of master's students in the OEHN option dropped. Our goal is to enroll three master's students per year. Recently the SON approved the change of the OEHN "Option" to an OEHN "minor". Our advisory committee suggested that this designation might improve the marketing of the course and also allow more MSN graduates to return to Penn specifically to take the "minor" coursework series.

Since approval of our doctoral program in OEHN we have had three admissions and one graduation. Admission to the University of Pennsylvania School of Nursing Doctoral program is contingent on combined GRE quantitative and verbal scores over 1000, GPA's over 3.50, TOEFL scores greater than 600, excellent research match with our faculty and research centers, solid recommendations and demonstrated leadership or potential as evidenced by their curriculum vitae. We receive approximately 40 applications per year for our School of Nursing doctoral program and admit approximately 10-12 students per year. Approximately 9% of our students are international students and approximately 12% are Afro-American or Hispanic. The average GRE for our enrolled students is over 1200. Since we implemented full funding for four years in 2000 and improved our doctoral progressions oversight, we have been graduating more students as our time to degree has decreased.

We had our first OEHN graduate in 2007 from our doctoral program. Dr. Victoria Dickson received her master's of science degree in nursing in Adult Primary Care in 1985 and since 1996 has been employed in the Employee Health Department of the Cigna Corporation in Philadelphia, PA. She served as a preceptor for graduate students in the master's OHN option in the Penn SON for many years. Ms. Dickson manages a comprehensive occupational health practice including direct provision of care, budget oversight, consultation on workers compensation cases, worksite drug testing, consultation on ADA, and development and management of employee health programs for 39,000 employees nationwide including "Working Well Moms" and "Triumph Program", a disability linked behavior modification program. This latter program focusing on the management of disability in the workplace served as an impetus for Ms. Dickson's research interest in self-care behavioral change in persons with heart failure. Her research is directly relevant to the health and safety needs of the aging US workforce and stems directly from issues that she is encountering in her practice in OHN. Her publications and presentations are listed below:

Presentations

- *Employee Health and Primary Care: An Innovative Approach to Improving Employee Health and Productivity* (Concurrent Session #606), AAOHN 2006 Symposium and Expo, May 10, 2006, Albuquerque, New Mexico
- *Living and Working with Heart Failure: A Qualitative Study on Employment as an Influential Variable in Self-Care Behavioral Change in Persons with Heart Failure* (Poster Session) AAOHN 2006 Symposium and Expo, May 10, 2006, Albuquerque, New Mexico
- *Wellness in the Workplace*, Workhealth Occupational Health Conference, November 2005, Bensalem, Pennsylvania
- *A Comparative Mixed Method Study of a Motivational Approach to Self-Care Behavioral Change for Persons with Heart Failure*, Heart Failure Society of America 9th Annual Scientific Meeting,, September

2005, Boca Raton, Florida.

Publications

- Riegel, B, Dickson, McMahon J, Reis B, Sayers S, Hoke L., A Motivational Counseling Approach to Improving Heart Failure Self-Care: Mechanisms of Effectiveness. *Journal of Cardiovascular Nursing*, 2006 (21:3 *In Press*)
- Dickson V, McMahon J, Reis B, Sayers S, Hoke L, Riegel B. A motivational approach effectively improves heart failure self-care (abstract). *Journal of Cardiac Failure*. 2005;11:S192.

Awards

- Johns Hopkins University ERC Pilot Project Research Training Award of \$6000

Our second doctoral student, Ms. Victoria Pak, began study in the Summer 2006. Ms. Pak, a minority student, was recruited to the PhD program by Dr. McCauley while she was an undergraduate nursing student. Ms. Pak has worked as a research assistant for Dr. McCauley and began her doctoral studies in May 2006. Ms. Pak is one of a select number of doctoral students who are admitted directly from their BSN program into the doctoral program. She is interested in chemical exposures and effects during pregnancy. While just beginning the program, she has had one manuscript accepted, one accepted pending revisions, and a third under review. She had a poster presentation at the AAOHN conference in Spring 2007. Her manuscripts/posters are listed below:

- Pak, Victoria. "Risks of Phthalate Exposure Among the General Population" Poster accepted for presentation at the AAOHN Symposium and Expo, Orlando Florida, April, 2007.
- Pak, VM., McCauley, LA. (2006) "The Risks of Phthalate Exposure among the General Population: Implications for Occupational Health Nurses," AAOHN Journal.
- Pak, VM., McCauley, LA. (2006) "How to Reduce DEHP in your NICU: A plan of simple steps to promote change," The Journal of Neonatal Nursing (In review).
- Pak VM., Nailon, GE., McCauley, LA. (2006) "Health risks of exposure to plasticizers in neonates in the NICU: An immediate call for change in health care practice," The American Journal of Maternal Child Nursing (Accepted pending revisions).

She has recently successfully passed a General Examination which tests her ability to synthesize the knowledge obtained in her eight OEHN/Epidemiology courses and to apply this knowledge to the area of OSH research.

Our third doctoral student, Tiffany Dovydaitis, graduated from our Women's Health Practitioner Program with an OEHN emphasis in June 2007 and now is a full time doctoral student. Her area of interest is female immigrant workers and intimate partner violence in the workplace

Current master's students include Cynthia Baigis, a part time master's student in the Health Care Administration/OEHN option, Rebecca Bixby, a part time master's student in Family Nurse Practitioner Program and Gunjan Rastogi-Wilson, a part time master's student in the Family Nurse Practitioner Program.

In addition to the formal training OEHN programs at the master's and doctoral level, the faculty has also established the program goal of increasing the capacity of all undergraduate and graduate students at the University of Pennsylvania to understand the importance of the occupational and environmental health of our working populations. Dr. McCauley is the course director for the undergraduate community health nursing course and 6 hours of content on OSH is integrated into this course. Students have chosen to do independent inquiry projects in OSH. Dr. McCauley also has a strong presence in the MPH program and with Dr. Ted Emmett, provides substantial OSH content within the program. Students from other disciplines have conducted capstone experiences in OSH. We have developed two new courses (Exposure Assessment and Safety in the Workplace and Environmental Toxicology: Risk Assessment and Health Effects) that are now offered at the University of Pennsylvania. The University of Pennsylvania has not previously had coursework in

introductory toxicology or human risk assessment. Likewise students had not previously had access to courses on worksite safety and exposure assessment.

The SON has a well established student recruitment program administered by the Enrollment Management Office. This program includes attendance at college, hospitals, and career fairs that support a large minority population. National and international nursing conferences are selected for outreach to applicants. On campus events are held to highlight SON initiatives and prospective students engage with faculty, current students, and enrollment staff to address needs regarding application and admission. In addition, Drs. McCauley, Clarke, and Rogers, with supportive faculty, utilize professional and scientific contacts to recruit individuals with strong potential for research training in occupational health and safety. Dr. McCauley also encourages students in the OHN master's option to apply for the doctoral program and undergraduate students to submatriculate into the OEHN option. Information on the OHN research focus area is disseminated on the University of Pennsylvania School of Nursing website, school research brochures, and at local, regional and national OHN meetings.

The University of Pennsylvania is committed to increasing the number of minority students and an organized university wide program exists to this end. Increasing diversity within the University is part of the University wide strategic plan and infrastructure exists throughout the University to support this goal, including full time recruiters for minority students. Minority presence is prized at Penn not only because it fulfills a commitment to equal education opportunities but also because it helps create the educational environment that best prepares people to contribute to an increasingly diverse and rapidly shrinking world. At the School of Nursing, the participation of minority students, faculty, and staff is valued and nurtured for the same reasons.

D. CONCLUSIONS

The University of Pennsylvania has a long standing program of graduate training in occupational health nursing. During the last 5 year funding cycle, changes have occurred that have affected program leadership, recruitment, and focus.

1. During the 1990's, students were admitted directly into an occupational health nursing master's program and could focus in either Administration or Primary Care. In 2002, the School of Nursing consolidated several of their master's programs and moved OEHN as an "option" of study available for any student admitted to the Healthcare Administration Program or the Primary Care Practitioner Programs. This change resulted in dropping numbers of students completing the OEHN option. In September 07, the "option" title was changed to "OEHN Minor" upon recommendation of our advisory panel and approved by the SON faculty senate. We will make sure that all admitted students are aware of the study option and the possibility of funding support from NIOSH. We closely align the OEHN master's student recruitment with the recruitment for our Primary Care Practitioner Program Recruitment and our Administration Program recruitment. All students applying to these programs are notified of the NIOSH-supported option in OEHN and interview with Dr. McCauley if interested. In addition, Dr. McCauley and Victoria Dickson personally contact each student that is accepted into our Primary Care Practitioner Programs and Administration program to give them more detailed information on the requirements of the OEHN minor.
2. In January 2004, Dr. McCauley was recruited to the University of Pennsylvania as the Associate Dean for Research. She became the Program Director for the OEHN option and was assisted by Ms. Kay Arendasky who had been with the program for 10 years. In June 2005, Ms. Arendasky retired and was replaced on the grant by Ms. Maryellen O'Hara who continued working closely with the master's students as had Ms. Arendasky.
3. In 2002, the University of Pennsylvania initiated a MPH program within the School of Medicine and nursing faculty has had a prominent role in the development of the curriculum of that program including coursework in core occupational safety and health content previously not available at the University. In Spring 2006, coursework was developed to replace previous courses that OEHN students took at Temple University in Philadelphia. Moving these courses to the University of

Pennsylvania allowed doctoral students to receive graduate credit for this essential content and also allowed for interdisciplinary interaction with other students at the University of Pennsylvania. The movement of these courses to the University of Pennsylvania also provides the enrichment opportunities offered by Penn's recently funded NIEHS Center for Excellence in Environmental Toxicology. Furthermore, the placement and leadership of these courses in the Penn SON highlight the significant integration of the nurse's role in toxicology, safety and industrial hygiene.

4. In July 2005, the School of Nursing received NIOSH approval and funding to offer a doctoral program in occupational/environmental nursing research and the first student received funding in Fall 2005. We currently have two students in the doctoral OEHN program.

5. We continue to incorporate within the SON strategic plan the need to increase the diversity of faculty and students in 2002.

6. Dr. McCauley has brought significant research strength and leadership to the program, has initiated doctoral training and has other well funded nursing scientists in occupational health engaged in the program. She is fortunate to have two other well-funded investigators in occupational health, Drs. Clarke and Rogers, to assist with training of doctoral students. In addition, in her Associate Dean role, Dr. McCauley has excellent opportunities to recruit future OSH researchers and to encourage other scientists to apply for funding in this area. Dr. McCauley also is a member of the University's NIEHS Center for Excellence in Environmental Toxicology and collaborates with other scientists in the Gene-Environment Core, Oxidative Stress Core, and Outreach Core.

7. Education at the University of Pennsylvania is expensive. Most of the master's students at the University of Pennsylvania obtain educational loans for their Penn education. The availability of tuition and/or stipend support from NIOSH is a powerful recruitment tool. In addition, the SON is committed to full funding for 4 years for all its doctoral students. The cost of tuition and stipend at a private university such as the University of Pennsylvania exceeds \$50,000 per year for each student. The support that is available from NIOSH clearly is an incentive for students in selecting an occupational health focus of study.

Student Publications:

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Dickson V, McMahon J, Reis B, Sayers S, Hoke L, & Riegel B: [2006] A Motivational Counseling Approach Effectively Improves Heart Health. *Journal of Cardiovascular Nursing* 21: 232-241

Dickson V, Tkacs N, & Riegel B: [2007] Cognitive influences on self-care decision making in persons with heart failure. *American Heart Journal* 154: 424-431

Pak VM, Briscoe V & McCauley LA: [2006] How to reduce DEHP in your NICU: A plan of simple steps to promote change. *Neonatal Network* 25: 447-449

Pak VM, Nailon, GE, McCauley, LA: [2007] Health risks of exposure to plasticizers in neonates in the NICU: An immediate call for change in health care practice. *The American Journal of Maternal Child Nursing* 32: 244-249

Pak VM & McCauley LA: [2007] Risks of phthalate exposure among the general population: implications for occupational health nurses. *AAOHN Journal* 55:12-17

Riegel B, **Dickson V**, Goldberg L, Deatrck J: [2007] Factors Associated With the Development of Expertise in Heart Failure Self-Care. *Nursing Research* 56: 235-243

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