



Research-to-Practice: Selected Examples from the MCOHS

More than 226 publications were completed and 365 presentations given at local, national and international levels by center faculty and/or students during the two-year period from July 1, 2007 to June 30, 2009. Below is a partial list of research projects that have and will continue to have an effect on occupational health and safety:

Reducing the Burden of Injuries On Agricultural Operations



Dr. Gerberich, and her team of co-investigators and students, leads major injury prevention studies that are the basis of regional research-to-practice efforts. These include surveillance studies of the incidence and consequences of, and risk factors for, agricultural and other injuries in Minnesota, Wisconsin, North and South Dakota and Nebraska. The study results and identification of intervention efforts are translated to practice through collaboration with regional Agricultural Extension leaders who work directly with operators and communities. Dissemination has also been accomplished through numerous peer-reviewed publications and presentations in local, national and international arenas.

Nanoparticle Exposure Assessment

With a variety of instruments, Drs. Ramachandran and Raynor, and PhD student Ji Young Park, measured the levels of engineered and incidental nanoparticles that workers may inhale at several workplaces including research laboratories, food service establishments, and die casting facilities. They used their measurements to determine the best metrics for evaluating nanoparticle exposures in different workplace settings. Industrial hygienists will

utilize this research to guide their plans for measuring worker exposures to airborne nanoparticles.

Nanoparticle Releases During Vehicle Recycling



Most parts from automobiles are reused or recycled at the end of the useful lives of the vehicles. Because car manufacturers now use nanocomposite materials in their vehicles, they are concerned that workers involved in recycling components from automobiles may receive harmful exposures to airborne nanoparticles emitted from the parts as they are shredded for recycling. Dr. Raynor and MPH student, Jessica Ingraham, are using a range of sampling instruments and analytical techniques to evaluate airborne particles generated as a granulator shreds nanocomposite test plaques and test plaques that do not contain nanoparticles. This work is being performed in conjunction with Argonne National Laboratory. The study will tell industrial hygienists whether they should anticipate nanoparticle exposures for workers during the recycling of vehicle parts.

Violence Against Nurses: The Next Step

Identification of risk factors for work-related physical assault by Drs. Gerberich and Nachreiner, their colleagues, and students, are particularly important to application of relevant interventions. These risks include working in environments with low lighting, not carrying cell phones or alarms, working in emergency and psychiatric departments and long-term care facilities, and increasing hours of patient contact. Dissemination to professionals has been accomplished through numerous peer-reviewed publications and professional presentations. Dr. Gerberich has also been invited to participate in a major violence prevention intervention effort that considers results from this and related studies.

Preventing Violence Against Teachers



Dr. Gerberich, research team members, and students have been providing translation of research data from the Minnesota study of "Violence Against Teachers: Etiology and Consequences," to practice throughout the school systems, in collaboration with their dedicated advisory board of teachers. Risk factor identification, which serves as a basis for development of relevant interventions, includes consideration of various environmental factors, assault deterrents, violence policies, and school financial resources. To date, results have been presented at numerous major professional meetings, including audiences involving teachers, and in publications for peer-reviewed literature.

Preparation of Occupational Medicine Physicians

Drs. Baker, Greaves, Zheng and Brosseau, along with a resident physician, assessed the demographic profile and opinions of current United States occupational medicine physicians on the importance of specific core competencies required of their specialty. Physicians valued core competencies related to hazard recognition, behavior and communication most highly. Professionalism, interpersonal communications and clinical occupational medicine were ranked as most valuable for employers. These observations provide guidance for the content of training programs, suggesting that greater emphasis be placed on career development skills.

Improving Performance of Isolation Rooms

Hospitals house some patients in negative-pressure airborne infection isolation rooms (AIIRs) to protect

workers, visitors, and other patients from diseases that can be spread through the air. The amount of pressure differential and airflow required for effective control of airborne agents from these rooms is uncertain.



Dr. Raynor and PhD student Rolando Gonzalez are studying the effects of pressure difference, airflow, and room entry and exit by staff on the containment of airborne agents by AIIRs. Their results will be used by the American Institute of Architects and Centers for Disease Control and Prevention to specify design parameters for isolation rooms.

Screening for Lead Exposure in Pregnancy

Because lead is readily transferred across the placenta, maternal exposure may result in potentially toxic fetal exposures. With evidence that blood lead at levels below the Centers for Disease Control and Prevention "level of concern" in children may cause long-term cognitive and neurobehavioral effects, the use of a questionnaire for risk determination in pregnant patients was recommended by the Minnesota Department of Health (MDH) for use in pregnant patients. Drs. RoeberRice and Baker (Occupational and Environmental Medicine), in cooperation with the MDH, conducted a pilot study to identify risk factors in pregnant women that correlate with elevated levels of blood lead. This work is being used to target screening more precisely toward those women at increased risk and develop clinical recommendations for health care providers.

Minnesota Health Partnership Disability Prevention Project

The Minnesota Health Partnership Coordinated Healthcare and Disability Prevention Project was sponsored by the Robert Wood Johnson Workers' Compensation Health Initiative. This demonstration and evaluation project piloted and evaluated a model of health care that combines the best practices of general health and workers' compensation medical care. Results of this effort have been disseminated through national medical journals such as the

American Family Physician, online medical references such as Up To Date, and the Workers' Compensation Health Initiative Website.



Relevant information has also been included within the formal curriculum of family medicine residency programs and the American College of Occupational and Environmental Medicine Disability Prevention Guideline.

Pesticide Exposures to Farmers and Their Families



Drs. Alexander and Baker and a team of researchers evaluated how much pesticide exposure occurs to farm family members when chemicals are used in real-world scenarios. The study identified pathways of exposure to the farmer, spouse, and children age 4-17, and examined how methods of exposure assessment can be improved. The results of the study will aid the development of better metrics of exposure for use in studies of the health effects of pesticides. To date, the results of this study have been used in developing an educational booklet produced in collaboration with the Purdue University Extension Service entitled "Family Exposure to Pesticides... a discussion with farm families". This booklet discusses the risk of pesticide exposures and how farm families can limit their exposure.

Postpartum fatigue among employed mothers is important in its own right, and may lead to more serious problems such as depression

A prospective study of employed women's health after childbirth revealed that 50% of mothers had returned to work by 11 weeks postpartum. On

average these mothers experienced four childbirth-related symptoms, most frequently fatigue.



On average, mothers slept 6.8 hours per night with two awakenings per night, with a net result that 30% of mothers reported "never or rarely" feeling refreshed after awakening in the morning. While most mothers have declining levels of fatigue over the first two weeks postpartum, some experience relentless fatigue. For these women, an intervention aimed at encouraging rest may be essential for preventing depression, the most prevalent serious complication of pregnancy. Postpartum fatigue may be caused by recovery from childbirth, childcare responsibilities, reduced sleep and anemia. The study by Professors McGovern, Dowd and Gjerdigen was published in *Annals of Family Medicine* (2007) 5: 519-527, and can help occupational health providers counsel pregnant women about expectations for recovery and return to work after childbirth.

Postpartum Depression and Health Services Utilization and Costs



Professors McGovern and Dowd collaborated with doctoral student, Rada Dagher, and others to investigate the incidence and costs of postpartum depression among employed women after childbirth. Depressed women had consistently higher health services costs than non-depressed women. A six-fold increase in counseling visits and a four-fold increase in emergency department visits appeared to be driving the cost differences between depressed and non-depressed mothers. Research findings

suggested the need for employers to evaluate health plan coverage and employee access to preferred providers, using evidence-based best practices screening and treatment for depression in primary care.

Packaging for Containing Mercury from Broken Bulbs



After commercial and industrial facilities replace fluorescent bulbs, the U.S. Environmental Protection Agency (EPA) allows them to ship the used bulbs to recyclers via common carrier to encourage recycling. The packaging for the bulbs bound for recycling must prevent the release of mercury should the bulbs be broken during shipping to avoid unnecessary exposures for truckers, recycling facility workers, and the public. Dr. Brosseau, recent MS graduate Tracy Glenz, and MS student Maren Korpela have studied the ability of a variety of bulb shipping materials to prevent mercury release should bulbs be broken during transport. Their findings are being used by bulb suppliers and waste handlers in instructions to facilities who are shipping their bulbs for recycling.

Mothers' Perceptions of Pesticide Exposures

Professors McGovern and Alexander and PhD Student, Maggie Stedman Smith collaborated with the University of Minnesota's Regional Sustainable Development Partnership to develop and implement a needs assessment of perceived pesticide exposures among mothers of young children in the Red River Valley. The research team employed Photovoice as a method for the mothers to document their concerns with digital cameras and create a photography exhibit to communicate their needs to decisions makers. (See <http://redriverkids.blogspot.com/>). Study findings revealed the need for a pesticide education program to be delivered by public health nurses serving parents of young children to address concerns about pesticide exposure, especially aerial spraying, mosquito fogging, safe use and storage of pesticides

and effects on fetal and child health. A subsequent intervention grant led to the development of the curriculum initiative and, to date, 27 public health nurses have participated in the program with outreach to ~ 600 families in the region. Ruth Rasmussen, Director of MCOHS Continuing Education and Dr. Heidi RoeberRice, Occupational Medicine, are collaborating with the Regional Sustainable Development Partnership on this second phase of the project.



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Mother of children under 5 years, northwestern MN: "This is my neighbor's son fogging for mosquitoes. He is probably 12 years old. He has no mask or anything covering his face or hands, but that is very common."



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Same mother: "This is my driveway. The spray for the city had come around...It's so hard 'cause of the mosquito spraying. I'm worried about West Nile too. I wish the city could notify us in advance..." (to get the children and toys inside)

Quantitative Aid for Decision Making in Industrial Hygiene



Dr. Ramachandran, Dr. John Mulhausen, and PhD students Perry Logan and Monika Vadali, have developed a method for incorporating professional judgment quantitatively into industrial hygiene decision-making. They are conducting a NIOSH-funded study that looks at the accuracy and determinants of such decisions. Industrial hygienists from major companies such as 3M, Intel Corporation, Pfizer Inc., Rohm and Haas, Merck, and W.L. Gore, are participating in the study. Results indicate that targeted training dramatically improves decision-making accuracy.

Taconite Workers Health Study



Drs. Ramachandran and Raynor and doctoral student, Jooyeon Hwang

Minnesota houses one of the world's largest bodies of iron ore, and supplies 65% of the ore needed for North American steel production. Mining has been in place in the state since the early part of the previous century. During that time, thousands of workers have had jobs in this industry. Worker studies in the early 1990s indicated the presence of abnormal chest x-rays, suggestive of silica-related exposures. More recently, a cohort of taconite workers has had an apparent excess of mesothelioma, as determined via the state's cancer surveillance system. Although undoubtedly related to asbestos exposure, the exact cause of this problem and its significance, along with

a comprehensive view of the health of this industry is being determined.

Led by several MCOHS investigators (Drs. Mandel, Alexander, Ramachandran, Raynor, Perlman), and involving students (Jooyeon Hwang, Christine Lambert, Jinny Johnson, Monika Vadali) several worker studies are in progress and include:

- cohort mortality study of all causes of death in taconite workers (n=68,000);
- cancer incidence study that focuses on the major cancers associated with asbestos exposure;
- screening survey of occupational lung disease within current and former taconite workers and their spouses;
- workplace exposure assessment that utilizes current and past exposure data and complements the above-mentioned studies.



CONTACT INFORMATION:

Susan Goodwin Gerberich, PhD, Director
Midwest Center for Occupational Health and Safety
Division of Environmental Health Sciences
School of Public Health, University of Minnesota
420 Delaware Street SE – MMC – 807
Minneapolis, Minnesota 55455
Telephone: 612-626-5464 or
1-877-366-2647 (1-877-36-MCOHS)
E-mail: gerbe001@umn.edu
Website: www.mcohs.umn.edu