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“SAFETY COMES FIRST”

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Physicians' Extended Work Shifts Associated with Increased Risk of Medical Errors That Harm Patients

Originally Published on 12/14/2006

First-year doctors-in-training reported that working five extra-long shifts — of 24 hours or more at a time without rest — per month led to a 300 percent increase in their chances of making a fatigue-related preventable adverse event that contributed to the death of a patient, according to a new study. Preventable adverse events are defined as medical errors that cause harm to a patient.

The study, which was funded by the Department of Health & Human Services' (HHS) Agency for Healthcare Research and Quality (AHRQ) and the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health, was published December 12 in the online journal PLoS Medicine.

The study carries significant implications for the way first-year residents, or interns, are trained in the United States. Unlike previous studies on interns and fatigue that have suggested a link between resident work hours and medical errors that harmed patients, this study has a sample size large enough to demonstrate that the rate of preventable adverse events grows when interns work shifts of 24 hours or more.

According to the study, interns were three times more likely to report at least one fatigue-related preventable adverse event during months in which they worked between one and four extended-duration shifts. In months in which they worked

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Nanotechnology: New Study on Workplace Safety Practices Released

Published on 11/16/2006

“The use of conventional practices for handling nanomaterials appears to stem from a lack of information on the toxicological properties of nanomaterials, as well as nascent regulatory guidance regarding the proper environmental, health and safety practices that should be used with them”

The first comprehensive, international survey of workplace safety practices in the burgeoning nanotechnology industry finds that many nanotech companies and laboratories believe nanoparticles — specks of matter that are smaller than living cells — may pose specific environmental and health risks for workers. In response, companies are reporting that they are developing special programs and procedures for mitigating risks to workers and consumers. Yet, due in part to a lack of general information regarding nanomaterials risks, companies and labs have workers using conventional environmental, health and safety (EHS) practices when handling nanomaterials, even though the practices were developed to deal with bulk materials that can have markedly different chemical properties than their nano-sized counterparts.

The use of conventional practices for handling nanomaterials appears to stem from a lack of information on the toxicological properties of nanomaterials, as well as nascent regulatory guidance regarding the proper environmental, health and safety practices that should be used with them," said Dr. Kristen M. Kulinoski, Director of the International Council on Nanotechnology, a coalition of academic, industrial, governmental, and civil society organizations that commissioned the survey.

Both the survey and report, *A Survey of Current Practices in the Nanotechnology Workplace*, were produced by a research team from the University of California, Santa Barbara (UCSB) that includes environmental scientists, sociologists, and corporate environmental management experts, and anthropologists.

“This is an important study because it reinforces the perspective that there needs to be more information regarding the toxicology of new nanomaterials and how they should be handled in the contexts of industry, consumers and the environment,” said Dr. Patricia Holden, principal investigator (PI) for this project and associate professor in the Bren School at UC Santa Barbara where she co-advised four Master’s students in this research as part of their group thesis.

“The value of this study is that we brought together knowledge of academic and industry laboratory practices, toxicologic risk assessment, and social science approaches. This allowed us to gather and analyze a unique set of detailed data from... (continued on page 4)



Security of Radioactive Materials

Security of all hazardous materials is a primary concern of DOES and should be a primary concern for all individuals using hazardous materials. Radioactive materials are no exception to this rule. All radioactive material (this includes stock vials and stock solutions) shall be secured against unauthorized access or removal unless you or someone from the laboratory authorized to use the material is present (reference OAC 3701:1-38-17; ODH Broad Scope License).

Equipment containing radioactive materials, i.e., cabinets, refrigerators, freezers, etc. that is located in hallways must be locked or contain a secure lock-box inside the storage unit. Moreover, a refrigerator containing a secure lock-box should also have a special label posting on the outside of the refrigerator.

If the radiation-labeled equipment does not contain radioactive material and is not being used for radioactive material, then the equipment should be decommissioned. For equipment that is used occasionally for radioactive material storage, the equipment shall be locked even if no radioactive material is currently present.

An unsecured refrigerator or freezer labeled as radioactive but which contains no radioactive material is considered a security violation as per RSOF guidelines. Radioactive waste does not need to be secured in the same manner as other radioactive material. However, waste is to be kept in the waste area of the laboratory and its activity sensibly minimized.

For clarity remember, *if you or someone from your lab authorized to use radioactive material is not present, all radioactive material must be secured.* Call DOES at ext. 2906 with any questions regarding security procedures for radioactive materials.

“If you or someone from your lab authorized to use radioactive material is not present, all radioactive material must be secured.”



Nanotechnology: New Study on Workplace Safety Practices Released (continued from page 2)

around the globe, establishing a beachhead for future studies and a first step toward developing safe handling guidelines for nanomaterials," said Dr. Barbara Herr Harthorn, principal investigator and co-director, NSF Center for Nanotechnology in Society, UC Santa Barbara (and co-PI on the ICON study).

Survey data were collected this summer from 64 organizations in North America, the European Union, Asia, and Australia. North American and Japanese respondents each represented 39 percent of those surveyed, with 17 percent from the European Union and 5 percent from Australia. About 80 percent of responses were from private-sector companies, including for-profit entities that are developing or have developed at least one product containing nanomaterials.

"The National Institute of Occupational Safety and Health (NIOSH) is pleased to see the ICON report, which we will review with great interest in our ongoing efforts to further scientific research and provide interim recommendations on safe approaches to nanotechnology," said NIOSH Director John Howard, M.D. "We appreciate UCSB's partnership, early in their process, in inviting us to participate in the planning and design of the survey. This work will give researchers a better understanding of current work practices in the nanotechnology industry, and valuable insight into current information gaps that might exist in understanding and managing the occupational health implications of this revolutionary technology."

Workers occupy the frontiers of nanotechnology development. Engineered nanomaterials are intentionally designed to take advantage of properties that emerge at the nanoscale, and nanotech workers typically face the greatest exposure risks from engineered nanomaterials. For example, in products containing nanomaterials that are incorporated in a plastic composite or other solid matrix, risks to consumers are believed to be minimal because the materials are locked up tight. But workers who make the products, and who handle the nanomaterials in raw form, face more risk of exposure.

There remains little specific information about the potential harm workers face from most engineered nanomaterials. By attempting to understand how employers and workers are currently approaching the development and implementation of workplace safety practices, ICON and UCSB are taking an important step toward the development and global adoption of best practices to minimize exposure and hazard from engineered nanomaterials.

"This report highlights some key obstacles to the responsible and successful development of nanotechnology. While a majority of companies report a lack of environmental health and safety information to guide good risk management, few companies conduct their own studies to develop this information," said Tracy Godfrey, a project analyst with Environmental Defense."

Nanotechnology: New Study on Workplace Safety Practices Released (continued from page 4)

"Environmental Defense is working to address these important gaps through our efforts to increase risk research, improve government policy, and develop proactive corporate standards."

The survey and report were part of a two-phase project aimed at determining how industry is managing the occupational safety risks that may be posed by certain nanomaterials.

"When ICON began discussing the need for best-practices guidelines for handling nanomaterials, we quickly realized there was little documentation of existing workplace policies and practices," Kulinowski said. "It's hard to know where you need to go if you don't know where you are. With only limited anecdotal evidence of EHS practices available, we decided that a more comprehensive evaluation was needed."

The first-phase report, *Current Knowledge and Practices regarding Environmental Health and Safety in the Nanotechnology Workplace*, was issued last month. It offered a review and analysis of existing efforts to develop "best practices" for workplace safety in the nascent nanotech industry. The second-phase report takes a snapshot of industry practices currently in use. Taken together, the two reports provide the first-ever overview of environmental health and safety in the nanotechnology workplace.

ICON, which commissioned the survey and worked with UCSB's team during both phases of the project, is committed to developing and communicating information regarding the potential health and environmental risks of nanotechnology and of thereby fostering risk reduction while maximizing societal benefits of the growing industry. ICON is administered by Rice University's Center for Biological and Environmental Nanotechnology (CBEN).

ICON issued a call for proposals for the study in late 2005 and awarded the grant to the UCSB team in March. UCSB's project leader is Patricia Holden, associate professor of environmental microbiology. The UCSB team includes Magali Delmas, associate professor of corporate environmental management; Richard Appelbaum, professor of sociology and global and international studies; Barbara Herr Harthorn, research anthropologist and principal investigator and co-director of UCSB's Center for Nanotechnology in Society; Bren Master's students Gina Gerritzen, Keith Killpack, Maria Mircheva and Leia Huang; Sociology Ph.D. candidate Joe Conti.

***Mark Your Calendar:
MLK Day is January 15***

Physicians' Extended Work Shifts... *(continued from front page)*

*“It is clear
that sleep
deprivation
takes its toll
over time on
physicians”*

more than five extended-duration shifts, the doctors were seven times more likely to report at least one fatigue-related preventable adverse event and were also more likely to fall asleep during lectures, rounds, and clinical activities, including surgery.

"Given the number of extended-duration work shifts that interns routinely put in, these findings are very troubling," said AHRQ Director Carolyn M. Clancy, M.D. "These findings underscore the urgency of focusing on both high-quality learning and high-quality patient care."

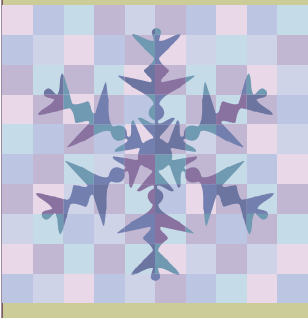
Laura K. Barger, Ph.D. (a research associate in medicine at Brigham and Women's Hospital and Harvard Medical School in Boston) and her colleagues analyzed the results of a national, Web-based survey in which 2,737 interns completed 17,003 monthly reports. Researchers assessed the association between the number of extended-duration shifts worked in the month and the reporting of significant medical errors, preventable adverse events, and attentional failures.

The findings are significant because interns routinely work extended shifts in teaching hospitals. Guidelines for graduate medical education in the United States still allow up to nine "marathon" shifts (30 hours at a stretch) per month, even though the total number of hours worked is capped. This study shows that the long shifts worked by interns are bad for patient safety, as they are more likely to cause harm that would not otherwise happen.

"It is clear that sleep deprivation takes its toll over time on physicians," Dr. Barger said. "While tradition holds that forcing young doctors to work extended-duration shifts teaches them to become better doctors, the evidence shows that this method of education is dangerous to patients."

The study builds on previous research and the growing awareness that sleep-deprived interns working 24-hour shifts make many more serious medical errors while working in intensive care units and crash their cars more often than those whose work is limited to 16 consecutive hours; that most interns are working hours that exceeded the limits of a 2003 national standard implemented by Accreditation Council for Graduate Medical Education; and that interns are more likely to injure themselves mistakenly with a needle or another sharp instrument when working in a hospital more than 20 consecutive hours, or at night.

"Considered as a whole, the evidence demonstrates that academic medicine is failing both doctors and patients by routinely requiring exhausted doctors to work marathon 30-hour shifts. The human brain simply does not perform reliably for 30 consecutive hours without sleep," said Charles A. Czeisler, M.D., Ph.D, Chief, Division of Sleep Medicine at Brigham and Women's Hospital and Baldino Professor of Sleep Medicine at Harvard Medical School.



Upcoming Training Sessions*

*As always, consult our website (<http://does.case.edu>) for a full schedule of training sessions

New Radiation Safety Training

Retraining is required annually.

DOES conference room - Service Building 1st Floor

PREREGISTRATION IS *REQUIRED* ! - Please call 368-2906

X-Ray Safety Training

DOES conference room - Service Building 1st Floor

PREREGISTRATION IS *REQUIRED* ! - Please call 368-4601 or email jxb153@case.edu

Laser Safety Training

DOES conference room - Service Building 1st Floor

PREREGISTRATION IS *REQUIRED* ! - Please call 368-4600 or email hwj@case.edu

The Laser Safety training schedule is now available online at the DOES website <does.case.edu> under Laser Training.

New Bloodborne Pathogen Training

Please call 368-2907 to preregister for this class.

ALL NEW WORKERS MUST TAKE THIS IN-CLASS SESSION.

Class Objective: To go over the Bloodborne Pathogen Standard

Class Frequency and Time: The class is offered every Tuesday from 3:00 to 4:30 pm. Location: The class is held in the DOES conference room in the Service Building First Floor unless otherwise specified in the calendar.

Bloodborne Pathogen Re-Training

Please call 368-2907 to preregister for this class.

There is an online version of this class.

Class Objective: Retrain workers annually for the Bloodborne Pathogen Standard

Class Frequency and Time: The class is typically offered twice a month. It is approximately 1 hour in duration.

Location: The class is held in the DOES conference room in the Service Building First Floor unless otherwise specified in the calendar.

Formaldehyde, Benzene, Methylene Chloride, and Vinyl Chloride Retraining

Please call 368-2907 to preregister for this class. There are online versions of Formaldehyde and Benzene retraining. If you take the online versions of Benzene or Formaldehyde you do not have to take the class.

Chemical Safety (OSHA Lab Standard Training)

Please call 368-2907 to preregister for this class.

ALL NEW WORKERS MUST TAKE THIS IN-CLASS SESSION.

Class Objective: To train all university personnel using hazardous chemicals in a laboratory setting in basic chemical safety principles and the requirements of the OSHA Laboratory Standard 1910.1450.

Class Frequency and Time: The class is offered every Tuesday from 1:00 to 3:00 pm. Also additional classes are available.

Location: The class is held in the DOES conference room in the Service Building First Floor unless otherwise specified in the calendar.

Hazard Communication Training (Right-to-Know)

See website <does.case.edu> for schedule.

Radiation Safety Retraining

Please retrain on the Internet @: <http://does.case.edu>

Annual Respirator Training

DOES conference room—Service Building 1st Floor.

PREREGISTRATION IS REQUIRED ! - Please call 368-2907

Note: *There is an online version of this class.* If you take the online version you do not have to take the class. But you still need to come in for a fit test.

(Again, for a complete listing, please consult the DOES website at <<http://does.case.edu/>>)

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