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NIOSH alert: Do more to protect health workers from chemo agents

Exposure continues despite PPE, precautions

Current work practices are not adequate to protect health care workers from chemotherapeutic agents and other dangerous drugs, and hospitals need to be more vigilant in their efforts to prevent exposure, according to a hazard alert from the National Institute for Occupational Safety and Health (NIOSH).

Health care workers are being exposed to possible reproductive and carcinogenic hazards despite the use of engineering controls and personal protective equipment, the alert cautioned. For example, residue may linger on contaminated surfaces, such as IV poles; may become aerosolized when bedpans are emptied or IV lines flushed; or may be absorbed through the skin when drugs spill on clothing.

In all, more than 5.5 million health care workers may be at risk from exposure to hazardous drugs, NIOSH said.

"People thought the problems were solved when [pharmacists and pharmacy technicians] started working with biological safety cabinets," says **Thomas Connor**, PhD, a research biologist with NIOSH in Cincinnati and an author of the alert. But in research studies, Connor and colleagues found evidence of drug residue on work surfaces. "Even with biological safety cabinets, there was contamination everywhere," he says.

Exposure may occur in these situations:

- Drugs are reconstituted or diluted.
- Nurses or others expel air from syringes or give injections, and small amounts are aerosolized.
- Uncoated tablets are counted or dosed in a unit-dose machine.
- Health care workers touch contaminated surfaces, patients' body fluids, or contaminated clothing and linens.
- Workers prime the IV with drug-containing solution or administer the drug with the IV.

"Every step along the way, you have the potential for release and exposing the workers," says Connor. "I don't think people are aware of

it. They can't see it [because the drugs are colorless] and don't think there can be a spill."

(The alert contains further information on exposure-prone activities. It is available at www.cdc.gov/niosh/docs/2004-HazDrugAlert/pdfs/2004-HazDrugAlert.pdf. **See excerpt, p. 72.)**

The Oncology Nursing Society, (ONS) based in Pittsburgh, welcomed the alert, which reflected their longtime concerns. In fact, exposures are increasing as chemotherapy drugs are used to treat a wider range of conditions, such as rheumatoid arthritis, multiple sclerosis, and lupus, notes **Martha Polovich**, MN, RN, AOCN, an oncology clinical nurse specialist at Southern Regional Medical Center in Riverdale, GA, and a member of the NIOSH working group on antineoplastic and other hazardous drugs.

At the same time, nurses assume they are protected and become complacent, she says. "We still have people who don't take it seriously." They don't see bad things happening from exposures. [They think,] 'I've given chemo for 20 years. Nothing bad happened to me, so it must be OK.'"

Bill Borwegen, MPH, occupational safety and health director for the Service Employees International Union (SEIU), also lauded the extensive alert, which is 93 pages long. "If hospitals voluntarily started adhering to the recommendations in this document, everyone would be safer," he says.

As a first step, hospitals should conduct an analysis of the potential hazards and make a list of hazardous drugs, the alert says. The NIOSH alert provides a list of dangerous drugs, and the list will be placed on-line at www.cdc.gov/niosh (on the health care worker page) and updated periodically.

The list includes antineoplastic agents as well as some antivirals, antibiotics, hormonal agents, and bioengineered drugs.

The list is likely to grow — and so is the population at risk, says Connor. "The number of cancer patients is going to increase, so there's going to be more need for more drugs," he explains. "Clinicians are able to use higher doses of drugs because there are ways to reduce the side effects, which means nurses and pharmacists will be exposed to higher doses. All of these [issues] are leading to the potential for more exposures."

As hospitals purchase new drugs, they should consider adding them to their own list of hazardous drugs. In fact, identifying and updating the list of drugs that pose occupational hazards is a requirement of the Hazard Communication Standard of the U.S. Occupational Safety and Health Administration (OSHA). **(See related article, p. 73.)**

Employee health professionals and safety managers should conduct a walk-through to trace the use of the drugs and the potential hazards to a variety of employees. "Look at places where you may have problems with contamination or hazards: high-traffic areas where there's preparation; proper storage; look at what type of gloves and gowns are being used," Connor advises. "Every step along the way [from the pharmacy to disposal], produces some waste material."

For example, vinyl gloves are not effective chemical barriers. Health care workers handling

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Editor: **Michele Marill**, (404) 636-6021, (marill@mindspring.com).
Vice President/Group Publisher: **Brenda Mooney**, (404) 262-5403, (brenda.mooney@thomson.com).
Editorial Group Head: **Coles McKagen**, (404) 262-5420, (coles.mckagen@thomson.com).
Senior Production Editor: **Ann Duncan**.

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Editorial Questions

For questions or comments call **Michele Marill** at (404) 636-6021.

these drugs should use special gloves designed for that purpose, says Connor. NIOSH recommends double-gloving and nonpermeable gowns. The outer glove should cover the cuff of gown sleeve, he adds. "We don't recommend lab coats because they just absorb the drug and press it against the skin."

The proper precautions often are not followed, according to a recent survey of oncology nurses. **(See article, below.)**

The hazard alert is designed for both employers and employees. Educating workers to handle hazardous drugs or the related contaminated waste in a safe manner is a major emphasis.

"People need to realize that a lot of these drugs were chemical warfare agents in World War I," adds Borwegen, who was a member of the NIOSH working group. "A lot of people don't realize how dangerous these agents can be."

Employees also need to understand the wide range of tasks that can lead to exposure, he says. "Even some of the more innocuous work tasks may be putting workers at risk — workers emptying the bedpan of the patient who was administered chemotherapeutic drugs. Just flushing the toilet can aerosolize the drugs."

The alert describes incidents that led to exposures, and even symptoms, in health care workers.

(Continued on page 73)

More chemo protection is needed: Gown, goggle use low

Nurses who prepare and administer chemotherapy agents in outpatient settings often don't use the proper gloves or other recommended personal protective equipment (PPE), according to a survey of oncology nurses.[1] Furthermore, few nurses who handle chemotherapeutic drugs received health evaluations that included reproductive and cancer evaluation, the survey found.

Although the study found an increase in the use of PPE among nurses compared to earlier research, the PPE use did not reflect widespread adherence to recommendations of the National Institute for Occupational Safety and Health (NIOSH).

In fact, the study found less use of PPE among nurses with more years of oncology experience.

"I hear nurses all the time say, 'This isn't hazardous,'" says **Sue Martin**, DNSc, RN, AOCN, a Long Island, NY-based consultant specializing in health care issues related to oncology. "I've had seasoned nurses who have worked with drugs for many years say, 'I don't have to wear gloves. I know how to make sure I'm not exposed.'"

The study underscores the importance of educating oncology nurses, as outlined in a recent NIOSH hazard alert. **(See related article, p. 72.)**

NIOSH recommends the use of chemotherapy gloves, low-permeability disposable gowns and sleeve covers, and eye and face protection. Respiratory protection should be available when biological safety cabinets are not adequate to protect against inhalation exposure, the agency says.

But a survey of 263 members of the Oncology Nursing Society (ONS), based in Pittsburgh, found that lab coats were used most often during administration of chemotherapy. The study also found a significant use of PVC (or vinyl) gloves, which are not protective against these agents.

Goggle and mask use was rare, the study found. The nurses worked in outpatient centers, both hospital-based and community-based.

"Nurses don't necessarily consider gowns a necessity for administering chemotherapy up to this point," says **Martha Polovich**, MN, RN, AOCN, an oncology clinical nurse specialist at Southern Regional Medical Center in Riverdale, GA, and an author of the ONS chemotherapy and biotherapy guidelines and recommendations for practice. "Even people who wear gloves think, 'If I use good technique, I won't contaminate my clothing.' But we know now that's not the case."

The risk is particularly great in office or clinic settings, where a nurse may prepare as well as administer the drugs, she says. The study found nurses were responsible for preparing chemotherapy in 74% of community-based practices.

Medical surveillance also remains an area of concern, the authors concluded. Most of the respondents said they received no medical evaluation at all. Just 46% received health evaluations from their employer, and half of those occurred only as a preemployment medical exam. Only 6% said their health evaluation included a reproductive and cancer evaluation.

Essentially, no one is monitoring the effects of long-term handling of these hazardous drugs, Martin says. In Europe, more research has been conducted on exposure and health effects related to chemotherapeutic agents, she says.

"We don't have a really good handle on the true effects of handling these agents in the United States," she says.

Reference

1. Martin S, Larson E. Chemotherapy-handling practices of outpatient and office-based oncology nurses. *Oncology Nursing Forum* 2003; 30:575-581. ■

Warning! Handling Hazardous Drugs

Health care workers who prepare or administer hazardous drugs or who work in areas where these drugs are used may be exposed to these agents in the air or on work surfaces, contaminated clothing, medical equipment, patient excreta, or other sources. Studies have associated workplace exposures to hazardous drugs with health effects such as skin rashes and adverse reproductive events (including infertility, spontaneous abortions, or congenital malformations) and possibly leukemia and other cancers.

The health risk is influenced by the extent of the exposure and the potency and toxicity of the hazardous drug. Potential health effects can be minimized through sound procedures for handling hazardous drugs, engineering controls, and proper use of protective equipment to protect workers to the greatest degree possible.

Employers of health care workers should:

- Ensure that written policies address medical surveillance of health care workers and all phases of hazardous drug handling including receipt and storage, preparation, administration, housekeeping, deactivation, and cleanup and disposal of unused drugs and contaminated spills and patient wastes.
- Formally seek input from employees who handle drugs in developing a program for preventing exposure.
- Prepare a written inventory identifying all hazardous drugs used in the workplace, and establish a procedure for regular review and update of the inventory.
- Make guidance documents, Material Safety Data Sheets (MSDSs) and other information available to those who handle hazardous drugs or work in an area where hazardous drugs are handled.
- Provide training to employees on the recognition, evaluation, and control of hazardous drugs.
- Ensure that horizontal laminar flow workstations that move the air from the drug toward the worker are never used for the preparation of hazardous drugs.
- For hazardous drug preparation, provide and maintain ventilated cabinets designed for worker protection. Examples of these include biological safety cabinets (BSCs) and containment isolators that are designed to prevent hazardous drugs inside the cabinet from escaping into the surrounding environment. The exhaust from these cabinets should be HEPA-filtered and whenever feasible exhausted to the outdoors (away from air intake locations). Additional equipment, such as closed-system drug-transfer devices, glove bags, and needleless systems will further protect workers from exposures when used properly.
- Establish and oversee the implementation of appropriate work practices when hazardous drugs, patient wastes and contaminated materials are handled.
- Ensure training in and the availability and use of proper personal protective equipment (PPE) to reduce exposure via inhalation, ingestion, skin absorption, and injection of hazardous drugs as required based on the results of a risk assessment and the OSHA PPE Standard. PPE includes chemotherapy gloves, low-lint, low-permeability disposable gowns and sleeve covers, and eye and face protection. NIOSH-certified respiratory protection is needed when equipment such as biological safety cabinets are not adequate to protect against inhalation exposure. Surgical masks do not provide adequate respiratory protection.
- Provide syringes and intravenous (IV) sets with Luer-Lok fittings for preparing and administering hazardous drugs, as well as containers for their disposal. Closed-system, drug-transfer devices and needleless systems should be considered to protect nursing personnel during drug administration.
- Complete a periodic evaluation of workplace hazardous drugs, equipment, training effectiveness, policies, and procedures to reduce exposures to the greatest degree possible.
- Comply with all relevant U.S. Environmental Protection Agency Resource Conservation and Recovery Act regulations related to the handling, storage, and transportation of hazardous waste.

Health care workers should:

- Participate in standardized training on the hazards of the drugs handled and equipment and procedures used to prevent exposure.
- Review guidance documents, MSDSs, and other information resources for hazardous drugs handled.
- Be familiar with and be able to recognize sources of exposure to hazardous drugs.
- Prepare these agents in a dedicated area where access is restricted to authorized personnel only.
- Prepare these agents within a ventilated cabinet designed to protect workers and adjacent personnel from exposure and to provide product protection for all drugs that require aseptic handling.
- Use two pairs of powder-free, disposable chemotherapy gloves with the outer one covering the gown cuff whenever there is risk of exposure to hazardous drugs.
- Avoid skin contact by using a disposable gown made of a low-lint and low permeability fabric. The gown should have a closed front, long sleeves, and elastic or knit closed cuffs and should not be reused.
- Wear a face shield to avoid splash incidents involving eyes, nose, or mouth when adequate engineering controls are not available.
- Wash hands with soap and water immediately before using and after removing personal protective clothing, such as disposable gloves and gowns.
- Use syringes and IV sets with Luer-Lok fittings for preparing and administering these agents and place drug-contaminated syringes and needles in chemotherapy sharps containers for disposal.
- When additional protection is necessary, use closed-system, drug-transfer devices, glove bags and needleless systems within the ventilated cabinet.
- Handle hazardous wastes and contaminated materials separately from other trash.
- Decontaminate work areas before and after each activity with hazardous drugs and at the end of each shift.
- Clean up spills immediately while using appropriate safety precautions and PPE unless the spill is large enough to require an environmental services specialist.

Source: National Institute for Occupational Safety and Health, Cincinnati.

Chemo case studies: How HCWs became exposed

When the complete tubing system fell out of an infusion bottle of carmustine, all of the solution poured down the right arm and leg of a female oncology nurse and onto the floor. Although she wore gloves, her right forearm was unprotected and the solution penetrated her clothing and stockings. Feeling no sensation on the affected skin areas, she immediately washed her arm and leg with soap and water, but did not change her clothing. A few hours later, while at work, she began to experience minor abdominal distress and profuse belching, followed by intermittent episodes of nonbloody diarrhea with cramping abdominal pain. Profuse vomiting occurred, after which she felt better. She went to the emergency department where her vital signs and physical examination were normal. No specific therapy was prescribed. She felt better the following day. Carmustine is known to cause gastric upset, and the authors attributed her gastrointestinal distress to systemic absorption of carmustine.[1]

A 41-year-old patient care assistant working on the oncology floor developed a pruritic, disseminated rash approximately 30 minutes after emptying a commode of urine into a toilet. She denied any direct contact with the urine, wore a protective gown and nitrile gloves, and followed hospital policy for the disposal of materials contaminated with antineoplastics. The rash subsided after one to two days. Three weeks later, a similar reaction occurred approximately one hour after performing the same procedure. Upon investigation, it was found that both hospital patients had been recently treated with vincristine and doxorubicin. The employee had no other signs or symptoms present, no changes in lifestyle, and no history of allergies or recent infections. She was treated with diphenhydramine, intramuscular and oral corticosteroids, and became asymptomatic.

Although the cause could not be definitely confirmed, both vincristine and doxorubicin and their metabolites have been associated with allergic reactions when given to patients. The aerosolization of the drug present in the urine may have provided enough exposure for symptoms to develop.[2]

References

1. Kusnetz E, Condon M. Acute effects from occupational exposure to antineoplastic drugs in a para-professional health care worker. *Am J Ind Med* 2003; 44:107-109.
2. McDiarmid M, Egan T. Acute occupational exposure to antineoplastic agents. *J Occup Med* 1988; 30:984-987. ■

(See box, at left.) Health care workers who are not aware of the potential for exposure in some tasks may fail to protect themselves, says Polovich, who was an author of the ONS chemotherapy and biotherapy guidelines and recommendations for practice. For example, they may touch a contaminated surface while not wearing gloves, she says.

"I hope people will stop and look at their practice and say, 'What are the opportunities for exposure in my workplace?' Think about that seriously. What can be changed to make it a safer place?"

The NIOSH alert does not require medical surveillance of employees who work with hazardous drugs, which is a concern of ONS. There is no blood test that can test for exposure to hazardous drugs. Air sampling also is not recommended. "We've recommended an annual health questionnaire with a special focus on those systems that would be affected by hazardous drugs," Polovich says.

Connor acknowledges that the guidance is lacking on medical surveillance because there is no marker that can be detected in tests. He advises employees, "If you have any problems you think might be related to occupational exposure, talk to the occupational health physician or your personal physician."

The NIOSH hazard alert is a voluntary guideline. Hazard Communication is the only OSHA standard that addresses hazardous drugs in the workplace. But employers who fail to protect their workers from known, serious hazards can be cited under OSHA's "general duty" clause, Connor notes. ■

OSHA adds emphasis to hazard communication

MSDSs may change, training needs reviewed

The Occupational Safety and Health Administration (OSHA) announced an initiative to emphasize hazard communication, an area that already is a routine part of inspections.

Every inspection — even those focused on a specific complaint — includes a review of hazard communication and record keeping, says **Rich Fairfax**, CIH, OSHA's director of enforcement. Employers must have updated, accessible Material Safety Data Sheets (MSDSs) and must train employees on safe handling and use of personal

protective equipment. "It all adds up to knowledge," he says. "If employees are trained and know what they're working with, they're going to take better precautions to protect themselves."

During inspections, "we ask as a part of our interview if the employees have been trained, [and] if they know where the data sheets are," Fairfax adds.

OSHA has developed a model training program for employers. They are required to provide training at the time of an employee's initial assignment to work with hazardous chemicals and whenever a new physical or health hazard is introduced. "[N]o employee should be in the position of encountering unfamiliar or unknown hazards," the agency stated.

The guidance document, which was released in draft form this spring, outlines how employers should decide which employees to train and what that training should include. It includes information on developing lesson plans and compares different techniques of training, such as computer-assisted programs or small group activities. Employers should monitor the effectiveness of the training program and maintain adequate documentation, OSHA explained.

Employees need to be trained before they begin their assignment in a department, and they may need additional training if they move to an area that uses different hazardous chemicals or drugs, Fairfax says. Hospitals soon may need to update their MSDSs. OSHA announced that compliance officers will be reviewing MSDSs and checking them for accuracy and comprehensibility. (That enforcement action will be targeted toward manufacturers.)

"We've received a number of letters and calls over the last several months about inaccurate data sheets," Fairfax notes.

What about experimental drugs? "Often toxicological data are incomplete or unavailable for investigational drugs," according to the National Institute for Occupational Safety and Health hazardous (NIOSH) drug alert. "However, if the mechanism of action suggests that there may be a concern, it is prudent to handle them as hazardous drugs until adequate information becomes available to exclude them." NIOSH also points out that the Hazard Communication Standard applies "not only to health care professionals who provide direct patient care, but also to others who support patient care by participating in product acquisition, storage, transportation, housekeeping, and waste disposal."

(Editor's note: The Draft Model Training Program for Hazard Communication is available at www.osha.gov/dsg/hazcom/MTP101703.html. For more information about the Hazard Communication Standard, go to www.osha.gov/SLTC/hazardcommunications/index.html.) ■

FDA rule delay limits info on latex gloves

New test identifies sensitizing protein

While a Food and Drug Administration (FDA) content labeling standard remains mired in the federal bureaucracy, glove purchasers aren't getting the newly available information on protein content that could help reduce new sensitivities.

The American Society for Testing and Materials (ASTM) has developed a test for antigenic protein, the kind most likely to trigger sensitivity. The ASTM also has set voluntary standards for antigenic protein (10 mcg per dm^2) and total protein (200 mcg per dm^2). Powder-free gloves tend to be significantly below the standard, with a level of total protein as low as 50 mcg per dm^2.

Under current federal regulations, manufacturers can state that they comply with the ASTM standards but cannot label the boxes with the level of antigenic and total protein. The proposed rule sets maximum allowable protein levels of 1,200 mcg per dm^2 and requires labeling of protein content. Some manufacturers are testing for antigenic protein, others only are testing for total protein, says **Kok-kee Hon**, chairman of the ASTM D-11.40 Subcommittee on Consumer Rubber products.

"What the FDA doesn't have is the rule that they must label it on the box," he says. The best bet for glove consumers: Ask the manufacturer for a certificate identifying the total extractable proteins and the antigenic protein level, Hon says.

The labeling rule is still moving forward, with a review of the economic impact analysis, says **Mel Stratmeyer**, PhD, chief of the Health Services Branch in the Center for Devices and Radiological Health in White Oak, MD. The FDA first proposed a latex glove labeling rule in 1999.

The FDA previously had projected that protein levels would continue to decline with labeling of protein content. Now, new tests will encourage manufacturers to reduce the proteins that cause

sensitivity or trigger allergic reactions, explains Stratmeyer.

"We've gone from looking at total protein to an antigenic protein test," he says. "To narrow down the problem even more, you would go to the allergenic protein."

Glove manufacturers in Malaysia have developed the most sophisticated technology to remove proteins, says Hon.

What is the bottom line for hospitals as they consider purchasing latex gloves?

Powder-free gloves continue to be the safest choice, and they also have the lowest protein levels, glove experts say. Using latex gloves with low levels of antigenic protein greatly reduces the risk of new sensitivities among health care workers, says **Denise Korniewicz**, DNSc, RN, FAAN, professor, associate dean for research and doctoral programs and director of the Center of Nursing Research at the University of Miami School of Nursing.

And those gloves are easy to find. "Most manufacturers have already decreased different kinds of protein that cause reactions," says Korniewicz, who conducts glove research and also is on the faculty of the University of Miami School of Medicine. "Most gloves on the market are safe to use."

If someone has a latex allergy, he or she may be able to work in an environment where other health care workers wear powder-free, low-allergen gloves. However, "just because the allergen proteins have been leached out to make it a low allergen content, I'm not sure that necessarily means you can wear a latex glove again," adds Korniewicz.

While research indicates that powder-free, low-allergen latex gloves have a low risk of causing a reaction in allergic individuals, hospitals should provide alternatives, she says.

Going latex-free may not resolve all issues of glove sensitivity, because some health care workers are sensitive to the chemical accelerants used to manufacture nitrile gloves, Korniewicz notes.

"We don't have a perfect glove yet," she says. "I don't think I could make a recommendation that they totally replace all their gloves with this one kind of glove."

One day, manufacturers may find a way to create gloves that don't trigger latex allergies, predicts Hon. With a test for allergenic protein, which is still under development, "maybe they can reduce [the proteins] until no more allergen is there and create safe gloves one day," he says. ■

Undiagnosed patient spreads TB to HCW

Case highlights need to isolate

The spread of active tuberculosis to health care workers and patients at a Washington, DC, hospital has highlighted the risk posed by the undiagnosed patient.

A phlebotomist developed active TB and 56 employees tested positive for latent TB infection after a highly infectious patient spent three weeks on general medical wards before being placed in a negative pressure room.

"Although the incidence of TB continues to decline, heightened awareness and vigilance is required by hospital staff to identify and treat persons with suspected TB promptly," says **Kashes Ijaz**, MD, MPH, chief of the Outbreak Investigations Team for the Division of TB Elimination at the Centers for Disease Control and Prevention (CDC). "Patients with suspected TB should be placed in respiratory isolation until infectious TB is ruled out."

Clinicians should be especially cautious when evaluating patients with HIV or AIDS because the signs of TB may be more difficult to discern. That was one of the complicating factors in the Washington, DC, case, Ijaz says.

The patient, who had AIDS and was schizophrenic, was first admitted to a different hospital with a fever and nonproductive cough. He had a normal chest X-ray and sputum specimen. "One sputum [test] may not be adequate to totally come to the conclusion that he was noninfectious. Usually we require three sputums," says Ijaz. "But there was some evidence that he was not infectious while he was at that hospital."

A few weeks later, the patient was admitted to the DC hospital with similar symptoms. The staff suspected that he had a central-line infection, treated him with intravenous vancomycin, and released him after six days. Three days later, he returned with these findings, according to the CDC's *Mortality and Morbidity Weekly Report*: "His CD4 T-lymphocyte count was 30 cells/μL. A chest radiograph revealed hilar adenopathy, and a computerized tomography scan of the chest revealed a questionable left upper lobe infiltrate thought to represent pneumonia." He received ceftriaxone to treat suspected pneumonia.

Finally, the hospital staff learned that a stool

culture obtained during the patient's first admission had grown *M. tuberculosis*. "The patient was placed in isolation that day. Three subsequent sputum specimens were 4+ AFB smear-positive, indicative of a high degree of infectiousness, and a contact investigation was initiated," according to the *MMWR* report.

The patient, who was ambulatory, had contact with 261 patients and 784 staff. Four patients who were hospitalized in different rooms and the phlebotomist developed TB. Thirty-nine patients and 56 staff members had positive TB skin tests.

TB outbreaks persist around country

Although TB has declined continuously in the United States in the past decade, the risk of hospital-based outbreaks remains significant in many parts of the country. With 14,871 cases in 2003 (5.1 per 100,000 population), the rate of decline in TB was the lowest since 1992. Nineteen states reported increases in 2003, and 12 states and the District of Columbia had rates higher than the national average.

California, New York, and Texas had the most cases, but even less populated states can experience outbreaks. For example, Virginia reported a 5.4% increase in TB in 2003, the third consecutive increase. Although nationally TB is more prevalent among foreign-born people, the Virginia Department of Health noted that "TB affected people of all ages and races, and living in all geographic areas [of the state]."

Outbreaks also have occurred in Maine, Oregon, and Washington state homeless shelters.

"The real danger is the undiagnosed case," says **Al DeMaria**, MD, Massachusetts state epidemiologist. "Very rarely do you get TB from a diagnosed case."

Or, as Ijaz says, "The health care providers should think TB."

Respiratory etiquette, which was developed in the wake of severe acute respiratory syndrome, could help prevent the spread of TB from undiagnosed patients. A majority of hospitals are asking coughing and febrile patients to cover their mouths with tissues, wear surgical masks, and use alcohol-based hand gels. At many hospitals, health care workers in close contact with coughing and febrile patients, such as triage nurses, also wear surgical masks.

The decline in TB after CDC issued guidelines in 1994 led the Occupational Safety and Health Administration (OSHA) to withdraw its proposed TB rule Dec. 31, 2003. The agency noted that the occupational risk of TB was also lower. "[A]n OSHA standard is unlikely to result in a meaningful reduction of disease transmission caused by contact with the most significant remaining source of occupational risk: exposure to individuals with undiagnosed and unsuspected TB," the agency said in the *Federal Register*.[1]

Yet to **Bill Borwegen**, MPH, occupational safety and health director for the Service Employees International Union (SEIU), the recent outbreaks are evidence of the continued need for a standard.

"If [the Washington, DC, health care] workers had been trained as required under the proposed TB rule, they would have been more sensitive to the signs of a patient walking through the hospital, coughing," he says.

Strong infection control practices can reduce the

PULMONARY COUGH SCREEN

Identification of patients at high risk of, or with documented *Mycobacterium tuberculosis* disease is to occur at the earliest point in the health care encounter. Avoiding delays in such identification will reduce potential staff and patient exposure to TB. All patients presenting for care in Grady Health System are to be screened for symptoms of pulmonary tuberculosis using the Pulmonary Cough Screen.

The initial assessment of all patients will include screening for symptoms of pulmonary tuberculosis implementing the Pulmonary Cough Screen.

- Productive cough ($\geq$ 2 weeks duration) or cough or any duration and any of the following:
  - — complaints of hemoptysis (bloody sputum);
  - — night sweats;
  - — weight loss (> 10 lb., without deliberate intention);
  - — anorexia;
  - — fever;
  - — HIV infection or at risk for HIV infection, if pulmonary symptoms are present;
  - — history of known contact with TB.

A surgical mask (i.e., 3M1800 mask) is to be placed over the nose and mouth of any patient noted with the above symptoms and a chest radiograph should be obtained. The patient is to be placed on airborne infection isolation (AII) precautions and placed in a negative pressure room until further assessment is made regarding whether the patient will be admitted to the hospital and will required AII precautions.

Source: Grady Health System, Atlanta.

risk from the undiagnosed patient, says **Henry Blumberg**, MD, program director of the Division of Infectious Diseases at Emory University School of Medicine in Atlanta and hospital epidemiologist at Grady Memorial Hospital. Grady still sees a significant number of TB patients. "TB is still on our radar screen and we put a lot of emphasis on TB infection control," he says.

Grady uses a screening tool to determine which patients should be isolated while TB is ruled out. **(See sample tool, p. 76.)**

"If TB is in the physician's differential diagnosis, or if the sputum specimen for AFB is ordered, the patient has to be in respiratory isolation," says Blumberg. "If the patient is HIV infected and has an abnormal chest X-ray, he is isolated."

In 2003, the tuberculin skin test conversion rate among health care workers at Grady was four out of 5,306 administered, or 0.8%. Some employees may test positive due to community exposures or even false positives, he notes.

"Administrative controls are the most important [aspect of] a TB infection control program," Blumberg says. "I think almost all the risk is from undiagnosed patients. If you have someone who is undiagnosed and infectious, you can see what happens."

Screening may be challenging especially when evaluating HIV-infected patients, Ijaz adds. "Hospital infection control programs are encouraged to develop protocols and implement administrative procedures for HIV-infected patients with pulmonary symptoms suggestive of TB," he says. That would include cough, fever, night sweats, and weight loss.

Some patients may be isolated unnecessarily until TB is ruled out, but the extra vigilance pays off, Blumberg says.

Reference

1. 68 *Fed Reg* 75,767-75,775 (Dec. 31, 2003). ■

Dollars and sense: Making a case for ergonomics

Are you comfortable talking about "return on investment"? How about "loss run analysis"? Those business concepts may sound like someone else's job. But if you talk the language of the hospital's financial officers, you may win unprecedented support for your ergonomics program.

That was the approach taken by **Lori Zinnecker**, OTR/L, ergonomics specialist in the safety management department at Northwestern Memorial Hospital in Chicago. "You have to know what your problem is and the direction you're heading. Then you need to know how to justify and present your case to upper management."

Zinnecker used consultants such as ErgoLogix of Portland, OR, to analyze the cost of back injuries. The basic information used to calculate costs, called a "loss run," is available from the hospital's risk management department.

"What we do is help them figure out exactly how much money they've spent over the last three years on workers' compensation claims for musculoskeletal injuries," says **Ken Aebi**, ErgoLogix managing director. "We use three years of the most recent workers compensation loss runs. We then calculate how much will be spent on lift and transfer injuries over the next three years if no action is taken to mitigate the risk, such as the purchase of lifting equipment."

The consultants also calculate how much could be spent on equipment, with the cost offset by the reduction in workers compensation claims. Ergonomics could reduce that cost by as much as 70%, he says. "It's a very simple, straightforward, and unequivocal analysis." **(See sample report, inserted in this issue.)**

The insurance loss runs contain information about each workers' compensation claim: the employee's name, the date and cause of injury, and the total amount spent on the claim. Workers' compensation information is not covered by the Health Insurance Portability and Accountability Act, therefore there are no privacy issues related to gathering and sharing the information.

Sometimes, the loss run may have only general information about the claim, and the employee health professional will need to fill in the blanks. Was it a lifting injury in materials management or patient handling? For your analysis, you would want to look at those separately, Aebi notes.

"What you quickly figure out in most hospitals, the cost of lift and transfer injuries run between 40% and 60% of the money being spent on workers' comp costs. It just jumps out at you." Yet most top administrators haven't seen those numbers. "It's a surprise to them when they see it," Aebi explains. "I've yet to see a [chief financial officer] look at these numbers and just pass them off. They are aghast at what [workers' comp] money has already been spent."

After determining the costs, Zinnecker needed to set some goals. She needed to figure out how long hospital administrators could expect it to take before they would see a return on their investment in ergonomic equipment. She also considered other related costs.

"If you're going to reduce your lost or restricted days, it is helpful to turn them into a money value," she says. "As you're writing your goals, you want to make sure your return on investment is going to neutralize out pretty quickly."

Meanwhile, as Zinnecker developed her proposal for the hospital administration, she also worked with frontline health care workers in the units. She conducted physical demands assessments to determine the ergonomic hazards. Using forms developed by the Patient Safety Center at the James A. Haley Veterans Hospital in Tampa, she asked employees to describe and rank the difficulty of their daily activities.

Employees were involved as she began to evaluate equipment. She set up an equipment fair with vendors and invited employees to check out the equipment. They filled out questionnaires and commented on the features they preferred. They provided feedback after working with equipment for a 90-day trial period. "You have to incorporate employees when you're making these recommendations," she says. "You don't want to bring in equipment and have no one using it."

With a multidisciplinary task force that included infection control, materials management, and biomedical engineering, she thought through the logistical issues of storing and maintaining the equipment. "How do you make sure the slings are cleaned? What are the infection control protocols you're going to have in place? We had everybody from employee level to manager level on our task force [to consider those issues]," she says.

The financial analysis — along with the physical demands assessment, unit profile, patient handling equipment inventory, and employee feedback assessments — can be conducted in-house or with the help of vendors. The key is to get buy-in from all levels at the hospital, Zinnecker adds. "It comes down to two things. One is justifying the cost. The other is changing the culture."

[Editor's note: ErgoLogix can be contacted at (877) 312-7002. E-mail: kaergologix@earthlink.net. For forms to evaluate the level of risk of patient handling tasks and employee satisfaction with equipment, go to www.patientsafetycenter.com in the Patient Care Ergonomics Resource Guide.] ■

Do you need to use a safer needle device?

Advice on complying with OSHA regs

Complying with needle safety regulations remains a challenge. The bloodborne pathogens standard is the most frequently cited in Occupational Safety and Health Administration (OSHA) inspections of hospitals. Here are some frequent questions and answers about needle safety compliance provided by the Safety Institute of Premier Inc., an alliance of 1,700 nonprofit hospitals and health systems based in Oak Brook, IL. More information is available on the Premier web site at www.premierinc.com/safety.

If there is a safety device available for a particular procedure, does it have to be used?

If there are safety devices available for a particular procedure, they should be evaluated by frontline workers and one selected for use to reduce risks. The only exception to the use of a safety device, when available, is if the device(s) interferes with a clinical procedure and cannot be used without compromising the procedure or increasing the risk to the patient. In this case, the specific reason for not selecting and using the device needs to be documented in the exposure control plan. As part of the annual review, there should be an evaluation of any other newer devices that might be available that might not interfere with the specific procedure. This review, and the results of the evaluation should be documented; that is, either the adoption of device, or an explanation of why the device (s) interferes with a specific clinical procedure and/or increases risk to the patient.

Can cost be a consideration in the process of selection of a safety device and still meet the intent of OSHA?

Cost certainly is an important consideration as is the cost-effectiveness in choosing a safety device. However, it cannot be the only consideration. The most important consideration, according to OSHA, is that frontline workers are involved in choosing the device, as opposed to the employer selecting a device just because it is the lowest in cost. There may be opportunities for cost-effective devices under a group purchasing contract; however, the devices chosen by the frontline worker must be implemented whether or not they are covered by a group purchasing contract.

What is the definition of "frontline worker"?

Frontline workers are those who actually use the safety devices and could be staff nurses or charge nurses, for example, not management staff who do not use these devices.

Are employers responsible for providing safety devices for contract workers?

Yes, and the employer must provide safety devices to all employees at the work site if they are at risk of exposure to contaminated sharps, even if they are employed by another company in a contractual arrangement. For example, contract or per diem workers in a hospital are employees of the contracting agency; however, they still must be provided with safety devices, personal protective apparel, and training for compliance with all the requirements of the bloodborne pathogen standard. In some instances, some of the requirements are managed or paid for by the contracting agency and not the hospital, such as hepatitis B vaccination.

However, both employers (hospital and contracting agency) are responsible for making sure that all aspects of the OSHA standard are enforced by one of the employers, and this must be clearly documented in the contract.

Please clarify the need for continual (annual) evaluation of new devices. If the injury rate has been reduced and there are no reports of employee dissatisfaction, what is our obligation to review/consider a different device?

OSHA cannot tell an organization exactly what it needs to do in an annual review, except the intent of the review is to make sure that the devices being used remain appropriate, control the hazard and reduce risks to workers. The type of review can be determined by the employer and outlined in the exposure control plan. The intent is that you would not choose a device and keep using it year after year despite employee complaints and documented ongoing problems with the device. Nor does it mean you evaluate every device on the market every year. Rather, you would conduct an annual review of your program that would include a review of your devices. For example, your exposure control plan could outline which factors or data you would review/consider in your annual review. The precise type of annual review (and what data will be reviewed and by whom) and what devices are evaluated, if necessary, should be outlined in your plan.

In some small facilities or departments, where sharps injuries are rare, there might not be a need for a formal meeting, but rather the exposure control plan would outline an ongoing assessment and review of any injuries or exposures to determine if a change in a device or procedure is necessary.

The annual review could be as simple as a review of data and discussion at a safety or infection control-related meeting, with documentation in minutes. It might include documentation, for

CE *questions*

This concludes this CE semester. An evaluation form has been enclosed. Please fill out and return in the envelope provided.

21. Which of the following pose a risk of exposure to chemotherapeutic agents?
    A. counting uncoated tablets
    B. priming the IV with drug-containing solution
    C. expelling air from a syringe used to give the drug
    D. all of the above

22. What is the ASTM standard for antigenic protein in latex gloves?
    A. 5 mcg per dm^2
    B. 10 mcg per dm^2
    C. 20 mcg per dm^2
    D. The ASTM standard applies to total protein only.

23. According to Kashes Ijaz, MD, MPH, clinicians should be cautious especially when evaluating HIV patients for TB because:
    A. TB is uncommon in HIV patients.
    B. HIV patients have frequent hospitalizations.
    C. TB symptoms may be difficult to discern.
    D. HIV patients are less likely to be put in isolation.

24. According to Ken Aebi of ErgoLogix consulting, a loss run is:
    A. trends of lost workdays due to injury
    B. costs of workers' comp claims related
    C. cost of your department compared to injury prevention
    D. forecasted cost of workers' comp claims

Answer Key: 21. D; 22. B; 23. C; 24. B

COMING IN FUTURE MONTHS

- Can you bring ergonomic claims down to zero?
- Updated TB test: Will it replace skin tests?
- Slips and falls: They're more costly than you think
- Changing the needle safety culture
- Q&A: What the Joint Commission expects for infection control

example, of your sharps injury data and mention of any considerations in the annual review (e.g., feedback from staff on acceptance of current device, etc.) such as:

- If injuries are identified, they need to be assessed to determine if the injury is from the device or perhaps some other issue such as overfilled disposal containers that needs to be addressed.
- If no injuries have occurred with a particular device or injury rates are reduced, it may be determined that a review of a new device is not needed.

If there is an increase in injuries from a specific device and all the injuries occur during activation of the safety mechanism, it might indicate the need to evaluate a different device.

It is important to evaluate the nature and circumstances of sharps-related injuries that occur and not attempt to calculate injury rates to compare safety devices that will rarely be statistically significant. Rather, you should look at trends and nature and circumstances of specific injuries to glean important information.

This is a performance-oriented standard, not a "specification standard." As such, each work site needs to develop and modify, if needed, their exposure control plan based on their work site data. The plan will include information on how their program is managed, including the annual review, and method for selection of devices with frontline worker input. This plan will vary with each facility and depend on the types of risks, review of institutional-based injury data, types of procedures performed, patient populations, and other considerations. All device selection and evaluation will be done with frontline worker input. ■

CE objectives

After reading each issue of *Hospital Employee Health*, the nurse will be able to do the following:

• identify particular clinical, administrative, or regulatory issues related to the care of hospital employees;

• describe how those issues affect health care workers, hospitals, or the health care industry in general;

• cite practical solutions to problems associated with the issue, based on overall expert guidelines from the Centers for Disease Control and Prevention, the National Institute for Occupational Safety and Health, the U.S. Occupational Safety and Health Administration, or other authorities, or based on independent recommendations from clinicians at individual institutions. ■

Summary of Loss Analytics

Valued as of 04/07/2003

Actual Historical Losses by Period

Causative Agent	Claim Code	Claim Count	Incurred Values	Development Factors	Developed Incurred	Percentage Total
Period: 07/01/1999 - 06/30/2000						
Patient Handling	A	16	346,534	1.273	441,138	55%
Repositioning	B	8	173,267		220,569	28%
Cumulative Trauma	C	2	2,705		3,443	0%
Slip & Falls	D	4	44,519		56,673	7%
Not Otherwise Classified	E	23	62,621		79,717	10%
Total By Period		**53**	**$ 629,647**		**$ 801,540**	**100%**
Period: 07/01/2000 - 06/30/2001						
Patient Handling	A	27	488,641	1.514	695,887	51%
Repositioning	B	12	204,285		309,287	23%
Cumulative Trauma	C	1	2,729		4,131	0%
Slip & Falls	D	4	1,164		1,762	0%
Not Otherwise Classified	E	38	237,497		359,571	26%
Total By Period		**82**	**$ 908,316**		**$ 1,370,640**	**100%**
Period: 07/01/2001 - 06/30/2002						
Patient Handling	A	18	143,979	2.148	309,264	32%
Repositioning	B	11	87,986		188,985	20%
Cumulative Trauma	C	6	25,191		54,116	6%
Slip & Falls	D	6	55,757		119,767	12%
Not Otherwise Classified	E	32	136,287		297,849	31%
Total By Period		**73**	**$ 451,199**		**$ 969,176**	**100%**
Grand Totals:		**208**	**$ 1,988,162**			

Projected Losses without Intervention

Average Values

Causative Agent	Claim Code	Number of Claims	Average Value	Development Factor	Developed Claim Values	Percent Of Total	Projected 3 Year Total	Percent of Projected
Patient Handling	A	20	316,718	1.645	482,109	46%	1,446,299	46%
Repositioning	B	10	155,179		238,617	23%	715,851	23%
Cumulative Trauma	C	3	10,208		20,562	2%	61,685	2%
Slip & Falls	D	5	23,814		59,451	6%	178,353	6%
Not Otherwise Classified	E	31	146,135		245,443	23%	736,329	23%
Total By Period		**69**	**$ 662,054**		**$ 1,047,122**	**100%**	**$ 3,141,365**	**100%**

Zero-Lift Projected Expected Three Year Savings

Causative Agent	Claim Code	Reduction Percentage	Annual $ Reduction	Total Savings	Percent of Projected
Patient Handling	A	34.6%	268,334	781,981	25%
Repositioning	B	32.4%	77,636	232,908	7%
Cumulative Trauma	C	8.8%	1,645	4,935	0%
Slip & Falls	D	5.4%	3,208	9,623	0%
Not Otherwise Classified	E	2.7%	6,627	19,881	1%
Total By Period		**N/A%**	**$ 349,449**	**$ 1,048,348**	**33%**

With help from ErgoLogix, you can objectively quantify three critical elements toward building an effective injury prevention program: (1) Actual historical losses at your medical facility for the past three years, (2) Projected future losses without implementing a program, and (3) Projected expected savings with a program in place.

Prepared by ErgoLogix

Disclaimer: Figures above are for demonstration purposes only and do not reflect any given medical facility.

Glossary of Terms

CAUSATIVE AGENT
The action or series of actions, or root cause that led to the filing of a Workers' Compensation Claim.

CLAIM CODE
An alpha-numeric letter that represents a particular causative agent.

CLAIM COUNT
The number of claims that were filed and listed on a Workers' Compensation loss run that were caused by or occurred during a defined period.

CUMULATIVE TRAUMA
A Workers' Compensation Claim that arose through a series of nearly identical repetitive actions.

DEVELOPMENT FACTORS
A numeric multiplier that is applied to incurred claim values to determine the most probable present value of ultimate loss costs.

DEVELOPED INCURRED
Incurred claim values multiplied by a development factor for a designated period of time.

HISTORIC PERIOD
The three year time period that precedes the year in which Workers' Compensation loss run information was supplied to ErgoLogix, or as otherwise depicted in the report itself.

INCURRED VALUES
The dollar amount of Workers' Compensation medical and indemnity claims that were reported on a Workers' Compensation loss run for a designated period of time.

INDEMNITY CLAIMS
Payments made to claimants under Workers' Compensation statutes for loss of time.

INTERVENTION
Methods employed to mitigate a given risk.

LOSS RUN
A listing of claims that occurred during a given period of time.

MITIGATE
To modify or change.

MEDICAL CLAIMS
Payments made to claimants under Workers' Compensation statutes for services rendered by healthcare professionals.

NOT OTHERWISE CLASSIFIED
Any Workers' Compensation Claim whose root cause is not patient handling, repositioning, cumulative trauma, or a slip and fall.

PATIENT HANDLING
A Workers' Compensation Claim whose causative agent was the lifting of a patient, or transferring of a patient from one surface to another.

PERCENTAGE OF TOTAL
The portion of the total amount of claims that is attributable to a given causative agent.

PERIOD
A one year segment of time that is further depicted through the use of a starting and ending date.

PROJECTED LOSSES
The most likely amount of claims costs to occur in the future based upon what has happened in the past.

PATIENT REPOSITIONING
A Workers' Compensation Claim whose causative agent was the movement required to properly situate a patient on the same surface (e.g. in a bed).

SLIP AND FALLS
Any Workers' Compensation Claim that arose due to a stumble or fall of the claimant whether by uneven, slick, or otherwise unsafe walking surface, or through clumsiness.

ULTIMATE LOSS COSTS
The total amount that is paid for a Workers' Compensation Claim.

ZERO LIFT
Healthcare safety equipment industry jargon that refers to programs designed to mitigate the risk of lifting, transferring, or repositioning patients.