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IN THIS ISSUE

Continued on next page

It's not just latex that may be causing occupational asthma

OSHA to develop glutaraldehyde exposure limit

Uncontrolled exposures to the disinfectant glutaraldehyde may be widespread in hospitals around the country, contributing to a prevalence of occupational asthma among nonsmokers that is estimated to be higher than in any other industry.

The impact of occupational asthma ranges from mild sensitivity to death. Of the 10 occupations with the highest proportionate mortality from asthma, five of them are in health care, according to surveillance data collected by the National Institute on Occupational Safety and Health (NIOSH).[1]

While latex allergy is the most likely cause of severe asthma incidents in hospitals, glutaraldehyde plays a role in broad and underreported episodes of respiratory sensitization, occupational asthma experts say.

"Five percent to 10% of health care workers have some exposure to glutaraldehyde," says **Edward Lee Petsonk**, MD, senior medical officer in the division of respiratory disease studies at NIOSH in Morgantown, WV. "We're talking about hundreds of thousands of potentially exposed individuals."

The Occupational Safety and Health Administration (OSHA) is developing a permissible exposure limit (PEL) that is likely to be four times lower than the 0.2 ppm that was included in an air contaminants standard in 1989. The standard has been voided by a federal court, leaving no current enforceable limit.

Yet even if hospitals conduct routine monitoring

In This Issue **continued from page 13**

Literature Review

COMING IN FUTURE ISSUES

- How occupational health nurses can help prevent workplace violence
- Knowing your true costs is the first step in controlling them
- IOM poised to release report on TB screening, respirator fit testing
- A step-by-step approach to accident investigation
- Are you guaranteed to save money with ergonomic equipment?

and provide controls of central processing units, they may not be adequately protecting workers. Glutaraldehyde often is used in various types of containers throughout a hospital and its satellite clinics, typically poured down the sink, or even sprayed on surfaces as a contact cleaner, a practice that is considered particularly troubling.

"The institutionalized practice of how glutaraldehyde is used in many hospitals, big and small, is completely erratic," says **Jamie Tessler**, MPH, research associate with the Sustainable Hospitals Project, a program on pollution prevention and occupational health at the University of Massachusetts in Lowell. "There is no uniform across-the-board standardized method of controlling exposure to glutaraldehyde. Common practice at many locations within a facility is what I call a dinosaur — an open bin of glutaraldehyde to which workers, and potentially patients, are exposed, and the risk of spills is great."

Employee health professionals and safety officers may not be fully aware of the hazards of glutaraldehyde without some investigation, Tessler notes. After all, the symptoms of burning eyes or a headache usually go away when the exposure stops. Employees who begin to have respiratory problems typically go to a primary care physician and may not make the connection with work exposures.

"Physicians often don't make a connection between their patients' asthma and their jobs," says **Catharine Tumpowsky**, MPH, director of the work-related asthma surveillance project in Massachusetts, one of four states reporting occupational asthma data to NIOSH. "We suspect that there is tremendous underreporting of work-related asthma in the state."

Meanwhile, glutaraldehyde may be used in a multitude of settings to disinfect equipment, such as endoscopes or gynecologic speculum, and to fix film in radiology department darkrooms. When safety professionals at one 600-bed hospital conducted a thorough survey of uses of glutaraldehyde, they found more than 30 uncontrolled sites, including uncovered bins or plastic containers.[2]

Without an OSHA regulation, efforts used to reduce exposure depend on the safety consciousness of the department manager, Tessler says.

"In one clinical area, you might have state-of-the-art technology, [while] in another area, you might have uncovered bins," she says. "Each department has independent strategies depending on who's directing the use of it."

In some cases, an open bin might rest on a cart

in a patient room, potentially exposing patients to vapors. Industrial hygienists also have found glutaraldehyde used when high-level disinfection wasn't even necessary.

Monitoring uses a 15-minute, time-weighted average to measure the exposure. So while experts say the .05 ppm is a level that should never be exceeded, current monitoring techniques would miss a momentary "peak," notes Tessler.

An unpublished survey of New Jersey hospitals found that slightly more than half (55%) were conducting air monitoring for glutaraldehyde. Of those, 36% had recorded levels that exceed limits recommended by the American Conference of Governmental Industrial Hygienists in Cincinnati. Independent air sampling conducted by the state's Occupational Health Surveillance Program found just 11% of 54 samples taken at 10 hospitals registered levels exceeding the .05 ppm limit.

Activating and mixing new glutaraldehyde solution posed the greatest risk of exposure in the sampling, says **Donald P. Schill**, MS, CIH, project coordinator of the program, which is part of the New Jersey Department of Health and Senior Services in Trenton. That involves mixing a buffering agent into a gallon jug of glutaraldehyde.

However, Schill noted that certain activities weren't captured by the sampling, such as pouring glutaraldehyde down a sink drain (with the water running to dilute it) and the use of open containers in areas other than the operating room, which has frequent air exchange. Exposures during spills also could greatly exceed recommended levels.

"We are very suspicious that spills contribute a lot to people developing symptoms," says Schill, an industrial hygienist. "A single high acute exposure can trigger the sensitization. Then lower exposures thereafter could cause symptoms. That is true of irritants in general."

OSHA tried to establish exposure limits to glutaraldehyde as part of a 1989 air contaminants standard. However, in 1992, the 11th Circuit Court ruled that OSHA hadn't met its regulatory burden of showing substantial risk of harm from the current exposure limits to a large number of chemicals. The court voided the standard and sent it back to OSHA for further work.

In the case of glutaraldehyde, that meant the 0.2 ppm standard never became effective, and OSHA currently has no regulation requiring monitoring and maximum levels for the disinfectant.

In its aborted standard, OSHA cited studies showing "significant risk of irritation to the eyes,

Glutaraldehyde at a Glance

- ✔ **Properties:** In a buffered alkaline solution, it is a highly effective microbicidal agent used as a high-level disinfectant of medical, surgical, and dental equipment. It usually is a clear liquid, which turns green when activated. It has a sharp, pungent odor.
- ✔ **Health effects:** Glutaraldehyde is a strong irritant to the skin, eyes, and respiratory system. Contact can lead to skin sensitization and allergic contact dermatitis. Vapor inhalation can lead to occupational asthma or can aggravate preexisting asthma or pulmonary disease.
- ✔ **Control:** Local exhaust ventilation is considered to be the best way to control glutaraldehyde vapor. In general, glutaraldehyde should be used in rooms that are well-ventilated, with a minimum of 10 air changes per hour.
- ✔ **Protection:** Splash-proof goggles and/or full face shields should be used whenever working with glutaraldehyde. Eyewash units must be available for immediate emergency use. Nitrile and butyl rubber are the materials most impervious to glutaraldehyde. Latex gloves should not be used except where only short-term, incidental contact is expected. Employees who may be exposed to glutaraldehyde above recommended limits during routine or emergency work procedures should use appropriate respirators, in compliance with the Occupational Safety and Health Administration's Respiratory Protection Standard.
- ✔ **Spills:** The Joint Commission on Accreditation of Healthcare Organizations specifies under its Hazardous Materials Plan that a glutaraldehyde spill containment "response team" should be created. The team should include a representative from the safety committee, a physician (ideally an occupational health physician), the unit supervisor, and any other personnel deemed appropriate. The team will develop a written plan for the containment of glutaraldehyde spills.
- ✔ **Further information:** *Safe Use and Handling of Glutaraldehyde-based Products in Health Care Facilities* (ANSI/AAMI ST58-1996) is available from the Association for the Advancement of Medical Instrumentation, 3330 Washington Blvd., Arlington, VA 22201-4598. Telephone: (703) 525-4890.

Source: New Jersey Division of Environmental and Occupational Health Services. *Glutaraldehyde: Guidelines for Safe Use and Handling in Health Care Facilities.* Trenton: New Jersey Department of Health and Senior Services; 1997.

nose, and throat associated with short-term exposures to glutaraldehyde at concentrations of 0.3 ppm or above." The agency concluded, "OSHA considers the irritation effects associated with exposure to glutaraldehyde to be material impairments of health."[3]

In fact, subsequent studies showed that glutaraldehyde causes respiratory sensitization at even lower levels than the irritant effects.

During the next 12 years after OSHA's attempts to regulate indoor air quality, little research occurred in the United States on glutaraldehyde's effects in a health care setting. But research in Britain, Italy, and other European countries showed a link between the substance and occupational asthma at hospitals. In one study of 24 health care workers with asthmatic symptoms, a diagnosis of occupational asthma was confirmed in all but three. In seven cases, researchers measured an immunologic response to glutaraldehyde.[4]

Their symptoms improved when not at work

All the workers experienced respiratory symptoms, such as cough and chest tightness, when exposed to glutaraldehyde but an improvement of symptoms when they were off from work. Occupational asthma evolved over an average of 6.7 years, and 42% first had more minor nasal symptoms, such as stuffiness and sneezing.

Such evidence led health officials in the United Kingdom to withdraw its 0.2 ppm maximum exposure limit and issue an alert. "Because of the information now available on the health effects of glutaraldehyde, the [occupational health expert] committee could no longer identify a level which is both safe and practicably achievable," the alert stated.

The Health and Safety Commission moved toward a maximum exposure limit (MEL) of .05 ppm, which places a "duty on the employer to reduce exposure to as low as is reasonably practicable, and in any case below the MEL."

The American Conference of Governmental Industrial Hygienists reviewed the medical literature and the actions of other countries in 1997 and lowered its ceiling threshold limit value to .05 ppm, noting that it is an "airborne concentration that should not be exceeded during any part of the work shift."[5]

NIOSH is reviewing medical literature and is expected to set a lower recommended exposure limit by 2002. "Effects appear to be occurring below [the current REL of 0.2 ppm]," says **Joann Wess**, MS, a biologist in the education and information division of NIOSH in Cincinnati. NIOSH also is publishing a brochure on glutaraldehyde geared toward workers, she says.

As evidence accumulates and other organizations set lower exposure limits, OSHA's review of glutaraldehyde gains steam. Surveillance data collected by NIOSH provide further impetus. For example, in Massachusetts, 12% of health care workers with occupational asthma who were interviewed by health officials said they were exposed to glutaraldehyde.

"In taking a look at the chemicals . . . [whose permissible exposure limits were] vacated by the 11th circuit, we collected some information on the degree of the hazard and how many workers are exposed," says **Lyn Penniman**, RN, MPH, health scientist with OSHA's directorate of health standards program. "We identified some chemicals we were going to take a closer look at, and glutaraldehyde was one of those."

Scientific evidence linking glutaraldehyde to respiratory effects and asthma is critical, says Penniman. "When OSHA does come out with a proposed standard, what you will see is a proposed PEL based on a quantitative risk assessment. That's what the court said we need to do, and that's been the holdup all this time."

Even in the absence of a standard, employers are expected to control hazards under OSHA's "general duty" clause. "This is a recognized hazard," says Penniman. "Employers are required to maintain a workplace that's free of recognized hazards."

Even mild symptoms should be cause for concern, occupational health experts say, because they may be a precursor of more serious effects. In the New Jersey survey, three-quarters of respondents reported smelling the odor of glutaraldehyde, which means they had some level of exposure. The most common symptoms were burning eyes, nasal stuffiness, and headache.

Employee health professionals should use a questionnaire to determine if workers using glutaraldehyde are experiencing any symptoms, Petsonk advises. Even a single case of occupational asthma linked to glutaraldehyde can be a "sentinel event," he says. "If someone develops asthma in response to glutaraldehyde, that should raise concerns that others may be [having the same problem]," he points out.

As with many other conditions, early detection is critical. "People who get work-related asthma

can improve and even have their condition resolved completely if they control their exposure adequately and early," says Petsonk. "If they continue to be exposed and don't control the exposure early . . . it can become a lifelong problem."

[Editor's note: Work-Related Lung Disease Surveillance Report 1999 *is available on the NIOSH Web site at www.cdc.gov/niosh/w99cont.html or from the Surveillance Branch of the Division of Respiratory Disease Studies, NIOSH, 1095 Willowdale Road, Morgantown, WV 26505-2888. Fact sheets and information on glutaraldehyde controls and alternatives are available on the Web sites of the Sustainable Hospitals Project at the University of Massachusetts in Lowell (www.uml.edu/centers/lcsp/hospitals) and the Occupational Health Surveillance Program of the New Jersey Department of Health and Senior Services (www.state.nj.us/health/eoh).]*

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2. Tessler J. Strategies to reduce or eliminate glutaraldehyde from hospitals. Presented at the 128th Annual Meeting of the American Public Health Association. Boston; November 2000.
3. Occupational Safety and Health Administration. *Air Contaminants* (29 CFR 1910.1000). Washington, DC; 1989.
4. Di Stefano F, Siriruttanapruk S, McCoach J, Sherwood Burge P. Glutaraldehyde: an occupational hazard in the hospital setting. *Allergy* 1999; 54:1,105-1,109.
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Hospitals seek safer alternative product

Cost of controls may offset higher-priced options

As hospitals seek greater protections for workers from the hazards of glutaraldehyde, they reach an inevitable question: Should they spend money on additional ventilation and other controls, or should they switch to an alternative product or technology?

Public agencies such as the U.S. Occupational Safety and Health Administration (OSHA) avoid recommending the elimination of an approved substance, instead emphasizing the steps needed to control the hazard. But the Sustainable Hospitals Project at the University of Massachusetts in Lowell is seeking to educate hospitals about alternatives — as well as about the costs of keeping the status quo.

"If we have a [skin and respiratory] sensitizer that has alternatives that maintain quality infection control . . . and the true costs are similar, why not use [it]?" asks **Jamie Tessler**, MPH, research associate with the Sustainable Hospitals Project.

The Sustainable Hospitals Project has developed fact sheets for hospitals on alternative products and their properties, case studies of hospitals that have eliminated glutaraldehyde or improved their controls, and cost-accounting information. At all sites where glutaraldehyde is used, the hospital should have local exhaust ventilation, an emergency response program for spills, regular employee monitoring, and training programs.

Neutralizing agents can reduce exposure when employees pour the chemical down a sink, and neutralizing absorbent mats beneath bins can moderate the impact of a spill. Employees also need training on handling of glutaraldehyde and on proper response to a spill. "What we found is that most people who were working with glutaraldehyde had received no training at all on how to work safely with the chemical," says Tessler.

Alternatives allow hospital to avoid hazard

Safety issues prompted **Geoff Kelafant**, MD, MSPH, FACOEM, medical director of the occupational health department of the Sarah Bush Lincoln Health Center in Mattoon, IL, to use up supplies of glutaraldehyde and switch to an alternate product.

"We've always tried to avoid [hazards] when we can," he says. "In the long run it's cheaper because you don't have to do any air monitoring or worry about anyone being exposed."

But convincing hospital administration to invest in new disinfecting technology may be difficult. When the Sustainable Hospitals Project conducted case studies of hospitals that had eliminated or reduced exposures, half of them had eliminated glutaraldehyde altogether and half had implemented comprehensive controls.

"Hospitals make cost decisions based on a variety of factors," notes Tessler, and they often do it without considering all the direct and indirect costs of each option. "Also, hospitals that have full-time industrial hygiene personnel feel less

burdened by the costs of monitoring programs."

With a .05 ppm exposure limit likely to come from OSHA, hospitals may begin reevaluating the economics of keeping glutaraldehyde.

"I think glutaraldehyde will get a lot more attention in this country," says Tessler. "Our mission is to provide the resources to hospitals that want to make changes, to provide them with links to new technologies and alternatives, and to help them think about the impact of risk-shifting as they make these changes."

[Editor's note: For more information about alternatives to glutaraldehyde, see the Sustainable Hospitals Project Web site at www.uml.edu/centers/lcsp/hospitals. E-mail: shp@uml.edu. Telephone: (978) 934-3386.] ■

FDA may ban some conventional needles

Petition says only safety devices should be sold

Saying that conventional sharps devices are inherently unsafe, a health care workers union and consumer advocacy group jointly petitioned the Food and Drug Administration (FDA) to ban them.

The Service Employees International Union (SEIU) and Public Citizen are targeting conventional IV catheters, blood collection devices, blood collection needle sets (butterfly syringes), IV infusion equipment, and glass capillary tubes.

"It's complimentary to our tremendous victory in passing federal legislation," says **Bill Borwegen**, MPH, SEIU's occupational health and safety director. "The FDA is going to continue to allow devices to be sold on the market that are essentially going to be illegal under the OSHA [Occupational Safety and Health Administration] standard."

In November, President Clinton signed the Needlestick Safety and Prevention Act, which had passed Congress through an expedited, unanimous consent. The law mandates the use of safety devices and maintenance of a needlestick log and amends the OSHA bloodborne pathogen standard, bypassing the lengthy process of rule-making.

In 1999, OSHA had already issued a compliance directive ordering hospitals and other health care facilities to use "engineered controls" to reduce needlesticks.

But Borwegen contends those actions aren't enough. "We're trying to have some consistency here. It also would have more immediate impact rather than leaving it up to hospitals one on one to try to comply with the OSHA standard."

An FDA spokesperson declined to comment on the petition. The agency is required to respond within 180 days.

The groups also asked the FDA to use its own criteria for safety devices as a performance standard for new products — in effect, preventing new conventional devices from reaching the market.

The petition does not request the FDA to ban conventional syringes, which can have a number of uses. But it asks for labeling, which states, "to prevent possible exposure to HIV and hepatitis, do not use for standard blood draws."

The SEIU petitioned the FDA to ban certain conventional needle devices in 1991, but the agency met with representatives from manufacturers and decided that the market was changing rapidly to the safer devices. However, a substantial demand for safer devices didn't occur until 1998, when California passed the first needlestick safety law.

Borwegen says he is hopeful about the current petition. "We know the FDA has actually put out alerts on two of the items we're asking them to ban," he says. "If they put out alerts, in light of the new federal law, they should ban these products." ■

Future of OSHA's ergo standard remains in doubt

Bush appointees could grant stay of enforcement

The future of new ergonomics regulations remained in doubt as the U.S. Occupational Safety and Health Administration (OSHA) standard was due to go into effect Jan. 16.

Over the past several years, Republicans in Congress repeatedly tried to stall or scuttle the standard. Lawyers for business organizations suing OSHA are expected to ask the new labor secretary under President George W. Bush for an administrative stay to halt enforcement of the standard while lawsuits are pending.

Although Bush had expressed opposition to the ergonomics standard, **Bill Borwegen**, MPH, occupational health and safety director of the

Service Employees International Union (SEIU), notes that progress toward workplace safety has occurred under Republican administrations. In fact, work on an ergonomics standard began under Labor Secretary Elizabeth Dole during the previous Bush administration.

With the close split in the country, Borwegen expressed hope that hard-line positions might ease. "Some of the best days of OSHA were when we had a Democratic Congress and a Republican administration," he says.

Meanwhile, lawsuits have been filed in several federal circuit courts on behalf of business organizations that oppose the standard. The cases have been consolidated, and legal arguments likely will not occur until this summer, at the earliest, predicted Willis Goldsmith, an attorney with Jones, Day, Reavis & Pogue in Washington, DC, which represents the U.S. Chamber of Commerce, the Society for Human Resource Management, and other organizations.

"We believe the economic analysis that OSHA has provided is flawed," says **Baruch Fellner**, a Washington, DC, lawyer who represents the National Association of Manufacturers and the National Coalition on Ergonomics. "The analysis of the science is equally flawed. There are many procedural errors that the agency made in its rush to judgment."

Supporters of OSHA's ergonomics standard were buoyed by a victory in a case involving Beverly Enterprises, which operates nursing homes around the country. More than five years after it received the case for review, the Occupational Safety and Health Review Commission ruled in October that the nursing home corporation was properly cited for ergonomics hazards under the "general duty" clause of the Occupational Safety and Health Act. The general duty clause requires employers to keep workplaces free from recognized hazards that cause or are likely to cause serious physical harm or death.

The commission's ruling overturned a decision by an administrative law judge, who said OSHA had not identified a "recognized hazard" when inspectors issued citations against five nursing homes in Pennsylvania in the early 1990s due to injuries related to patient handling.

The commission's finding that lifting represented a hazard that requires abatement under the general duty clause gives credence to OSHA's efforts to establish an ergonomics standard, says Borwegen. "It really does support OSHA moving forward on this ergonomics rule." ■

Nurses keep surgical smoke a burning issue

Task force influenced NIOSH to gather more info

Thanks to the persistence of nurses around the country, renewed efforts are under way toward a federal "technical information bulletin" on the hazards of surgical smoke.

Three nursing organizations formed a joint task force on surgical smoke and urged their members to contact the National Institute on Occupational Safety and Health (NIOSH) with anecdotal reports of surgical smoke effects.

A NIOSH researcher set up an internal working group and agreed to make site visits to hospitals to look into surgical smoke concerns, says **Candace Romig**, MS, director of governmental affairs at the Association of periOperative Registered Nurses (AORN) in Denver.

"NIOSH may help persuade OSHA [the Occupational Safety and Health Administration] that enough data have already been gathered to warrant the release of the [surgical smoke] guideline," says Romig. AORN is working with the American Association of Occupational Health Nurses (AAOHN) in Atlanta and the American Association of Nurse Anesthetists in Park Ridge, IL.

Bulletin put on hold

Early last year, nursing advocates were expecting the imminent release of a technical information bulletin on surgical smoke. Romig and others had even reviewed a draft copy. But then OSHA officials abruptly decided to put a hold on the bulletin, saying they needed more scientific evidence.

"Essentially, the word from them was we can't move forward with anything unless we have some research that's going to show a definitive causality," says **Kae Livsey**, RN, MPH, public policy and advocacy manager of AAOHN. "What they have is a lot of anecdotal information."

When human tissue burns, either in electrosurgery or laser procedures, cells burst and tiny particles become airborne in a noxious plume. OR nurses report suffering from nausea, abdominal cramps, and respiratory problems after hours of breathing surgical smoke. **(For more information on surgical smoke and evacuation devices, see**

***Hospital Employee Health,* April 2000, pp. 37-40 and July 2000, p. 78.)**

There is, in fact, research that indicates that surgical smoke carries harmful and even infectious material. Studies have identified particulate matter in surgical smoke that is small enough to pass through surgical masks and toxic chemicals, such as benzene, toluene, and acrolein.

In one case, a surgeon contracted laryngeal papillomatosis with human papillomavirus DNA types that were identical to those of patients he had treated with laser therapy. The virus may have been transmitted through the laser plume, the treating otorhinolaryngologists concluded.[1]

NIOSH, the research arm of OSHA, issued a hazard alert in 1998, and the American National Standards Institute issued standards in 1996 calling for the evacuation of laser and electrosurgical smoke.

Still, in many hospitals, smoke is routinely evacuated from lasers but not from electrosurgery units, which are used in 75% to 80% of all surgical procedures. Nursing leaders say a document from OSHA would influence many hospitals to provide better smoke evacuation from electrosurgical as well as laser procedures. (Normal room ventilation is considered inadequate; several different types of devices are available to remove the smoke directly from the surgical site.)

Searching for evidence

Although the bulletin would be informational only, the legal and political challenges faced by OSHA apparently influenced its delay. OSHA is seeking evidence that links prolonged exposure to surgical smoke to a rise in illness or injury among operating room staff.

Through NIOSH, the three nursing organizations are working to help establish that link. "We're feeling hopeful that we now have another body that's listening to us," says **Paula Graling**, RN, MSN, CNOR, clinical nurse specialist for perioperative services at Inova Fairfax Hospital in Falls Church, VA, and chairwoman of the task force.

In addition to conducting surveys within OR specialty groups, AORN plans to review data from the Harvard Nurses Study, a longitudinal study that contains detailed information on the health of nurses.

Meanwhile, employee health professionals can help by encouraging employees and supervisors to report symptoms that may be associated with surgical smoke, says Livsey. "We're raising awareness on behalf of our members to be looking for these symptoms."

Reference

1. Hallmo P, Naess O. Laryngeal papillomatosis with human papillomavirus DNA contracted by a laser surgeon. *Eur Arch Otorhinolaryngol* 1991; 248:425-427. ■

For the best EH software, take control of the choice

You can quantify differences in software

Do you have someone who reminds you which employees are due for TB screens or immunization updates, tracks needlesticks and highlights patterns in employee injuries, helps manage your daily workflow of patients, and calculates costs and provides analysis?

You should. Those are all tasks that can be handled by a well-designed computer program.

Unfortunately, many employee health professionals are working with software that wasn't selected to meet their needs or isn't being used to its potential. In an interview with *Hospital Employee Health*, J**ames K. Ross**, MD, MBA, an occupational health physician and an expert in information systems for occupational health clinics, shared some basic advice.

"Selecting an information system is a strategic planning effort," says Ross, who is chairman of the informatics section of the American College of Occupational and Environmental Medicine and president of the American Institute of Medical Management, a consulting firm based in Ashland, KY. "It's not just purchasing something and hoping it will match up at the end."

Ross outlined steps employee health professionals should take in evaluating information systems:

1. **Make sure you are a part of the selection process for new information systems.** That may seem obvious, but too often employee health professionals allow the hospital's information technology (IT) experts to select software. The problem with that hands-off approach is that those IT experts don't know what your needs in employee health are.

You may end up with a system that performs well for what it does but doesn't do what you want. "You need to manage IT instead of IT managing you," says Ross.

2. **Determine your major work processes, then look for systems that would improve your productivity in that work.** It takes time to define each task you do in employee health, but that will be time well-spent. You want to set priorities for your needs and select a system that will help you manage the most important aspects of your work.

Ask questions that might relate to common scenarios. How would you register a patient in the system when he or she reports with an ankle injury? What would you do if the employee goes to the emergency room after hours instead of to the employee health clinic?

Meanwhile, be sure the system can interface with other hospital systems, such as the lab and human resources. **(For a list of key benchmarking factors, see box at right.)**

"Where most people go wrong is they read the vendors list of what it says it will do, and they accept the vendor's presentation. Then they get it in their clinic and say, 'This isn't what I thought it did,'" says Ross. Once you know what your greatest needs are, you can ask vendors how their systems meet those needs.

3. **Use a quantifiable method to evaluate systems.** Ross has developed a list of items, such as design and technical features and operational functions, that form an evaluation method he calls Effectively Quantifying Quality in Information Systems (EQQIIS). But your list doesn't need to be that detailed.

Your IT staff can help you list important technical features and you can identify work-flow needs, such as scheduling preplacement exams or analyzing needlesticks. Then each member of the selection team assigns a point value on a scale of 1 to 100 for how important each characteristic is and grades each possible software product in the same way. This method identifies the product that attains the highest score on the elements that are listed as most important.

4. **Be realistic in your expectations of information systems.** When you finish your scoring, don't expect any of your choices to end up with an "A" or even a "B." You'll be lucky to find a system that even merits a "C," Ross says. "We haven't found off-the-shelf programs that meet

Comparing Software? Consider These Six Factors

How well will a proposed occupational medicine management software program work in your department? Answering that question requires you to consider six critical areas, says **James K. Ross**, chairman of the informatics section of the American College of Occupational and Environmental Medicine and president of the American Institute of Medical Management, a consulting firm based in Ashland, KY. They include:

COMPATIBILITY. You must be able to exchange information easily with other departments in the hospital. You should be able to receive an e-mail about a test result from the lab, look it up, then place it in a patient record. Consider all the areas you are in contact with, such as human resources and radiology, and information-sharing needs.

TECHNICAL SUPPORT. Make sure the training is adequate to allow users to become familiar with the system. With an ongoing contract, the vendor will provide technical support and software updates.

EFFORT LEVEL. If it's too simple, it may not offer enough functions. But you need to find a middle ground of complexity so you or your staff will not feel frustrated and begin to use the computer like a very expensive boxy typewriter.

FUNCTIONALITY. What tasks do you want the program to do? What features do you want it to have? Your information systems specialist can help you evaluate the technical aspects, but only you know what elements of your job could be better managed with software support.

COST. Of course you'll be concerned about cost. But you should also consider the possible savings the new program can bring. For example, you may be able to hold off on hiring additional clerical staff or you may be able to analyze injuries — and prevent them. "With most systems, if they're used effectively, they are offsets of another cost that can be eliminated or not added," says Ross.

SECURITY. Along with password protection, you also need a system for immediately deactivating passwords of people who violate security. This area is complicated by federal and state privacy laws that dictate how employee records must be handled.

anybody's needs." You might use your in-house IT expertise to customize the system, or you might ask the vendor to add customized features. You may decide that the system responds to your more important needs, despite certain failings.

5. **Provide adequate training.** Again, this may seem obvious, but lack of sufficient training is a major reason for underuse of information systems. Hopefully, in your selection process, you identified user-friendly attributes as essential. You also should arrange for ongoing technical support, including updates to reflect major new regulatory developments (such as the Occupational Safety and Health Administration's ergonomics standard).

"It isn't a typewriter with a screen, it really is a computer," remarks Ross. "Most of the time, we're using it as a typewriter with a screen instead of something with embedded knowledge."

[Editor's note: More information on selecting occupational health information systems is available in the Guidebook to Occupational Health Informatics, *($75 ACOEM members, $90 nonmembers) from the American College of Occupational & Environmental Medicine, 1114 N. Arlington Heights Road, Arlington Heights, IL 60004-4770. Telephone: (847) 818-1800. Fax: (847) 818-9266. The American Institute of Medical Management provides informatics consulting and can be reached at (606) 329-3906 or www.mbadocs.]* ■

Johnson S, Baraboutis J, Sha BE, Proia LA, Kessler HA. **Adverse effects associated with use of nevirapine in HIV postexposure prophylaxis for 2 health care workers.** *JAMA* 2000; 284(21): 2,722-2,723.

Severe hypersensitivity reactions to nevirapine, an agent sometimes included in post-exposure prophylaxis (PEP), led researchers in separate cases to question its use. The letters published in the Dec. 6, 2000 issue of the *Journal of the American Medical Association* highlight the difficulty of balancing PEP effectiveness against toxicity. In both cases, nevirapine was included in a PEP regimen of lamivudine and zidovudine after health care workers suffered a significant exposure while caring for patients with advanced HIV infection.

In the first case, a 33-year-old nurse at the Veterans Affairs Chicago Healthcare System sustained a needlestick while drawing blood with a hollow-bore needle. Guidelines from the Centers for Disease Control and Prevention call for "inclusion of a protease inhibitor [in PEP] if there is an increased risk of HIV transmission or if resistance to zidovudine and lamivudine is suspected," the authors note. Eight days after the nurse began the triple therapy, she complained of nausea, anorexia, lightheadedness, fever, and headache. Her PEP regimen was switched to efavirenz (a different non-nucleoside reverse transcriptase inhibitor), lamivudine, and stavudine, because of concern about toxicity related to nevirapine.

She then developed a rash that began on both arms and spread to her trunk, face, and legs. The rash was accompanied by severe itching. The symptoms improved with prednisone but resumed two days after the course of prednisone was completed. The PEP regimen was again modified by discontinuation of efavirenz and institution of nelfinavir, and the prednisone was resumed.

Thirty-eight days after the start of PEP, when both PEP and prednisone had been discontinued, the patient's symptoms had resolved, except for soreness in the forearms and hands. HIV serology test results were negative at 31 and 64 days after exposure. "In light of the increased reports of severe hypersensitivity reactions to nevirapine, we suggest that this agent not be used for PEP until the incidence and full spectrum of nevirapine toxicity is clear, particularly if the risk of HIV seroconversion following a needlestick (0.3%) is equal to or less than the risk of this life-threatening complication," the authors state.

In the second case, a 43-year-old phlebotomist at Rush-Presbyterian-St. Luke's Medical Center in Chicago sustained a needlestick while drawing blood from a patient with advanced HIV infection and hepatitis C. "The health care worker's baseline serum transaminase, total bilirubin, alkaline phosphatase, and complete blood count test results were normal," the authors note.

Yet within 14 days, the patient complained of malaise, fatigue, fever, and chills. At 20 days, her lab values showed the following levels: aspartate transaminase, 2370 U/L; alanine transaminase, 1080 U/L; total bilirubin, 22.2 µmol/L (1.3 mg/dL), and alkaline phosphatase, 150 U/L.

Physicians stopped the PEP, but at 27 days post-exposure, she developed acute hepatic failure and coma. "The patient required an orthotopic liver transplant 35 days following initiation

of PEP," the authors state. "Pathology of the native liver showed confluent hepatic necrosis. Six months after transplantation, her liver enzyme levels were normal, and she remained seronegative for HIV and HCV."

The authors noted that 8% to 28% of patients receiving nevirapine suffer from asymptomatic hepatitis, and they concluded that the health care worker's hepatic failure was due to a severe hypersensitivity reaction.

"Current guidelines for health care worker-related PEP do not specifically exclude use of NNRTIs, but reserve their use for situations in which resistance to first-line drugs is suspected," the authors state. "This case raises the question of whether the safety profile of nevirapine warrants its use as a prophylactic medication in health care workers who are exposed to HIV when the risk of transmission is low." ▼

Wassell JT, Gardner LI, Landsittel DP, et al. **A prospective study of back belts for prevention of back pain and injury.** *JAMA* 2000; 284:

In the most comprehensive study of back-belt use ever conducted, researchers from the National Institute for Occupational Safety and Health (NIOSH) found no evidence that back belts prevent back injuries.

NIOSH researchers conducted interviews of 9,377 employees who were involved in lifting or material handling at 160 retail stores across the country. They gathered information on back-belt wearing habits as well as work history, lifestyle habits, job activities, demographic characteristics, and job satisfaction.

For a two-year period, the researchers then tracked workers' compensation claims for job-related back injuries and self-reported back pain. They asked employees if they had experienced any low back pain in the six months prior to the follow-up interview. Patients with long-term back problems were ruled out through the survey information collected at the start of the project. Some 6,311 workers completed the follow-up interview.

Store policies requiring back-belt use were widely ignored. "In the stores requiring belt use, 58% of employees reported wearing belts usually every day; 14%, once or twice a week; and 28%, never," the authors state. "In the stores with voluntary belt use, 33% of employees reported wearing belts usually every day; 11%, once or twice a week; and 56%, never."

But it hardly seemed to matter. Researchers found no significant difference either in injury claims or self-reported back pain between workers who wore back belts and those who didn't.

"There were no statistically significant protective effects comparing employees who wore belts usually every day with employees who never wore belts for either back injury claims or low back pain," they reported. "There were no statistically significant protective effects comparing employees who wore belts once or twice a week with employees who never wore belts for either back injury claims or back pain."

Workers who usually wore back belts had 3.38 injury claims per 100 full-time equivalent employees (FTE); 17.1% reported back pain. Those who infrequently or never wore back

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belts had injury rates of 2.76 cases per 100 FTEs; 17.5% reported back pain.

A history of back injury was the strongest risk factor for predicting either a back-injury claim or reported back pain among employees, regardless of back-belt use. The scope of this project adds weight to the findings.

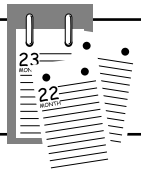
The authors noted that some other studies of back belts have assumed that a store policy requiring their use equated to actual back-belt use. "By directly interviewing employees about their belt-wearing habits, our study more closely measures typical belt use in the workplace rather than implied belt use based on store policy," the authors say.

"Our study evaluates back belts using a prospective design in new stores distributed over a wide geographic region, concurrent comparison groups, comprehensive individual interviews, detailed exposure information, a job satisfaction measure, multivariable regression analysis, and sufficient sample size," they state.

Their finding is definitive: "We found no effects of belt wearing in various subgroups: employees with and without a history of previous back injury, employees with consistent self-reported belt wearing habits from baseline to follow-up interviews, and employees with the most strenuous job."

This study reinforces a previous NIOSH finding, from 1994, that said there is no scientific evidence that back belts reduce back injury. ■

CALENDAR



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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. ■