AMERICAN HEALTH CONSULTANTS®

FOR MORE THAN 17 YEARS

Hospital Employee Health®

IN THIS ISSUE

SEPTEMBER 1999

VOL. 18, NO. 9 (pages 97-108)

American Health Consultants® is A Medical Economics Company

***Special Report:* Eliminating Latex in the OR**

Surgeons voluntarily give up latex gloves for synthetic alternatives

Clinic works with suppliers to meet special needs for surgical gloves

The notion that surgeons would willingly don synthetic gloves rather than natural latex gloves in the operating room might once have been considered ludicrous. But as evidence mounts about the growing incidence and dangers of latex allergies, a small group of surgeons, often at the urging of the institutions where they work, have voluntarily made a transition to synthetic surgical gloves.

At the multicenter Marshfield (WI) Clinic, the shift away from latex has become a matter of policy. For nearly two years, the clinic, which conducts ambulatory surgical procedures, virtually eliminated latex gloves and other latex-containing products from its surgical suites, according to **Bruce Cunha**, RN, MS, COHN-S, manager of employee health and safety. Marshfield Clinic consists of 38 facilities throughout central and northern Wisconsin, with its largest site located in Marshfield. It employs about 550 physicians.

Discovery of allergy lends impetus to effort

In 1995, responding to a growing concern nationwide about latex allergies among health care workers and patients, Marshfield considered its options for reducing latex usage. Examination and surgical gloves were clearly the greatest source of latex exposure for both patients and health care workers. Cunha explains that the main clinic facility had been working gradually on the development of joint allergy protocols with the hospital to which it is physically attached and to which it supplies all surgeons. But a year later, a sense of urgency interjected itself when a Marshfield surgeon developed severe latex allergy. A leading allergist told him he would have to give up practice unless he forswore the use of latex gloves.

Marshfield administrators, led by the clinic's medical director, weighed their options: change to low-protein, non-powdered latex gloves; change entirely to synthetic gloves; or use some of each. They

opted for synthetics because at the time of the decision, the facility "didn't have any scientific evidence that there were any acceptable levels of [latex] proteins that would not cause someone to become sensitized," explains Cunha. "Therefore, we were putting everyone at risk every time someone put on a latex glove."

The transition to synthetic non-sterile examination gloves drew few objections from the staff, who could choose from vinyl or nitrile gloves. Vinyl proved to be suitable for simple procedures in which little stress is placed on the glove, such as bandaging and vaginal or rectal exams. The material, however, does not conform to the hand as well as latex and tears easily. Nitrile gloves, which many health care professionals say approximate the characteristics of latex more than any other synthetic material on the market, are used at Marshfield for more extensive examinations or in the presence of sharp instruments. Nitrile, notes Cunha and others, is significantly more expensive than vinyl. "By mixing the two types of gloves, we were able to keep costs close to what we'd been paying for latex exam gloves," he says.

A successful transformation in the OR

In response to the latex threat, many medical facilities have greatly decreased the use of latex exam gloves. However, Marshfield went a major step further, pushing its latex-free campaign into its surgical suites — a rarity except for cases in which patients or surgical staff are known to be latex-sensitive. Administrators at Marshfield plunged into untested waters, and, after some concentrated persuasion and cajoling, succeeded in virtually eliminating the use of latex gloves by surgeons. Since the change, not a single documented case of latex-allergic reaction has been reported among clinic employees, says Cunha.

Marshfield made the change-over at a time when concern about latex allergies was waxing. The selection of synthetic surgical gloves was quite limited and quality was sometimes suspect, according to Cunha; for the most part, the sterile synthetic gloves on the market could not meet all the needs of surgeons, he adds.

Vinyl gloves, for instance, fit too loosely and tore too easily. Stretch vinyl was better, but still lacked consistent integrity. Nitrile gloves, which closely approximate the characteristics of latex, were not yet available in sterile packaging and were very costly. Especially challenging was finding gloves for orthopedic surgeons, who often require thicker gloves and gloves that can withstand surgical glues. Some surgeons circumvented the problem by double-gloving with synthetics.

One surgeon who performs operations on AIDS patients, recalls Cunha, was very concerned about protection from bloodborne pathogens. When they found a glove of adequate strength, it was too slick to wear as an outer layer. Finally, the surgeon was able to find a combination of two different synthetic gloves that provided both adequate protection and tactile feel. Ophthalmologists require very thin gloves, so many opted for Tactylon. Gloves made of neoprene became popular with other surgeons. **(See list of non-latex glove manufacturers, inserted in this issue.)**

As a group, the surgeons understood the clinic's reasons for doing away with latex gloves. The fact that the medical director, Frederick Wesbrook, MD, firmly supported the transition to synthetics in the OR, smoothed the process considerably. "Without [his support], it would have been very difficult to accomplish," says Cunha.

There were some missteps. "We made mistakes at first by just handing out various gloves to surgeons to try on without educating them about the materials," recalls Cunha. "They'd come back and say, 'I didn't like these because they ripped.'" Cunha enlisted the aid of glove manufacturers' representatives, who came in to explain the strengths and weaknesses of their synthetic gloves. Acceptance levels rose quickly after that.

A few surgeons objected strenuously to the change. Wesbrook and Cunha met individually with reluctant surgeons and persuaded the holdouts to give synthetics a chance by stressing the seriousness of latex allergies and the fact that Marshfield was seeing more patients with latex sensitivities. Eventually, they succeeded in marshaling the support of the entire medical staff. No surgeons left the Marshfield system because of the move to synthetic gloves, says Cunha.

Initially, surgical glove costs at Marshfield nearly doubled, though the increase was almost certainly offset by the looming threat of workers' compensation cases that might have occurred as the result of latex allergy, says Cunha. Since

(Continued on page 100)

Study highlights dangers of latex use in the OR

Twelve percent of the anesthesia staff at Johns Hopkins University are sensitized to latex, according to study results. The findings support the need to "transform the health care environment into a latex-safe one that minimizes latex exposure to patients and hospital staff," according to **Robert G. Hamilton**, PhD, associate professor of medicine and pathology at the Johns Hopkins University School of Medicine in Baltimore and co-author of a study of latex allergy among Johns Hopkins staff.[1]

The 168 subjects who volunteered for the study comprised virtually the entire anesthesiology staff in the Johns Hopkins Department of Anesthesiology and Critical Care Medicine. The protocol included a detailed clinical history, serologic testing, puncture skin-testing, and, if required, a two-stage glove provocation test. A small number of the participants did not undergo skin testing because they were pregnant, taking antihistamines, or simply declined.

During the study, the medical and surgical staffs at Johns Hopkins were routinely using powdered natural rubber latex examination and surgical gloves.

Twenty-one (12.5%) of the subjects tested were identified as sensitized or IgE antibody-positive to natural rubber latex allergens. Of those, four (2.4%) were both sensitized and symptomatic, presenting with rhinoconjunctivitis, hives, or asthma. Hamilton told *Hospital Employee Health* the study is probably the most definitive prevalence study of latex allergy in a tertiary health care facility because to diagnose latex sensitization, the investigators used the most well-characterized diagnostic skin test reagent available in the United States, the Greer nonammoniated latex extract (NAL).

The Greer NAL is still pending approval by the Food and Drug Administration (FDA). The lack of an approved latex skin test reagent in the United States greatly limits diagnosis and treatment of latex allergy, laments Hamilton. The sensitivity and specificity of FDA-approved serologic techniques for detecting latex-specific IgE antibodies are not ideal, with false-negative rates as high as 25%.

Results from a multicenter investigation of latex skin-testing efficacy conducted by Hamilton and his colleagues and submitted to the FDA demonstrated that the Greer NAL "displayed an excellent diagnostic sensitivity and specificity," and that "use of the clinical history alone may lead to misdiagnosis; however, a skin test result must also be viewed within the context of the patient's history. This is especially important in cases of asymptomatic individuals who have a positive skin test response and a confounding allergy to cross-reactive foods."[1]

The FDA's sluggishness in approving a reliable latex reagent leaves this country with no skin-testing reagent to allow allergists to determine the presence of latex allergy, Hamilton says. "They cannot do their job of diagnosing latex allergy effectively and they don't know what to do, so they're relying solely on the patient's history and serology results," he says.

Serology alone is not enough

"Our concern is that serological methods are not picking up all the individuals that need to be identified. On the other hand, one method gives 25% false-positive rates, and the other two, CAP and ALASTAT, have 25% false-negative rates in comparison to the Greer latex skin test. Then you are misdiagnosing cases of latex allergy, creating havoc in people's lives and unnecessary expense," Hamilton says.

"Skin testing is critical to do it well," he continues. "It impacts workers' compensation because it most accurately identifies allergic cases, and it impacts the management of latex allergy. If you can accurately determine who is sensitized, you can deal with those individuals more effectively. The skin-test reagent has been so slow getting through the [FDA] approval process, yet it's so critical."

Reference

1. Brown RH, Schauble JF, Hamilton RG. Prevalence of latex allergy among anesthesiologists. *Anesthesiology* 1998; 89:292-299. ■

Marshfield began the program, synthetic glove costs have greatly declined as competition for the burgeoning synthetic market has grown, he adds.

During the transition, Marshfield worked closely with the companies that became its major suppliers of synthetic gloves to iron out difficulties. For instance, pull tabs on packages of sterile gloves were too small to open without contaminating the contents. The manufacturers responded by making the tabs larger. Some stretch vinyl gloves didn't fit tightly enough and got pinched in the wheels used to guide endoscopes. The manufacturer responded by improving the glove fit.

After two years of keeping Marshfield surgical procedures free from latex gloves, complaints from surgeons about glove quality began to climb. Demand for synthetic gloves was on the rise, straining manufacturing capacities and compromising quality control, says Cunha. "There had always been some surgeons who had problems with the synthetics. When they became too great, we had to back up a bit." Marshfield retreated to limited use of nonpowdered latex in its OR suites, but has managed to remain largely latex-free.

"Since reintroducing to the OR, we have not been able to switch totally back to synthetic gloves," explains Cunha. "We know that's a compromise, but [latex] has been helpful in filling in gaps that we had before and it's making the surgeons feel more comfortable. As new synthetic and other gloves become available, we will re-evaluate the use of latex gloves in the OR."

Increasing the challenge

If convincing several hundred surgeons at a mostly rural clinic system to adopt synthetic gloves was a tour de force, accomplishing the same feat at a major medical center would seem monumental to some. But Johns Hopkins University is making the attempt — and so far is succeeding.

The facility, which now uses only vinyl or nitrile examination gloves, is in the process of systematically evaluating the use of latex gloves in each of its units and working with surgeons to identify suitable sterile, non-latex alternatives, according to **Robert G. Hamilton**, PhD, associate professor of medicine and pathology at the Johns Hopkins University School of Medicine in Baltimore.

About a quarter of the surgeons and all of the anesthesiologists and surgical nurses have converted to synthetic gloves, says Hamilton, who predicts that most surgical procedures at Johns Hopkins will be latex-free in about six months. **(See related story, p. 101.)** Other sources of latex in the OR are also being eliminated or greatly decreased with the help of a computerized database of latex-free alternative products. Select OR suites are already latex-safe, particularly in the pediatric areas.

"First we explain the problem [to surgeons], then we provide alternative gloves that they try on to determine which is best for them," Hamilton explains. "Generally, they can find one synthetic glove that works fine," says Hamilton, who adds that totally eliminating all latex sources from the surgical environment is a challenging goal at this point. "We at least want to eliminate use of latex in gloves and other sources that, based on the literature, are primary sources of allergen exposure."

Objections from surgeons were predictable and met with reasoning and one-on-one meetings to discuss the pressing need to reduce the risk of latex sensitivity among patients and staff, says Hamilton.

Hamilton offers several suggestions for facilities that wish to reduce the use of latex in their ORs:

- **Establish a latex task force with defined goals.** "For us, it was to create a latex-safe working environment for all employees and patients," says Hamilton.
- **Place benefit over cost.** Spending a little more money on synthetic gloves is worth the investment and is a decision that should be made institutionwide. Often, hospitals will make crucial medical decisions based on cost, not benefit, notes Hamilton.
- **Systematically eliminate powdered latex examination gloves.** "Not everyone needs to go to the great extent that we are to eliminate all latex gloves," explains Hamilton. "Powdered latex gloves represent the group of products that historically have contained the highest levels of allergens, and the cornstarch powder carries the latex protein into the air. Eliminating powdered gloves reduces skin contact with the allergen."
- **Create a list of alternatives to products that contain latex and develop a nursing protocol for latex-allergic patients and staff.**
- **Develop an education program so that all staff members realize the gravity of this issue and what their options are.** ■

Going powder-free is first step to beat latex allergies

Powderless gloves limit aerosolization of proteins

Reacting to growing concerns about latex allergies among health care workers and patients, many hospitals have curtailed the use of latex gloves used for examinations and surgery. But making the transition begs the question of how far to go and what amount of latex glove use is safe.

Despite noteworthy advances in synthetic alternatives, surgeons and other health care workers still consider latex gloves the gold standard because they embody a unique combination of strength, flexibility, durability, and tactility. Totally eliminating latex from the glove equation, particularly in the operating room, may be an unrealistic goal for most institutions.

But at the very least, health care facilities should eliminate the use of powdered latex exam and surgical gloves, according to **Robert G. Hamilton**, PhD, associate professor of medicine and pathology at the Johns Hopkins University School of Medicine in Baltimore.

"Powdered latex gloves represent the group of products that historically have contained the highest levels of allergens. By eliminating them, you eliminate the cornstarch that carries the protein allergen into the air, and thus you reduce contact exposure," Hamilton says.

Airborne allergens pose greatest threat

A Mayo Clinic study demonstrated that airborne latex allergen concentrations varied from 10 to 208 ng / m^3 in areas where powdered latex gloves were used, compared with 0.3 to 1.8 ng / m^3 where powdered latex was never or seldom used.[1]

"Problems [related to latex glove powder] don't usually occur in the OR suite, but in the pre- and postoperative bays where you have a lot of glove changes and a lot of accumulation of latex glove powder," says **Lauren Charous**, MD, director of the allergic and respiratory care center at the Milwaukee Medical Clinic and chairman of the American College of Allergy, Asthma and Immunology Latex Hypersensitivity Committee in Arlington Heights, IL.

"In most situations, you can use powderless latex gloves for both surgery and for exams," says Charous. "Getting rid of powdered latex gloves is a reasonable, doable goal, and except under special circumstances, you don't need a separate non-latex OR suite if you use only unpowdered latex gloves because they don't produce the aerosolized proteins."

Powderless gloves not only minimize aerosolization of latex proteins; they typically contain far lower amounts of the offending allergens that cause IgE / histamine-mediated (Type I) reactions, because they undergo more thorough washing and chlorination during manufacturing. **Wava Truscott**, PhD, vice president of scientific affairs for the Safeskin Corp. in San Diego, notes that powdered latex gloves can contain 3,000 times more allergen than unpowdered gloves.

Kenneth K. Meyer, MD, FACS, adjunct scientist at the Guthrie Foundation for Medical Research in Sayer, PA, has found that allergen levels in powdered latex gloves can be as high as 1,039 [gm]g / g, whereas the content of powder-free latex gloves rarely exceeds 293 [gm]g / g, as measured by the Lowry test.

These variations are significant, says Meyer, who says nearly 70% of patients with documented latex allergy test positive in the presence of powdered latex gloves containing more than 50 [gm]g / g of latex allergens. But in the presence of gloves containing minimal amounts of latex allergens, only 11% of latex-allergic subjects tested positive.

While the Lowry test is considered the national standard for determining latex protein content, it has been criticized because it lacks sensitivity and specificity. Meyer and others ascribe a great deal more credence to immunochemical assays, such as the LEAP assay and the RAST assay.

Glove users, Meyer adds, should never assume that gloves are protein-free based on laboratory tests, powdered or not. In a report published in the *Bulletin of the American College of Surgeons*, Meyer writes: "Laboratory tests cannot determine that no protein is present in the glove, and no manufacturer can honestly claim their latex gloves to be protein-free just because protein is undetectable by tests. Clearly, gloves with undetectable protein by the immunological methods have a significantly less likelihood of causing reaction than those tested

(Continued on page 103)

Durability of gloves can vary considerably

All of the materials currently used to produce examination and surgical gloves (natural rubber latex and synthetics) offer users equal protection against pathogens — at least when they're first removed from the box, according to the Food and Drug Administration (FDA), which regulates medical gloves. But according to some research, the quality of barrier protection can change significantly during use.

Mel Stratmeyer, chief of the Health Sciences Branch, Office of Science and Technology at the FDA's Center for Devices and Radiological Health in Rockville, MD, says examination and surgical gloves must meet criteria of the American Society for Testing and Materials (ASTM), which sets standards for the various glove materials. "Any glove that meets ASTM standards would at the time it's taken out of the box meet the FDA barrier requirements," he explains.

The Centers for Disease Control and Prevention concurs: "There is no difference in barrier effectiveness as long as the glove is intact," says **Sarah Critchley**, RN, in the CDC's Hospital Infections Program.

However, neither the FDA nor the CDC has investigated how glove use affects barrier integrity for various glove materials. "It doesn't appear that all of the materials are equal with respect to that. We're looking at what comes out of the box, not after use, but we're in the process of exploring the whole issue," Stratmeyer says.

So are other researchers, who have compared the strength and durability of natural rubber latex with some common nonlatex alternatives. Their findings reveal some notable differences. "It is the in-use barrier performance that separates gloves of various material composition in regard to on-the-job barrier protection," says **Wava M. Truscott**, PhD, vice president of scientific affairs for Safeskin Corp. in San Diego.

One group of investigators compared the barrier integrity of exam gloves made of latex, vinyl, and nitrile under controlled conditions that simulated common patient-care activities.[1] The study concluded that the barrier integrity of vinyl gloves was violated more quickly and more often than natural rubber latex and nitrile gloves.

Researchers tested 800 latex gloves, 800 vinyl gloves, and 400 nitrile gloves. To determine baseline leakage before use, gloves were taken directly from their boxes without manipulation and subjected to a water leak test.

Glove use simulations were designed to mimic rigorous patient care activities for approximately 20 minutes. Simulated use conditions were: attach and remove a capped needle to a Luer-Lok syringe 30 times; connect and disconnect a Luer-Lok syringe with intravenous tubing eight times; manipulate a stopcock eight times; and wrap, tape, and unwrap a blunt object two times (to simulate bandaging an amputation stump). Gloves either "passed" or "failed" based on the ASTM Standard Test method for detecting holes in medical gloves.

Vinyl gloves failed more often than others

Overall, the investigators found no significant differences in failure rates for gloves when tested, unused, directly out of the box. But after manipulation that simulated patient care activities, vinyl gloves failed 12%-61% of the time; latex failed 0%-4% of the time; and nitrile failed 1%-3% of the time. Failure rates for stretch vinyl, while still relatively high, were lower than those for standard vinyl. All of the latex gloves, with one exception, were low-protein gloves containing less than 50 [gm]g / g of latex allergen as determined by the Lowry test.

"Careful consideration to the degree of barrier effectiveness should be given prior to glove selection where the potential exposure to bloodborne pathogens or biohazard risk is a concern," concluded the investigators.

Reference

1. Rego A, Roley L. In-use barrier integrity of gloves: Latex and nitrile superior to vinyl. *Amer J Infect Control*. In press. ■

by the Lowry method."[2] He adds that powder-free gloves, because they hydrate more slowly than their powdered counterparts, "maintain their tensile and tactile properties as well as their resistance to chemical and viral transfer."

Meyer stresses that if latex gloves are present in the OR, only powder-free models be worn. To the degree possible, surgeons should know the protein content of the gloves they wear. Meyer advises glove users to obtain from manufacturers the results of immunochemical tests (LEAP and RAST assays), not Lowry test results. According to Meyer, surgeons should insist that their latex gloves contain less than 10 [gm]g / g as measured by LEAP assay or less than 100 allergen units / ml as measured by RAST. The "ideal" latex glove contains less than 1 [gm]g / g as measured by LEAP and 1 to 14 allergen units / ml by RAST.

Policies not enough

Despite all the sensible advice regarding latex, a study conducted by researchers at the University of Connecticut Health Center in Farmington demonstrates that simply implementing a policy to reduce powdered-latex glove use is ineffective unless coupled with a concerted and ongoing education program. **Marcia Trapé**, MD, medical director of the hospital's Employee Health Service, stated that "restricting the use of powdered latex gloves is but a first step in solving the problem of latex sensitivity among health care workers." **(See *Hospital Employee Health*, May 1999, pp. 55-57.)**

The University of Connecticut had implemented a policy recommending the use of nonlatex or powder-free latex exam gloves for nonsterile procedures. But one year later, half of nearly 1,100 employees surveyed said they still wore latex gloves, and 16% still used powdered latex gloves. Among workers who reported skin reactions to latex, 84% were still wearing it, even though they had access to nonlatex alternatives. In addition, health care workers who experienced a higher incidence of latex allergy symptoms wore powdered latex gloves more frequently than their colleagues who suffered fewer allergic episodes.

The survey data also showed that employees in high-exposure categories (which included surgical medical staff, non-surgical medical staff, and nursing staff) were 12 times more likely to develop latex-related skin symptoms than those considered at lower risk, such as maintenance workers and patient transporters.

The dangers of latex exposure were widely publicized by a NIOSH safety alert issued in 1997 **(see *HEH*, September 1997, pp. 97-101)**, which stated that "If you choose to use latex [gloves], use powder-free low protein."

Earlier this year, the Occupational Safety and Health Administration (OSHA) issued a technical bulletin recommending that hospitals use powder-free, low-protein latex gloves and provide nonlatex alternatives for health care workers and patients who are allergic to natural rubber latex **(see *HEH*, June 1999, pp. 61-63)**. OSHA has insisted that the bulletin is simply a strongly worded advisory — not a new regulation — but the document aroused controversy in the medical glove industry, which called the conclusions alarmist.

Undeniably, latex allergy is an issue to be taken seriously, yet the problem's true scope remains unknown. Estimates place the incidence of latex sensitivity among health care workers at between 8% and 17%. Many become sensitized to latex proteins after repeated exposure (including inhalation) to airborne glove powder, according to experts.

In comparison to other allergies, the incidence of latex allergy is relatively low and it is rarely life-threatening. According to one British researcher, not a single latex-allergy case of fatal anaphylactic shock has been documented anywhere in the world, despite an estimated annual consumption of more than 15 billion latex gloves. But the statistically small risk is little consolation to those whose careers have been severely restricted or even ended by latex sensitivities.

As one latex expert stated, "Although the threat to life from latex products may be extremely small, the allergy symptoms need to be avoided as far as possible. It is therefore in the interest of everyone, including latex product manufacturers, that gloves made of alternative materials are available and that they are used when necessary."[3]

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1. Swanson MC, Bubak ME, Hunt LW, et al. Quantification of occupational latex aeroallergens in a medical center. *J Allergy Clin Immunol* 1994; 94:445-451.

2. Latex allergy: How safe are your gloves? *Bull Am Coll Surg* 1997; 82.

3. Morris MD. *Latex Protein Allergy, the Latest Position.* Conference Paper. Paris: International Latex Conference; 1995. ■

Lift-free policy can reduce workers' comp claims

Involve staff in the selection of mechanical devices

More than a third of workers' compensation losses at hospitals and nursing homes occur when staff members attempt to move patients. Most of these injuries involve the back. But they can be avoided with the use of mechanical lifting devices, which, though expensive, cost far less than workers' compensation claims that result from lifting injuries, according to **Lois Zangl**, RN, BSN, COHN-S, CST, occupational health specialist at the Milwaukee office of Wausau Insurance Cos. Zangl and her colleagues at Wausau conduct seminars on how to minimize the need for manually lifting and moving patients.

"The lift-free idea uses mechanical devices when a resident is unable to bear weight, is unable to assist in his or her transfer, or has only partial weight-bearing ability," explains Zangl.

Devices geared for virtually any patient-lifting scenario are available to hospitals. For patients who cannot bear any weight at all, Zangl recommends total lift devices. For those who can bear some of their own weight and who have some capacity to control their muscles well enough to sit upright, she recommends using a sit-stand device, which allows a single staff member to bring the patient to an upright position and then pivot the patient to a bedside chair, toilet, or bathtub without risking back strain. Some patients may be able to use an apparatus that allows them to walk unassisted and will break a fall should the patient lose balance.

Zangl says one of the most common back injury scenarios in hospitals occurs when a patient collapses or falls and a staff member attempts to catch the patient on the way down. The sudden load can easily result in serious injury.

Sit-stand devices, which are becoming more common, are designed for patients who have some ability to swing into a sitting position at their bedside but are unable to bear their own weight completely. The devices work by using a sling under the patient's arm and then hydraulically lifting the patient to a standing position, after which the patient can maneuver the device alone. Other lifting devices help reposition patients in bed.

While the notion of lift-free transference focuses primarily on patient movement, other employees who lift heavy objects in the hospital also should use mechanical lifting devices, such as food service workers who are required to lift heavy pots and pans, Zangl recommends. Lifting accidents caused by moving materials are the second most common cause of injury in hospitals, she adds.

Zangl acknowledges that patient lifting devices are expensive, often costing from $3,000 to $6,000 apiece. But compared to the financial and human cost of losses caused by patient-lifting injuries, the investment is minuscule.

"It's not unusual for a back injury to a nurse to cost the hospital $50,000," says Zangl. "You can purchase a lot of mechanical lifting devices for that amount. Devices on the market are very versatile and available for a variety of different transfer situations. They'll pay for themselves in not much time at all."

But even hospitals that have a stock room full of patient-lifting tools must promote a culture that supports their use, or the machines will go to waste, Zangl stresses. "Some hospitals purchase expensive devices but don't encourage their use or educate staff on their benefits, so management gets frustrated," she says. "The administration needs to get the message out that using lifting devices is how we do business now. Don't manually transfer patients when the assessment warrants otherwise."

Zangl advises that hospitals take the following steps for introducing lifting devices into the hospital and making sure they don't collect dust:

- **Assess the lifting needs of each unit before purchasing any mechanical devices.** "An orthopedic unit, for instance, probably does more patient lifting than other unit, and so will likely need more lifting devices," Zangl says.
- **Ask staff members what lifting devices they need and would use.** Involving employees in the selection process will greatly increase the likelihood that staff will use the devices after delivery.
- **If possible, allow staff to test out equipment under consideration before making a purchase.**
- **Once delivered, lifting devices should be kept physically accessible, or staff members will ignore them.**
- **Administration must support the use of lifting devices by committing to buy enough of them to cover staff needs and conduct training sessions.**

"I've seen some facilities that have been very successful with lifting devices because management and employees were involved in the process from the beginning," says Zangl. ■

Protocol stems spread of nosocomial pertussis

Exposed, asymptomatic workers can be contagious

Nosocomial pertussis infections appear to be making a resurgence. Multiple outbreaks of the highly contagious disease have been widely reported, including a 1993 episode at a pediatric hospital during which 87 employees contracted pertussis.

Increased spread of the disease, say experts, has been facilitated by several factors, including waning immunity among vaccinated adults and adolescents; failure of hospital employees to recognize the early symptoms of pertussis, especially in adults (which may not include coughing); and delays in treating and isolating infected individuals and employees or patients who have been exposed to the disease.

Though the disease does not pose a serious threat to adults, it can be life-threatening to infants and young children. The World Health Organization estimates that in 1994 there were 40 million cases of pertussis worldwide, and 360,000 children died of the disease.[1]

"Many physicians are not familiar with the manifestations of pertussis, especially in adults. Hence, the diagnosis frequently is missed, leading to failure to institute proper isolation and therapy," according to one expert.[2]

"In the U.S., reports of pertussis have increased since 1988, and we know that immunity is declining. But we don't know how big the problem is," says **Donna J. Haiduven**, BSN, MSN, CIC, PhD-C, infection control supervisor at the Santa Clara Valley Medical Center in San Jose, CA, a 600-bed teaching facility affiliated with Stanford University Medical School. Adding to the threat of nosocomial transmission, Haiduven continues, are atypical presentation of the disease, infection from symptomatic adults with undiagnosed disease, diagnostic errors or delays, and poor compliance with childhood vaccination schedules.

At Santa Clara Valley, 49 pertussis exposures originating in the emergency department or the pediatric unit were recorded between July 1, 1989, and June 30, 1997. The facility responded by establishing guidelines to manage pertussis exposures among patients and employees. "Our goal was to create a standardized, practical protocol to protect visitors, patients, and employees," Haiduven says. "We believe the protocol has been effective." Haiduven says she believes that every time the pertussis protocol was used at Santa Clara Valley, no secondary transmission occurred.

The protocol defines an exposure as an unmasked direct contact with respiratory secretions or large aerosol droplet inhalation from infected persons. When an exposure is suspected, the hospital infection control department guides its response by a standardized checklist, which lists the following sequence of steps, according to Haiduven:

1. Verify the diagnosis.

2. Isolate the patient and send the exposed employee home.

3. Restrict infected visitors from the hospital.

4. Determine the length of the potential contagious period.

5. Interview infected staff members and/or conduct a chart review of the infected patient.

6. Determine which other departments or patients are at risk for exposure.

7. Notify the Employee Health Service, the Emergency Department, the laboratory, and the public health department of the exposure.

8. Prepare and distribute appropriate memoranda.

9. Arrange isolation guidelines and dates for the index case and any exposed patients.

10. Collect information from Employee Health Services and the Emergency Department on treated employees and/or those who refuse treatment.

11. Check the census daily for discharged exposed patients during the potentially contagious period.

12. Complete an exposure summary.

Patients who have a suspected or diagnosed case of pertussis are placed on droplet precautions until a diagnosis is either confirmed or ruled out or until they have been on effective drug therapy for five days. Patients who receive no drug therapy are isolated for 21 days after the onset of illness if they are still in the hospital, according to Haiduven.

Once an employee exposure to a patient with a diagnosed or suspected case of pertussis has been verified, the department manager where the exposure occurred posts a contact list to be signed by all employees who have had direct contact with an infected patient or exposed employee. All employees on the list must report

to Employee Health Services. A chart review is also conducted to determine if personnel from other departments might have been in contact with the infected patient. **(See CDC guidelines for employee exposures to pertussis, p. 107.)**

Exposed, asymptomatic employees who wish to continue their duties can choose from two options. One requires the employee to complete five full days of effective chemoprophylaxis. If all five days of chemoprophylaxis are completed before the first possible communicable day (namely, seven days after the first day of exposure to a case of pertussis), then no further action is required. Otherwise, the employee must wear a mask when caring for children under the age of four.

Under the second option, an asymptomatic exposed employee who wishes not to take prophylactic medications but who wants to continue working must wear a mask during the entire communicable period of the disease — from seven days after the first possible date of exposure to 14 days after the last possible date. Haiduven explains that the mask must be worn at all times while in the hospital and changed at least every hour or when the mask becomes moist. With either option, if an employee becomes symptomatic, he or she is sent home.

There is a standardized form for each of the two courses of action. The exposed employee must sign the appropriate one, thereby agreeing to adhere to the required postexposure protocol.

The policy for asymptomatic exposed employees who choose not to receive chemoprophylaxis is more conservative than the guidelines promulgated by the Centers for Disease Control and Prevention, which do not place any restrictions upon employees who have been exposed to pertussis but are asymptomatic. But Haiduven notes that asymptomatic exposed employees can be contagious when the catarrhal phase of the disease begins, before coughing starts.

"A lot of people may not attribute catarrhal symptoms to pertussis. If those employees continue to practice [without precautions], they might be spreading the illness before they even get a cough," she says. "We handle all employees as if they might develop pertussis, and we don't rely on employees to notice possible early pertussis symptoms in themselves."

This conservative approach, Haiduven says, has greater potential to prevent additional exposures. "Some people may not agree with it, but we feel it cuts down on the number of exposures before coughing starts. It's an additional protection for an employee receiving prophylactic treatment."

In the event of a pertussis outbreak, the existing protocol would stand and possibly be augmented by mandating widespread masking of employees until the threat of disease transmission has passed.

Erythromycin is the only FDA-approved drug for postexposure pertussis prophylaxis, though the newer macrolide-class drugs clarithromycin and azithromycin are often better-tolerated by recipients, according to Haiduven. For people who are allergic to macrolides, an alternative is the drug trimethoprim-sulfamethoxazole.

The hospital also has a protocol that covers visiting children. Children visiting the hospital must be screened for communicable diseases, including pertussis. If they display certain symptoms or haven't had all necessary vaccinations (varicella, measles, pertussis, rubella); if they have been exposed to any other child with a communicable disease within the past three weeks; or if they have had disease symptoms within the last 48 hours, such as any evidence of ear drainage, rash, red runny eyes, or a runny nose, they are denied visitation rights.

References

1. Ivanoff B, Roberson SE. Pertussis: A worldwide problem. *Dev Biol Stand* 1997; 89:3-13.
2. Weber DJ, Rutala WA. Pertussis: An underappreciated risk for nosocomial outbreaks. *Infect Control Hosp Epidemiol* 1998; 19:Editorial. ■

COMING IN FUTURE MONTHS

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CDC offers guidelines for pertussis

The following are excerpts from the Centers for Disease Control and Prevention's 1998 *Guidelines for Infection Control in Health Care Personnel* that relate to pertussis.[1]

Pertussis prophylaxis: Erythromycin, 500 mg qid PO, or one tablet bid PO, for 14 days after exposure. Indications: Personnel with direct contact with respiratory secretions or large aerosol droplets from respiratory tract of infected persons.

Work restrictions (active pertussis): Exclude from duty. Duration: From beginning of catarrhal stage through third week after onset of paroxysms or until five days after start of effective antimicrobial therapy.

Work restrictions (postexposure asymptomatic personnel): No restriction, prophylaxis recommended.

Work restrictions (postexposure symptomatic personnel): Exclude from duty. Duration: Until five days after start of effective antimicrobial therapy.

Prevention of Nosocomial Transmission of Pertussis:

- Do not administer whole-cell pertussis vaccine to personnel.
- NO RECOMMENDATION for routine administration of an acellular pertussis vaccine to health care personnel. UNRESOLVED ISSUE.
- Immediately offer antimicrobial prophylaxis against pertussis to personnel who have had unprotected (i.e., without the use of proper precautions), intensive (i.e., close, face-to-face) contact with a patient who has a clinical syndrome highly suggestive of pertussis and whose cultures are pending; discontinue prophylaxis if results of cultures or other tests are negative for pertussis and the clinical course is suggestive of an alternative diagnosis.
- Exclude personnel in whom symptoms develop (e.g., cough for greater than or equal to seven days, particularly if accompanied by paroxysms of coughing, inspiratory whoop, or post-tussive vomiting) after known exposure to pertussis from patient care areas until five days after the start of appropriate therapy.

Nosocomial transmission of *Bordetela pertussis* has involved both patients and personnel; nonimmunized children are at greatest risk. Serologic studies of health care personnel indicate that personnel may be exposed to and infected with pertussis much more frequently than indicated by the occurrence of recognized clinical illness. In one such study, the level of pertussis agglutination antibodies was found to correlate with the degree of patient contact; the prevalence of such antibody was highest in pediatric house staff (82%) and ward nurses (71%) and lowest in nurses with administrative responsibilities (35%).

Pertussis is highly contagious; secondary attack rates exceed 80% in susceptible household contacts. *B. pertussis* transmission occurs by contact with respiratory secretions or large aerosol droplets from the respiratory tracts of infected persons. The incubation period is usually seven to 10 days. The period of communicability starts at the onset of the catarrhal stage and extends into the paroxysmal stage up to three weeks after

Hospital Employee Health® (ISSN 0744-6470) is published monthly by American Health Consultants®, 3525 Piedmont Road, Building Six, Suite 400, Atlanta, GA 30305. Telephone: (404) 262-7436. Periodical postage paid at Atlanta, GA 30304. POSTMASTER: Send address changes to **Hospital Employee Health**®, P.O. Box 740059, Atlanta, GA 30374.

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onset of symptoms. Prevention of secondary transmission of pertussis is especially difficult during the early stages of the disease because pertussis is highly communicable in the catarrhal stage, when the symptoms are nonspecific and the diagnosis is uncertain.

During nosocomial pertussis outbreaks, the risk of acquiring infection among patients or personnel is often difficult to quantify because exposure is not easily determined. Furthermore, clinical symptoms in adults are less severe than in children and may not be recognized as pertussis. Pertussis should be considered for any person seeking treatment with an acute cough lasting at least seven days, particularly if accompanied by paroxysms of coughing, inspiratory whoop, or posttussive vomiting.

Prevention of transmission of *B. Pertussis* in health care settings involves (a) early diagnosis and treatment of patients with clinical infection, (b) implementation of droplet precautions for infectious patients, (c) exclusion of infectious personnel from work, and (d) administration of postexposure prophylaxis to persons exposed to infectious patients. Patients with suspected or confirmed pertussis who are admitted to the hospital need to be placed on droplet precautions until they have clinical improvement and have received antimicrobial therapy for at least five days.

Postexposure prophylaxis is indicated for personnel exposed to pertussis; a 14-day course of either erythromycin (500 mg orally four times daily) or trimethoprim-sulfamethoxazole (one tablet twice daily) has been used for this purpose. The efficacy of such prophylaxis has not been well-documented, but studies suggest that it may minimize transmission. There are not data on the efficacy of newer macrolides (clarithromycin or azithromycin) for prophylaxis in persons exposed to pertussis.

Restriction from duty is indicated for personnel with pertussis from the beginning of the catarrhal stage through the third week after onset of paroxysms, or until five days after the start of effective antimicrobial therapy. Exposed personnel do not need to be excluded from duty.

Reference

1. Bolyard EA, Tablan OC, Williams WW, et al. Guideline for Infection Control in Health Care Personnel, 1998. Atlanta; Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. ■

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. ■