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In search of a sharper (and safer) idea

If you hated some of your choices for safer needle devices, take solace. The device market is changing rapidly, and new devices promise better design. Needle safety experts are urging manufacturers to listen to health care workers as they consider changes to products cover

Ultimate safety: No needle, no stick

Alternatives to needles are gaining favor as manufacturers refine the designs of needleless injectors and introduce a slew of other products. There's a laser that replaces a lancet. Researchers seek to use spectroscopy to replace blood collection. To support these efforts, the National Alliance for the Primary Prevention of Sharps has asked the National Institute for Occupational Safety and Health to promote 'primary' prevention — the removal of the sharp device. 39

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Safety isn't always in the numbers

Two new reports of needlestick data reveal information about who gets stuck and where it happens. But the data can't show a clean before and after impact of new needle safety regulation. 'We're not comparing safety implemented after the law vs. nonsafety before the law,' says Janine Jagger, PhD, MPH, director of the International Health Care Worker Safety Center at the University of Virginia 41

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When will safer needles offer better designs?

Manufacturers respond to design complaints

If you are frustrated with your choices of safer sharps devices, consider this: Last year, dozens of patents were issued for safety syringes alone. The number of manufacturers has risen to more than 100, and the variety of safety products continues to grow.

This rapid escalation in needlestick prevention technology creates confusion in the short term — but offers promise for devices that are easier to use and lead to fewer needlesticks. Employee health professionals report that poor design is a major stumbling block as they seek to replace all sharps with safety devices.

"A lot of these devices still have problems with them," agrees **June Fisher**, MD, director of the Training for Development of Innovative Control Technology Project of the Trauma Foundation at San Francisco General Hospital, a collaboration of frontline health workers, industrial hygienists, and product designers. "I would like to see much closer cooperation of manufacturers dealing with frontline workers for input. They all tell me they get a lot of input. I doubt it because they wouldn't be making some of the mistakes they're making."

Complaints include:

- Safety devices have to be attached before use. (Many health care workers won't bother.)
- Syringes don't eject all the contents. (The hospital gets fewer doses from expensive medications.)
- Sharps are not sharp enough. (Patients are uncomfortable, and IV starts require more than one stick.)

These concerns point out the importance of

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Winning over management for ergonomic support

Tampa (FL) General Hospital administrators agreed to spend \$165,000 a year for a six-person lift team. The hospital installed 190 ceiling tracks for portable lifts and purchased a variety of devices, including slip mats, floor lifts, chairs that convert into stretchers, and beds that fold into chairs. Each unit also will have a 'superuser,' a nurse who received special training to guide others in the use of the equipment. How did JoAnn Shea, MSN, ARNP, director of employee health and wellness, get these resources during tight economic times? She crafted a well-researched argument, using cost and injury data from patient-handling injuries 42

Good results give lift teams a boost

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- Tools for assessing ergonomic needs
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- Why some hospitals screen new employees for HCV

continually screening new technology and getting input from frontline health care workers at every stage of the selection process, needle safety experts say. At the same time, complaints don't necessarily mean a device is bad, notes **Janine Jagger, PhD, MPH**, director of the International Health Care Worker Safety Center at the University of Virginia in Charlottesville.

"There can be legitimate reasons for wildly different opinions on the same device," she says. "The fact that health care workers in one setting don't like a device is not necessarily a condemnation of that device.

"At the same time, we need to be listening now more than ever to feedback from health care workers," she says. "This is a new generation of devices. The advances are going to be continuing at a very high rate. Now is the time for health care workers to convey their opinions."

Positive changes are apparent as new devices emerge. For some procedures, hospitals now have needleless alternatives. Safety features have become more refined. In the latest guidebook from ECRI, a technology assessment firm in Plymouth Meeting, PA, more than 30 of the 66 devices were evaluated for the first time. ECRI also covered 13 product groups. In *Sharps Safety and Needlestick Prevention*, ECRI rated safety scalpels, blunted sutures, arterial blood gas syringes, and protective lancets for the first time. And as technology changes, some devices that were considered acceptable in earlier assessments are now rated unacceptable. **(See editor's note for more information on the guide, at the end of this article.)**

Robyn Silverman, ECRI senior project officer, notes that manufacturers are gradually improving designs. "There is a lot more attention being paid to devices that would be easier for the health care worker to use without learning a lot of new techniques," she says. "The best thing is for a device to come in and not cause a big training and learning curve. That's what manufacturers are looking for now."

ECRI has been criticized for conducting its device testing in a laboratory environment. Silverman notes that ECRI also solicits input from device users. But she acknowledges that a device recommended by the firm might not be the best one for a particular hospital or unit.

"When we rate a device preferred, this is based on the fact that people find it easy to use and they like it," Silverman says.

"The most important thing is for your personnel to like the device so they'll feel comfortable using

Take away the needle — and the needlestick

Devices replace syringes, lancets, sutures

What is the best possible safety device? One with no needle at all. New developments have led to a rapid increase in the use of needleless technology. Hospitals can now administer vaccines or medication with needleless injectors. Nasal and intradermal alternatives are emerging. Adhesives are replacing sutures, and there's even a laser that eliminates the need for a lancet.

"Eliminate the needle, and you eliminate the risk [of needlesticks] entirely," says **Brad Poulos**, executive director of the National Alliance for the Primary Prevention of Sharps Injuries (NAPPSI), an alliance of device manufacturers based in Carlsbad, CA.

"Those are very important ways to reduce the use of needles," agrees **Janine Jagger**, PhD, MPH, director of the International Health Care Worker Safety Center at the University of Virginia in Charlottesville.

NAPPSI has petitioned the National Institute of Occupational Safety and Health to issue an advisory stating that health care facilities should use both primary and secondary prevention to reduce needlesticks. Whenever possible, the advisory would recommend using primary prevention, a term borrowed from epidemiology where it describes the protective impact of vaccines, says **Steve Bierman**, MD, NAPPSI founder and president of Venetec International. The San Diego-based company produces a device that secures central venous catheters without sutures.

"If you bring a needle into the institution, whether there's a safety mechanism or not, you run a risk," Bierman says. "The safety mechanism may fail; the nurse may fail to use it. In the haste of the moment, a needlestick may occur."

NAPPSI will request advisories from other agencies and organizations, such as the Food and Drug Administration, he says. "To date, the greater part of the attention that's been dedicated to needlestick safety has gone to retractable and sheathing secondary devices," he says. "We want to call attention in the workplace to all the devices that NAPPSI members make, which are [primary] safety devices."

Slowly, needle replacement is gaining favor in hospitals as new products emerge. For example, manufacturers are refining the designs of needleless

injectors to allow for more widespread use with a variety of medications. Some medicines are injected into the muscle and others under the skin, which means the injectors must be able to accommodate the different transmission. "What I'm seeing is a fair number of drug development companies partnering with drug injection companies," Poulos says.

At Marshfield (WI) Clinic, employees have had widely differing views on the needleless injectors. **Bruce Cunha**, RN, MS, manager of employee health and safety, administered flu vaccines to employees two years ago with the Biojector, from Bioject Medical Technologies in Portland, OR. In a survey, 53% said they liked it. The other 47% didn't.

"It's absolutely fine. But it gives a different kind of injection," he says. "It has a different reaction from the public. Some people love it; some people hate it."

The force of the injection can cause slight bruising, Cunha notes. But it's also fast and causes little pain, he says. The clinic purchases the injectors as one option for employees to use. They also have retractable and safety-cap syringes.

"How do you convince people that even though it's different — it's not the same as giving an injection, and it has different properties — that it's actually a better device?" he says. "In Wisconsin, [the injector] is not even considered a sharp, so you don't even have to throw it in a sharps container."

It would seem impossible to develop a needleless method for blood collection. But even in this area, noninvasive devices are coming to the forefront. Probes under development use reflectance spectroscopy to conduct a complete blood count or to measure blood glucose level.

It will take time for some of these devices to gain favor in cost-conscious hospitals, Poulos acknowledges. "Cost is going to be the issue, as with any new technology until there's a large adaptation of it," he says. "We're still early in the evolution of these things."

Needleless alternatives also usually involve a greater change in technique, which means health care workers must alter long-held habits. Bierman acknowledges that "when you're changing habits, it's a higher hill to climb." But he adds, "I think more and more the marketplace is recognizing that the benefit is worth the change."

(Editor's note: More information on primary prevention of needlesticks is available from the National Alliance for the Primary Prevention of Sharps Injuries. Web site: www.nappsi.org.) ■

it. If they don't, that's not the device for you."

Safety device design is much more advanced in some product categories than in others. "The products that have the highest volume use are

becoming fairly sophisticated with several different design options in each category," notes **Jane Perry**, MA, communications director for the International Health Care Worker Safety Center.

“Now manufacturers are starting to take on the issue of smaller niche products.” Allergy shots and pre-filled syringes are just two areas where new items have recently become available, she notes.

IV catheter systems are an example of a highly evolved market, Jagger says. “That product category is at a very high compliance rate right now. The technology keeps on getting better, more refined, and simpler to use, and it’s very, very effective in reducing needlestick rates,” she says. “That’s one of the shining lights in this transition to safer technology.”

How do you cope with the onrush of new products and designs? As a first step, you should screen two or three samples of every product available on the market in a given category, Fisher advises.

“You go through them quickly,” she says. “You probably will discard the majority of them. There are still a lot of bad devices out there.”

Frontline health care workers should be a part of this early screening, Fisher says. The user should guide the process, she says. “Making a pre-selection [of safer needle devices] and then showing it to people is not [a way to involve frontline workers].”

Health care workers in different units may reach very different conclusions about the merits of new products, Fisher notes. Your screening and selection process should allow for those differences. “Your device needs change for different work environments,” she says.

The San Francisco General emergency department (ED) has more in common with the ED at Bellevue Hospital in New York City than it does with its own neonatal unit, Fisher points out.

Marshfield (WI) Clinic offers flexibility even within units by purchasing two or three different products in the same category. For example, nurses may give intramuscular injections with a retractable or sliding sheath syringe or a needleless injector, says **Bruce Cunha**, RN, MS, manager of employee health and safety. **(For more information on needleless systems, see article, p. 39.)**

“We felt it was best to give employees the choice of what product they wanted to use,” he says.

As much as possible, Marshfield Clinic tries to buy passive products — those that are activated during use and don’t require extra steps from the health care worker. If it requires activation, the design should be as similar as possible to the conventional technique, Cunha says. But even if products don’t have an ideal design, they are still vastly better than conventional needles, and they are reducing needlesticks. In the first year of using

What Device Caused Injury?

Disposable syringe	26%
Suture needle	16%
Winged steel needle	9%
Scalpel (reusable and disposable)	8%
IV catheter (stylet)	5%
Vacuum tube blood collection needle	4%

Note: These are the devices most frequently cited in needlestick reports from 21 health care facilities in 1999.

Source: EPINet, International Health Care Worker Safety Center, University of Virginia, Charlottesville.

a “snap cap” style device, in which the user flips a cap over the needle, the clinic’s laboratory had no reported needlesticks. The only needlestick that has occurred happened when a patient moved, jarring the needle and exposing the worker.

“In general, the market is definitely moving to one-handed operation for safety devices,” says **Peter Allen**, spokesman for Becton Dickinson, the Franklin Lakes, NJ, company that is the nation’s largest manufacturer of needle devices.

“We’ve got some technologies in development that are more passive than our current technologies,” he says. “The issue of passivity is a tricky one because very often there’s a trade-off between how passive the device is and how much control the user has in the procedure.” A variety of factors impact the acceptability of products, he says. “The key criteria should be clinical acceptance and whether or not the project is effective in reducing accidental needlesticks.”

Some complaints about safer needle devices stem from discomfort with change. But gradually, the employees are getting used to the new devices, Cunha says. “Most people are comfortable with the fact that we are going with devices that will reduce their chance for injury,” he says. “Most people understand this is really for their safety.”

[Editor’s note: Sharps Safety and Needlestick Prevention (\$295) is available from ECRI, 5200 Butler Pike, Plymouth Meeting, PA 19462. Telephone: (610) 825-6000. Fax: (610) 834-1275. Web site: www.ecri.org. Lists of available safety devices are maintained by the International Health Care Worker Safety Center at the University of Virginia at www.med.virginia.edu/med_cntr/centers/epinet/ and the occupational health branch of the California Department of Health Services at www.dhs.ca.gov/ohb/.] ■

Safer workplace not yet obvious from needle data

Two reports show injury reporting problems

Safer needle devices reduce needlesticks, but that truism so far has been difficult to demonstrate through multihospital data collection. Two new data reports show the persistence of needlesticks and the continued need to implement safer devices and work practices.

The 1999 EPINet data, gathered from 21 health care facilities in the East Coast and Pacific Northwest regions, showed an average of 34 needlestick injuries per 100 occupied beds in nonteaching hospitals and 40 needlestick injuries per 100 occupied beds in teaching hospitals. Those numbers actually represent an increase over 1998.¹

Yet the number of hospitals reporting also changed, from 52 in 1998. The loss of a large nonteaching hospital with a low injury rate affected the figures, which was 22 per 100 occupied beds in 1998, according to *Advances in Exposure Prevention*, the publication of the International Health Care Worker Safety Center at the University of Virginia in Charlottesville.

Hospitals varied greatly in their rates of percutaneous injury, from 15 to more than 125 per 100 occupied beds. The mix of patients, underreporting, and facility type could influence those numbers, in addition to the implementation of safety devices, says editor **Jane Perry**, MA. "Because of these variables, we cannot assume that a health care facility with a low rate of reported injuries per year necessarily has a better safety record than a hospital with a higher rate," she says.

"It's difficult to take data from several hospitals and demonstrate a reduction in needlesticks," says **Janine Jagger**, PhD, MPH, director of the center. "The best way to get at that information is to study one [sharps] device against another. You compare the needlestick rates before and after [implementation of a safety device] in one institution or a couple of institutions."

She notes that even different units of a hospital may have variations in their implementation of safety devices. Meanwhile, data collection such as EPINet won't show a dramatic drop in needlesticks. Many hospitals had implemented safety devices before passage of the Needlestick Prevention and Safety Act in 2000 and new Occupational Safety and Health Administration's regulations.

Others still haven't made significant changes.

"No one is going to be able to get clean before and after data," Jagger says. "We're not comparing safety implemented after the law vs. non-safety before the law. This is a gradual transition that the law hasn't made complete. There are still a lot of conventional devices being used."

California health officials also had hoped to show the impact of new needle safety legislation. That state was the first in the nation to mandate safer sharps, with a 1998 law that became fully enforced in July 1999.

However, the most recent data report covers the period from Jan. 1, 1998, to Dec. 31, 1999, when hospitals were at various states of transition to safety devices. A study by the state's Sharps Injury Control Program found that just 64% of hospitals were using safety needles or needleless injection systems and 69% were using safety-engineered blood collection devices. The greatest area of implementation was in needleless IV systems, with 88% of hospitals reporting that they used the devices.²

The data are based on 1,940 sharps injury reports from more than 199 different health care institutions, 92% of them hospitals. However, California officials also note the shortcomings of the data collection. Many of the reports were submitted on nonstandard forms, and information frequently was missing. For example, only 69% included the job classification of the employee, and only 24% of those reporting knew the brand of the device they were using.

Of the 119 injured employees responding to a question about injury prevention, 62% said an engineered sharps device could have or would have prevented it. Thirty-eight percent said human factors could have prevented the injury, and 20% cited proper sharps disposal.

In a new data registry, California will try to get more detailed data from a representative sample of hospitals, says **James Cone**, MD, MPH, chief of

Who Uses Safety Devices?

Needles or needleless injection systems	64%
Blood collection devices	69%
Needleless IV systems	88%
Lancets	72%

Note: Hospitals reporting use of safety devices, Jan. 1998 to Dec. 1999.

Source: Sharps Injury Control Program, California Department of Health Services, Occupational Health Branch, Oakland.

the occupational health branch in the California Department of Health Services in Oakland. His department also is conducting a study of implementation of safer sharps at 80 hospitals.

Like Jagger, he says the data don't fully reflect the implementation of new devices. "It's hard to prove sometimes the effect of an intervention. It seems like it should be easy, but in practice, it's quite challenging."

In fact, even using the data as a benchmark is problematic, he says. "Needlesticks are notoriously underreported," Cone says. "As much as 90% of doctors fail to report [sharps injuries]. Whatever trend you see may just be a change in the reporting rate. Nurses report more, but still probably 60% fail to report."

Cone says he hopes to help hospitals develop a model program for analyzing their own needlestick data. "I think individual hospitals could look at their own data and see trends," he says.

(Editor's note: A copy of the EPINet report is available from the International Health Care Worker Safety Center. Web site: www.med.virginia.edu/medcntr/centers/epinet/. A copy of California's Sharps Injury Control Program report is available at www.dhs.ca.gov/ohb/.)

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1. Parker G, Perry J, Jagger J. 1999 Percutaneous injury rates. *Advances in Exposure Prevention* 2002; 6:7-9.
2. California Department of Health Services, Occupational Health Branch. *Sharps Injury Control Program Report*. Oakland; 2002. Web: www.dhs.ca.gov/ohb/SHARPS/default.htm. ■

How to build a case for ergonomic intervention

Aging work force, cost data justify program

It was a compelling case for ergonomic intervention: Four nurses had suffered serious back injuries due to patient handling. Multiple surgeries could cost the hospital as much as \$500,000 for each case, and the nurses might never return to full duty. Meanwhile, the risk of future serious injuries was growing with the aging of the hospital's nursing staff. Some 53% of the hospital's nurses are over 40.

JoAnn Shea, MSN, ARNP, director of employee health and wellness at Tampa (FL)

General Hospital, carefully gathered the facts on past and projected costs to build an argument for new lift equipment and lift teams. Her efforts paid off. This year, the hospital is launching a new ergonomics program it hopes will dramatically reduce patient handling injuries and workers' compensation costs.

Cost and injury data provide the key to gaining support for ergonomic improvements, Shea says. "You can't just go to senior management and say, 'This is what I want.' You have to tell how many injuries you're having, what it's costing them. We have very specific statistics. Back [injury] is our highest cost; patient handling is our highest injury. We showed that over five years, it's not getting better. In fact, it's getting worse."

Tampa General administrators agreed to spend \$165,000 a year for a six-person lift team, which will cover shifts from 7 a.m. to 8:30 p.m., seven days a week. The hospital began installation of 190 ceiling tracks for portable lifts and purchased a variety of devices, including transfer sheets, floor lifts, chairs that convert into stretchers, and beds that fold into chairs. Each unit will also have a "superuser," a nurse who received special training to guide others in the use of the equipment.

"It's a big program, but it's well worth it," Shea says. "We didn't know what else to do. How [else] can we prevent injuries in our staff?"

Creating a lift team was a critical part of Shea's request to hospital management. She had contacted other hospitals and discovered that without the support of staff dedicated to safe lifting, time-pressured nurses would revert to their old, unsafe methods. "You can buy all the equipment in the world, but they get stuck in a room, and no one takes them out. If you don't train the staff and have resources for them, you're not going to have any impact," she says.

In a time of competing demands for shrinking revenues, a new expenditure of more than \$300,000 in personnel and equipment may sound like an unlikely request. Shea took a methodical approach to justifying the need and the potential benefit of the Injury Prevention Program.

Shea's best asset was **Manon Labreche**, RPT, CEAS, a physical therapist whom she had hired as an injury prevention coordinator.

"A lot of people call us and ask, 'How did you get that position?'" Shea says. "I presented five years in a row. I went to the safety committee. I went to senior management. Before I hired Manon, I created a back injury task force. I tried to use [in-house] resources, but no one had the time. I finally

Anatomy of an Ergonomic Fix

When any staff suffer patient handling injuries, the entire unit may be affected. Creating an ergonomic “fix” requires a closer look at the hazards and possible solutions. Here are some steps Tampa (FL) General Hospital took in its critical intensive care unit:

PROBLEM

In 1999, the critical intensive care unit suffered 17 patient handling injuries, involving 93 restricted days, and 20 lost days due to injury.

LIFT NEEDS

Staff transfer about six to 10 patients per shift and reposition more than 15 patients per shift. Most patient transfers occur from 3 p.m. to 7 p.m. The only available ergonomic equipment was a transfer board and a manual lift without a transfer sling. The lift was used only for weighing patients.

OTHER HAZARDS

Monitors above beds are high and difficult to reach. Oxygen tanks in the storage room are difficult to lift. Heavy pumps are stored on high shelves.

ERGONOMIC ASSISTANCE

The hospital purchased 18 Hill Rom Total Care Beds, one stretcher chair, and lateral transfer devices. The unit also put a step stool in each patient room to make it easier to reach the monitors. Each staff member also received a gait belt to help with patient handling, and the unit purchased a special walker for patients who needed to ambulate.

OTHER INTERVENTIONS

The injury prevention coordinator trained staff on body mechanics and use of equipment and gave special training to one staff member who would provide training to all new staff. The hospital also rebuilt shelves and cabinets to improve the access to equipment in the storage room.

said it’s not working. If we don’t do anything, I’m going to keep coming back year after year, and our costs are going to keep going up.”

Aside from helping the staff use the existing ergonomic equipment more effectively, Labreche began gathering information and statistics.

Shea spoke with and eventually hired lift team expert William Charney, a consultant based in Bellingham, WA.

“I went to every single department more than once and met with managers to get an understanding of what they do and what their high-risk activities were,” Labreche says. “I conducted a comprehensive assessment of each department

to look at what percentage of passive patients they have and what their injury rates were.” (See a copy of Labreche’s Injury Prevention Assessment, inserted in this issue.)

Labreche brought in dozens of pieces of equipment to use on a trial basis as she and Shea considered what type of ergonomic intervention would help reduce injuries. She immediately saw that equipment alone wasn’t going to be enough.

“I would show [the staff] the piece of equipment and inservice them as much as possible,” Labreche says. “But when it actually came down to using the equipment, they didn’t take the time to go to the end of the hallway to get the floor lift. If it’s going to take them 10 minutes to move things out of the way, they’re not going to use it.”

Ceiling lifts take up less room and could be more accessible, Labreche concluded. But even then, staff could benefit from lifting help.

Over the past few years, lift teams have incurred some criticism. How much injury risk will those lift team members encounter? What if the lift team isn’t available? Is the extra expense worth it?

Shea considered all those questions and interviewed colleagues at hospitals that had used lift teams. She concluded that the lift team members must use adequate equipment, and acknowledged that their assistance wouldn’t be available at every shift. She decided to focus resources on the times of day when most lifts occur.

The two-person teams work 10-hour shifts and receive pay comparable to a patient care tech. They will carry beepers and will have a response time goal of five to eight minutes. They will work throughout the hospital.

“It’s stated [in the hospital’s new ergonomics policy] that the staff will page the lift team for certain types of patients,” Labreche says. “Eventually our whole goal is to become a no-lift hospital.”

Waiting for a lift team and using new equipment when the team isn’t available will require a change in habit and mindset for the staff, she acknowledges. Labreche will be providing support and hopes the “superusers” and nurse managers will reinforce the program.

“Our hope is that we make it such a positive experience that the nurses won’t let them take the lift teams away in future budget crunches,” Shea says. In fact, the ergonomics program may have other benefits in recruitment and retention of nurses. “Nurses say, ‘I’m telling my friends to come over here if we have a lift team. Lifting patients just adds another burden to their workday,’” she adds.

Lift teams save nurses time

Less injury means fewer lost days

Should hospitals have experts in safe patient handling? The concept of special "lift teams" has been slow to gain favor. But hospitals around the country are beginning to adopt lift teams, and they are seeing results, says **William Charney**, DOH, a health and safety consultant based in Bellingham, WA, and a leading proponent of lift teams.

"There are two ways to get to zero lift," Charney says. "One is through lift teams. The other is to train your work force to use mechanical lifts."

In a 10-hospital study published in 1997, lift teams resulted in a 69% reduction in injury rates and a 90% reduction in lost days.¹ Those teams had been in place from three to six years. Other hospitals are experiencing quicker results, Charney says. Five hospitals in the Kaiser Northern California group reduced patient-handling injuries in the nursing department by one-third last year after implementing lift teams, he says.

Nurses appreciate the lift teams because they not only reduce injuries, but they also allow them to focus more attention on caregiving, he says.

"[Patient transfer] takes about an hour per shift that can be given to bedside patient care," he says.

Too often, nurses fail to use ergonomic equipment, either because of inadequate training or time pressures. With lift teams, "You don't have to train 1,000 nurses on zero lifts," Charney says. The training costs and training-release time away from work goes way down.

Here are some major points hospitals should consider when setting up lift teams, Charney advises:

- **Assess your needs based on patient census and acuity.** A hospital with 200 to 300 beds would probably need two lift teams that would cover 12 hours, seven days a week, he says.

Few patient transfers occur during the overnight hours, and staff can be trained to use the lift equipment to handle those needs, he says.

- **Purchase adequate equipment for the lift teams.** These are not burly guys who will manually lift patients. "The nine most common [patient-handling] lifts exceed the National Institute for Occupational Safety and Health guidelines for lifting," for men or women, Charney notes. The key is having lift team members, whether men or women, who are well-trained and have the equipment necessary to reduce the risk of injury.
- **Create new policies and procedures.** What if nurses don't wait for the lift team and perform lifts without help? "You have a written policy and procedure that mandates that nurses have to call the team," he says. That includes disciplinary notices if employees don't follow the stated procedures, he adds. Meanwhile, supervisors must convince nurses that the time spent waiting for a lift team (usually 10 or so minutes) is far less than the time lost due to a back injury.
- **Maintain a quality assurance program.** Even with good policies, adequate equipment, and lift teams, someone may be injured in patient handling. A quality assurance (QA) task force should analyze problems as they occur and determine why an injury occurred, Charney says. "The biggest mistakes that hospitals make is that they don't put the QA in it and they don't train properly," he says.

[Editor's note: For more information on lift teams, contact William Charney at (360) 527-1241.]

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1. Charney W. The Lift team method for reducing back injuries: A 10 hospital study. *AAOHN Journal* 1997; 45:300-304. ■

While numerous studies show that ergonomic interventions reduce injuries, making the case at an individual hospital still requires time and planning. "When you start this project, you have to have the expectation that it's going to take a year or two to get some good programs implemented," Shea advises.

She began by visiting the risk management and safety committees and talking to nurse managers and nursing directors. "We got all of them behind us. Then we went to senior management," she says. "You have to spend the time putting together a meaningful but short presentation. You never get more than 20 minutes."

Shea is looking forward to the day when she can present data on reductions in injuries and costs due to the program. "When you present it, you don't have the hard dollar savings. You just have the studies that show what you can save [with equipment and lift teams]," she says. "It's not until we take the savings from the bottom line that they'll be believers."

Even with a compelling and clear case for ergonomics, Shea says her administrators took a leap of faith that their expenditures would produce a cost savings.

"I have to commend my administration for being so innovative and supportive," she says. ■



Literature Review

Patient-doctor-patient transmission a first in U.S.

Cody SH, Nainan OV, Garfein RS, et al. **Hepatitis C virus transmission from an anesthesiologist to a patient.** *Arch Intern Med* 2002; 162:345-350.

In the first reported case of its kind in the United States, an anesthesiologist appears to have contracted hepatitis C from one patient and later transmitted it to another patient during a procedure.

The case investigation began in January 1996, when a 64-year-old man, identified by the authors as Patient A, became ill with acute hepatitis seven weeks after undergoing a thoracotomy at hospital X. He had no identified risk factors. Just a week before surgery, he and his wife donated blood and both tested negative for anti-HCV; 10 weeks before surgery, his liver enzyme levels were normal.

Meanwhile, the anesthesiologist who had provided care during the thoracotomy exhibited symptoms of acute hepatitis infection three days after the procedure. Subsequent testing showed that no other members of the surgical team were positive for anti-HCV.

In epidemiologic investigations, the authors contacted patients who had been treated by the anesthesiologist for the six months before the onset of his illness, all patients treated on the same day as Patient A under the care of other anesthesiologists, and all patients who underwent surgery in the same operating room during the week before or after the incident. Also, investigators contacted and tested patients who had been treated by the anesthesiologist at another hospital, where he worked for 18 months beginning six months after his acute illness.

In all, seven patients tested positive, but only two of them shared a genotype: Patient A and Patient B, a 42-year-old woman who had tested positive for anti-HCV when she made an autologous blood donation one week before her surgery. Her procedure occurred 8½ weeks before the surgery of Patient A.

Based on detailed testing, the investigators concluded that the anesthesiologist contracted HCV from one patient and transmitted it to another.

“This scenario is supported by two findings,” they state. “First, the time intervals between Patient B’s surgery and the anesthesiologist’s acute hepatitis C and between Patient A’s surgery and his anti-HCV seroconversion are consistent with the average six- to seven-week incubation period for hepatitis C. Second, the HVR1 quasi-species of the isolates of the anesthesiologist and patients A and B indicate that they are extremely

Conference replays offer educational opportunity

Have you missed one of American Health Consultants’ recent audio conferences? If so, two upcoming conference replays offer another opportunity to take advantage of excellent continuing education opportunities for your entire facility.

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Learn how to prepare your facility for the unthinkable. The replay will be available from 8:30 a.m. on Tuesday, April 16, until 5:30 p.m. on Wednesday, April 17. Current AHC subscribers pay \$249, which includes free CME and CE credit. The cost is \$299 for nonsubscribers.

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closely related to each other. The close relationship of these quasi-species is in direct contrast to the high degree of variation observed among the quasi-species of unrelated HCV-infected persons in the general population studied in this investigation and among unrelated individual patients described by other investigators.”

Yet despite repeated interviews with the anesthesiologist and a review of OR and medical records, the investigators could not identify a specific exposure incident.

“The transmission pattern involving the two patients and the anesthesiologist suggests that the anesthesiologist experienced at least two percutaneous exposures to his patients’ blood during a nine-week period, neither of which he could recall,” the authors state. “During neither of these surgical procedures did the anesthesiologist perform procedures that would have placed him at high risk for incurring an injury or placed him in contact with the blood of the patient.”

The authors note that there are only three other published reports of transmission of hepatitis C from a health care worker to a patient. One involved a cardiac surgeon with a chronic infection in Spain who transmitted HCV to five patients. Another cardiac surgeon with a chronic infection in the United Kingdom transmitted HCV to one patient, and an anesthesiology assistant in Germany contracted HCV from a patient with a chronic infection and then transmitted the HCV to five other patients.

The authors cite reports of two outbreaks of nosocomial transmission of HCV that were related to abuse of intravenous narcotics intended for the patients. “The anesthesiologist involved in our investigation repeatedly denied injection drug or other substance abuse,” they state.

“Our investigation documented transmission of HCV from a health care worker to a patient that did not seem to occur during performance of his normal duties,” they conclude. “Acute hepatitis C in a patient without commonly recognized risk factors and with a history of recent surgery or hospitalization should engender a thorough investigation into the potential nosocomial source(s) of transmission.

“Current guidelines for the prevention of transmission of bloodborne pathogens from health care workers to patients do not recommend restrictions of the professional activities of HCV-infected health care workers,” they write.

“All health care workers should follow a strict aseptic technique and standard precautions,

CE questions

Save your monthly issues with the CE questions in order to take the two semester tests in the June and December issues. A Scantron sheet will be inserted in those issues, but the questions will not be repeated.

13. According to **June Fisher**, MD, director of the Training for Development of Innovative Control Technology Project of the Trauma Foundation at San Francisco General Hospital, how should hospitals handle the onrush of new needle safety devices?
 - A. Narrow the choice based on manufacturer information, cost, and usage needs.
 - B. Ask colleagues at other hospitals which products they prefer.
 - C. Screen two or three samples of every product available on the market in a given category.
 - D. Choose among products that involve the least change in technique for health care workers.
14. Primary prevention of needlesticks means:
 - A. taking the first steps toward protection, such as using devices with safety features
 - B. a lower level of protection than secondary prevention
 - C. eliminating the use of needles
 - D. needle safety among your primary (nonmanagerial) staff
15. According to Bellingham, WA-based health and safety consultant **William Charney**, how would a 200- to 300-bed hospital want to staff its lift team program?
 - A. one lift team per shift
 - B. two lift teams covering 12 hours, seven days a week
 - C. three lift teams, with two during the day shift and one at night, 24 hours a day
 - D. Charney says lift teams are unnecessary.
16. An article in the *Archives of Internal Medicine* detailed the transmission of hepatitis C from an anesthesiologist to a patient. How did the transmission occur?
 - A. A needlestick occurred during the procedure.
 - B. The anesthesiologist failed to wear gloves.
 - C. The anesthesiologist had an exposed sore.
 - D. Investigators could not determine the event that led to the exposure.

including appropriate use of hand washing, protective barriers, and care in the use and disposal of needles and other sharp instruments.” ■

NEWS BRIEFS

Proposed OSHA budget stresses assistance

Funds for standards development decline

The change in emphasis of the U.S. Occupational Safety and Health Administration (OSHA) was apparent in the agency's budget proposal, which would reduce funds for standards development by \$1.3 million for fiscal year 2003 but increase compliance assistance, outreach, and training activities by \$2.75 million. The proposed budget also includes a slight decrease of \$700,000 in the funds for federal enforcement, although the agency estimates that it will perform an additional 1,300 inspections in FY 2003.

The Bush administration's budget request of \$437 million for OSHA reflects a decrease of \$5.9 million, or 1%.

"There's still going to be a strong enforcement arm. That's still a major tool," says **Bill Wright**, OSHA spokesman.

"But compliance assistance and outreach are a major concern," Wright says. The agency will emphasize computer-based activities, such as e-Tools, an on-line compliance assistance program.

The budget proposal projects that four new standards will be promulgated in 2003: fire protection, walking and working surfaces, commercial diving, and fall protection.

The agency recently reopened the proposed tuberculosis standard for additional comment. Action could still be taken on the proposed rule in 2003, even though it isn't specified in the budget proposal, Wright says.

Remarks by OSHA administrator **John L. Henshaw** mirror those recently made by Labor Secretary Elaine Chao.

"OSHA will target inspections on the worst hazards and at the most dangerous workplaces," Henshaw said in a statement.

As far as creating new rules, he said: "We will continue to base all standards on clear and sensible priorities and then review existing rules to revise or eliminate obsolete and confusing standards." ▼

Flu season starts slowly; cases rose in February

Once again, this influenza season turned out to be a late one, with cases rising in February.

For 15 of the last 25 years, the flu season has peaked in February or later, according to the Centers for Disease Control and Prevention (CDC) in Atlanta.

From Nov. 25, 2001, to Jan. 19, 2002, epidemiological tracking showed only low levels of influenza activity. However, CDC officials cautioned that cases were beginning to increase and that more activity was expected in upcoming weeks.

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Editorial Questions

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

THOMSON
AMERICAN HEALTH
CONSULTANTS

Influenza activity was reported by state epidemiologists as widespread in Colorado, New York, Utah, and Virginia, and regional in 11 states.

In February, the CDC still was urging health care providers to vaccinate high-risk populations, including health care workers.

“Influenza activity is expected to increase, and unvaccinated [people] can benefit from vaccination even after influenza has been detected in their communities,” the CDC advised.

“The predominant viruses isolated so far this season have been influenza A (H3N2) viruses, and all of the U.S. isolates characterized antigenically at CDC this season have been well-matched by the vaccine strains,” the CDC reported.

The CDC update also noted that antiviral treatments administered within 48 hours of symptom onset can reduce the duration of illness by about one day in healthy adults.

Flu information that is updated weekly is available from CDC voice information: (888) 232-3228. Fax information: (888) 232-3299 (request document number 361100). Web site: www.cdc.gov/ncidod/diseases/flu/weekly.htm. ■



• **2002 American Occupational Health Conference** — April 12-19, Chicago. Parallel conferences of the American Association of Occupational Health Nurses (AAOHN) and the American College of Occupational and Environmental Medicine (ACOEM) in Arlington Heights, IL.

For more information, contact: AAOHN, 2920 Brandywine Road, Suite 100, Atlanta, GA 30341. Telephone: (770) 455-7757. Fax: (770) 455-7271. Web site: www.aohn.org. ACOEM, 1114 N. Arlington Heights Road, Arlington Heights, IL 60004. Telephone: (847) 818-1800, Fax: (847) 818-9266. Web site: www.acoem.org. ■

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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. ■

Injury Prevention Assessment

Patient Care Areas: Manager Interview

Department: _____ Cost Center: _____

Manager: _____ Ext: _____

Date: _____ Total # staff: _____

Staff: RN: _____ LPN: _____ PCT: _____

Other: _____

1999 Injuries: Total Cost: _____ Total Injuries: _____

#restricted days: _____ #lost days: _____

I. Interview with Manager

A. Lifting/transfer equipment is used in this department when appropriate:

Never Occasionally Frequently Always

B. Lifting/transfer equipment available on this unit includes:

Patient Lifts (i.e. Hoyer) Gait Belts Slide Boards/Mats

Air-Assisted Slide Aide Stretcher Chair Total Care Beds

Other: _____

Other: _____

Comments: _____

C. Please check all items below that you would like implemented in your department to help reduce work-related injuries:

Gait Belts Slide Boards/Mats Patient Lifts

Body Mechanic Training Air-Assisted Slide Aide Ergo Chair

Total Care Beds Stretcher/Chair Bed Scales

PT Transfer Training Bathing Lifts Standing Aide

Comments: _____

D. Other Comments: _____

Source: Tampa (FL) General Hospital.

Hospital Employee Health[®]

***Hospital Employee Health* Reader Survey**

In an effort to learn more about the professionals who read *Hospital Employee Health*, we are conducting this reader survey. The results will be used to enhance the content and format of *HEH*.

Instructions: Mark the appropriate answers by circling your response. Please write in your answers to the open-ended questions in the space provided. Return the questionnaire in the enclosed postage-paid envelope. The deadline is May 15, 2002.

1. What are you most dissatisfied with in your job?
A. staffing
B. heavy workload
C. low morale in your department or facility
D. impact of cost-cutting on quality of care
E. other (please specify) _____
2. What impact has the nursing shortage had on the quality of care in your field?
A. significant impact
B. moderate impact
C. little impact
D. no impact
3. How would you rate your overall satisfaction with your job?
A. very satisfied
B. somewhat satisfied
C. somewhat dissatisfied
D. very dissatisfied
4. Are the articles in *Hospital Employee Health* newsletter written about issues of importance and concern to you?
A. always
B. most of the time
C. some of the time
D. rarely
E. never

Questions 5-13 ask about coverage of various topics in *Hospital Employee Health* newsletter. Please mark your answers in the following manner:

- | | A. very useful | B. fairly useful | C. not very useful | D. not at all useful |
|-------------------------------|-----------------------|-------------------------|---------------------------|-----------------------------|
| 5. JCAHO requirements | A | B | C | D |
| 6. latex allergies | A | B | C | D |
| 7. occupational exposures | A | B | C | D |
| 8. ergonomic issues | A | B | C | D |
| 9. disaster planning | A | B | C | D |
| 10. surgical smoke | A | B | C | D |
| 11. workers' compensation | A | B | C | D |
| 12. TB compliance regulations | A | B | C | D |
| 13. wellness programs | A | B | C | D |
| 14. immunization programs | A | B | C | D |

15. Approximately how many workers are employed at your facility?
 A. fewer than 200 D. 1,001-2,000
 B. 200-500 E. more than 2,000
 C. 501-1,000
16. How large is your hospital?
 A. fewer than 100 beds D. 301-500 beds
 B. 100-200 beds E. more than 500 beds
 C. 201-300 beds
17. Do you have Internet access at work? yes no
18. How much time do you spend accessing job-related information via on-line services (e-mail listservs, web sites, etc.)?
 A. 0 hours per week
 B. 1-5 hours per week
 C. 6-10 hours per week
 D. more than 11 hours per week
19. Would you prefer, at some time in the future, to receive your newsletter electronically by e-mail? yes no

SATISFACTION

20. How would you describe your satisfaction with your subscription to *Hospital Employee Health* newsletter?
 A. very satisfied
 B. somewhat satisfied
 C. somewhat dissatisfied
 D. very dissatisfied

Please rate your level of satisfaction with the following: Please mark your answers in the following manner.

	A. excellent	B. good	C. fair	D. poor
21. quality of newsletter	A	B	C	D
22. article selections	A	B	C	D
23. timeliness	A	B	C	D
24. length of newsletter	A	B	C	D
25. overall value	A	B	C	D
26. customer service	A	B	C	D

27. On average, how much time do you spend reading each issue of *Hospital Employee Health*?
 A. less than 10 minutes
 B. 11-20 minutes
 C. 21-30 minutes
 D. 31-60 minutes
 E. more than an hour
28. On average, how many people read your copy of *Hospital Employee Health*?
 A. 1-3
 B. 4-6
 C. 7-9
 D. 10-15
 E. 16 or more
29. On average, how many articles do you find useful in *Hospital Employee Health* each month?
 A. none
 B. 1-2
 C. 3-4
 D. 5-6
 E. 7 or more

30. Do you plan to renew your subscription to *Hospital Employee Health*?

- A. yes
- B. no

If no, why not? _____

COMPETITION

To what other publications or information sources about employee health do you subscribe?
Circle the number of the publications you subscribe to and write any others in the blank below.

- 31. *Journal of the AOHP*
- 32. *AAOHN Journal*
- 33. *Occupational Health Management*
- 34. other (please specify) _____

35. Which publication or information source do you find most useful?

- A. *Hospital Employee Health*
- B. *Journal of the AOHP*
- C. *AAOHN Journal*
- D. *Occupational Health Management*
- E. other (please specify) _____

What did you like most about that publication or information source? _____

ABOUT YOU:

36. What is your title? (please choose the title that most closely reflects your position and responsibilities):

- A. employee health director/manager/coordinator
- B. employee health nurse
- C. infection control practitioner
- D. employee health/infection control manager
- E. other (please specify) _____

37. What is the highest degree that you hold?

- A. ADN (2-year)
- B. diploma (3-year)
- C. bachelor's of nursing
- D. master's of nursing
- E. other (please specify) _____

38. How long have you been employed in hospital employee health?

- A. 0-2 years
- B. 3-5 years
- C. 6-9 years
- D. 10-15 years
- E. 16 or more years

39. How long do you intend to remain in hospital employee health?

- A. 1-2 years
- B. 3-4 years
- C. 5-7 years
- D. 8-10 years
- E. indefinitely; have no plans to change

40. From where do you most frequently get your continuing education contact hours?
A. hospital-provided
B. travel off-site to live conferences
C. subscription-based newsletters/journals
D. outside-sponsored audio conferences
E. other (please specify) _____

41. What are the most effective teaching methods used to train staff at your hospital? _____

42. What, if any, outside vendors do you use for your training programs? _____

43. List the top three challenges you face in your job today: _____

44. What do you like most about *Hospital Employee Health* newsletter? _____

45. What do you like least about *Hospital Employee Health* newsletter? _____

46. What issues would you like to see addressed in *Hospital Employee Health* newsletter? _____

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BIOTERRORISM WATCH

Preparing for and responding to biological, chemical and nuclear disasters

Building a bridge over the abyss: Will bioterrorism help bring disjointed health system together?

Getting in same boat as 'tsunami' of money builds

Diverse and disjointed, the nation's public health and clinical settings have education needs and communication gaps that must be bridged if the system is to improve its response to bioterrorism, a group of consultants recently told the Atlanta-based Centers for Disease Control and Prevention (CDC).

The CDC's national center for infectious diseases is holding a series of meetings to assess the lessons of last year's anthrax attacks and begin to close the long-standing breach between public health and clinical medicine.

The gap may stem from differences between the private and public health care systems, both of which are fragmented and highly variable by geography and urban vs. rural settings, according to a CDC draft summary of the Jan. 7, 2002, consultants' meeting, which was obtained by *Bioterrorism Watch*.

Seeking collaboration

"There was lot of [discussion] about the gap between public health, private practices, and hospitals and how to bridge that gap and make things more collaborative," said **William Scheckler**, MD, a consultant at the meeting and hospital epidemiologist at St. Mary's Hospital in Madison, WI. "[We need] to reduce some of the redundancies in the systems both in terms of preparing and education."

Scheckler also is a member of the CDC Healthcare Infection Control Practices Advisory

Committee (HICPAC), which met Feb. 25-26, 2002, in Atlanta.

Scheckler gave a report on the consultants' meeting, telling HICPAC members that the CDC had input from a broad range of bioterrorism groups and clinical specialties. There is a wealth of information scattered among these groups and on numerous web sites, he noted. For example, a dermatology group at the meeting has photographs of skin lesions that could be a good resource in an investigation of cutaneous anthrax.

"When an outbreak occurs, the same questions [arise]: What do people need to know? What is the best way to get out the information?" he said. "There should be one best-practices web page that you can go to."

The CDC currently operates several different clearinghouses for information as well as different public inquiry numbers. The agency now is considering the possibility of centralizing its clearinghouses and public inquiry services, the CDC report states.

"During the anthrax crisis, the CDC public inquiry system was overwhelmed, and therefore the agency set up a new system during the outbreak," the CDC report continues.

In addition, the CDC found that "during the attacks, the amount of information on anthrax increased from virtually nothing to an overwhelming number of e-mails, web sites, printed

This supplement was written by Gary Evans, editor of *Hospital Infection Control*. Telephone: (706) 742-2515. E-mail: gary.evans@ahcpub.com.

documents, and other materials. Much of this information and work was duplicative.”

The consultants suggested that the CDC devise a strategy to centralize information development activities and then distribute the product, rather than having so many individuals working independently. (See CDC action items, below right.)

Linking the data base

Regarding public health and clinical partnerships, a relatively simple system of linking health departments with hospital emergency departments (ED) was described by HICPAC member **Alfred DeMaria Jr., MD**, state epidemiologist at the Massachusetts Department of Public Health in Jamaica Plain.

Under the program, participating hospitals in the Boston area report their daily number of ED visits to the health department. The numbers are compared against emergency visits a week earlier and on the same date a year prior to detect surges that might suggest a bioterrorism event, he said.

The information is easily obtainable by the hospitals and can be submitted electronically to the health department without extra work. That is important because bioterrorism surveillance systems that are labor-intensive will likely falter as vigilance inevitably wanes, DeMaria noted.

The system has provided the secondary gain of improving communication between public health and clinical sectors. The threshold for investigation occurs at two orders of magnitude above baseline, which thus far has occurred with influenza ED visits and those associated with a large trauma event such as a bus crash, he said.

Sometimes, the threshold will be reached simply out of random chance, as ED visits increase for no single reason. “The question is, we don’t know how big an event has to happen [to be detected],” DeMaria said.

The CDC is interested in such bioterrorism surveillance systems, and also may seek to apply its existing hospital sentinel networks, including the National Nosocomial Infections Surveillance system, said **Steve Solomon, MD**, chief of special studies activity in the CDC division of healthcare quality promotion.

National concerns about patient safety and bioterrorism have created a “tsunami of money” to address such issues, Solomon told HICPAC members.

“We have a lot of concerns about the surveillance and response needs,” he said. “We are

seeking a small trickle of that tidal wave of funds.”

Ultimately, the CDC may help shape a national system or contribute to a “mosaic” of systems that track surrogate markers such as severity of illness in “real time,” he said.

The research and development needs for such a system are in the ballpark of \$120 million to \$180 million, which may be available in the current climate over the next four or five years, he said. There is considerable interest being expressed from health care-related industries in partnering with the CDC on such efforts.

“They are standing in line,” Solomon told HICPAC members. “The phone is ringing off the hook. We are trying to figure out who is the best partner.” ■

CDC gets plenty of advice for action

Clarify roles, make info user-friendly

A recent consultants’ brainstorming session on education and communication needs for bioterrorism resulted in numerous suggestions to the Centers for Disease Control and Prevention (CDC) in Atlanta. Some of the points of information and recommended items for action included:

- ✓ Strengthen the CDC Health Alert Network e-mail notification system to ensure that all state and local health departments are involved.
- ✓ Make surveillance and reporting as automatic as possible, and do not depend on the clinician to initiate the report quickly.
- ✓ Because the CDC is recognized as an authoritative source for information provided through *Morbidity and Mortality Weekly Report* and press releases, the CDC web site should be changed to make it more user-friendly.
- ✓ Ruling out disease is the most important clinical issue, rather than identifying new cases of disease.
- ✓ Clarify roles when a criminal investigation is going to occur during a public health emergency.
- ✓ Develop a prototype disaster plan for use by communities and make it readily available.
- ✓ The cacophony of information is a problem. For clinicians, an appropriate tool would be a page of bulleted information necessary for the

clinical setting. This should be provided in addition to baseline information.

- ✓ The CDC smallpox plan is a good model for allowing outside review during the development phase.
- ✓ Identify additional ways for using communication technology, particularly e-mail, to link local resources together. ■

Was anthrax mailer a bioweapons researcher?

'This has military lab stamped all over it'

Given the difficulty of creating high-quality anthrax in a civilian research lab, the original source of the *Bacillus anthracis* that killed five people last year was likely a U.S. bioweapons facility, the president of the American Society of Microbiology (ASM) tells *Bioterrorism Watch*.

"Given the high quality of the preparation that was used, this has military laboratory stamped all over it," says **Abigail Salyers**, PhD, ASM president and a professor of microbiology at the University of Illinois in Urbana-Champaign.

The U.S. bioweapons program was formally disbanded as part of a global treaty in the early 1970s, but many military labs remained open for "biodefense" research to counter bioterrorism, she says. "These anthrax spore preparations last for decades," Salyers says.

Anthrax mailer is 'criminal, but not stupid'

The atmosphere of a university research lab is too open and freewheeling for someone to produce anthrax undetected, she says. Salyers' personal theory is that someone who worked in a military bioweapons laboratory stole the anthrax, possibly years ago.

"It's anybody's guess as to what is going on here, but I would be astounded if this came out of a university laboratory," she says. "[This person] is crazy, criminal, but not stupid. I can't imagine that anybody who was going to do that would take the trouble and risk of trying to do that in a university laboratory environment."

In a related matter — despite a published report to the contrary — the Federal Bureau of Investigation denies it has narrowed its anthrax

investigation to a former scientist in a U.S. bioweapons lab.

A FBI spokeswoman at the agency's national office in Washington, DC, told *Bioterrorism Watch* that the agency has not identified "a prime suspect" in the hundreds of interviews it has conducted in the investigation.

A story that was published in the Feb. 25, 2002, *Washington Times* reported that the FBI's search was focusing on a former U.S. scientist who worked at a government bioweapons laboratory. The government's chief suspect, the article reported, is believed to have worked at the U.S. Army Medical Research Institute of Infectious Diseases at Fort Detrick, MD, which has maintained stores of weapons-grade anthrax. No charges had been filed as this issue of *Bioterrorism Watch* went to press.

Do you know this person?

Salyers described her theory on the case — before the newspaper report was published — when the FBI openly solicited help from the ASM in the investigation. In a message appealing for help from ASM members, **Van Harp**, assistant director of the FBI's Washington, DC, field office, said "a single person" is most likely responsible for the mailings. "It is very likely that one or more of you know this individual," he told ASM members.

A \$2.5 million dollar award is offered to anyone providing information that leads to an arrest of the bioterrorist. The FBI profile describes a socially withdrawn person who has "a clear, rational thought process" and is very organized. "The perpetrator might be described as 'stand-offish' and likely prefers to work in isolation as opposed to a group/team setting," Harp told the ASM. It is possible the mailer used off-hours in a laboratory or may have even established an improvised, concealed facility to produce the anthrax, the FBI profile noted.

"The person is experienced working in a laboratory," Harp told the ASM. "Based on his or her selection of the Ames strain of *Bacillus anthracis*, one would expect that this individual has or had legitimate access to select biological agents at some time. This person has the technical knowledge and/or expertise to produce a highly refined and deadly product."

Indeed, the Ames strain used in the attacks has been used in bioweapons research both in the United States and worldwide, Salyers says. In

addition, given the elaborate research protocol required, it is unlikely a university laboratorian creating anthrax would go undetected no matter how “standoffish” he or she was.

“I’m just telling you what you have to go through if you were crazy enough to be a bioterrorist,” Salyers says. “If a deranged scientist tried to do this in a university laboratory, red flags would be going up all along the way.”

Recipe for disaster

The first step — cultivating the bacteria and producing spores — is something that almost any microbiologist could do, she says.

“But you get this slush, and that is not going to hurt anybody,” she says. “There are people who will tell you that you can do this the hard way with a mortar and pestle and grind it up in the laboratory. But it is clear that the powder that was in the letters was a much higher quality than that.”

The anthrax “slush” must be ground into a fine powder to be capable of getting past human respiratory defenses. “The machinery for doing this is mostly in military research laboratories,” Salyers says. In addition, sophisticated treatment of the spores must be done to defeat their general property of clumping and sticking together.

“You would want to treat the spores so that they don’t stick together and also so that you get a preparation that is very volatile — goes into the air and stays in the air,” she adds.

Regardless of whether the mailer worked in a military lab or other facility, there is growing consensus that the attacks were not the work of foreign terrorists.

“The current thinking among many people is that this is a domestic event that kind of occurred in the slipstream of 9/11,” says **William Schaffner**, MD, ASM member and chairman of preventive medicine at the Vanderbilt University School of Medicine in Nashville, TN.

“The [FBI profile] characteristics don’t seem terribly surprising. They seem akin to the kind of characteristics that were part of the picture of [the Unabomber] Ted Kaczynski — a disgruntled person who is very bright, and in this instance, has a substantial amount of professional and technological expertise in order to carry this off.”

[Editor’s note: Those who think they may have information relevant to the case can contact the FBI via telephone at (800) CRIME TV — (800) 274-6388 — or via e-mail: Amerithrax@FBI.gov.] ■

Bioterrorism forensics: The burden of proof

If bug does not fit, you must acquit?

Already asked by federal investigators to assist in finding the anthrax mailer, the American Society of Microbiology (ASM) is taking the next step and discussing the emerging science of bioterrorism forensics.

Despite an impressive array of scientific methods, primarily used in health care epidemiology and outbreak investigations, linking a pathogen to a terrorist will not be easy.

“You want to trace it back to the ‘smoking gun,’” says **Abigail Salyers**, PhD, ASM president and a professor of microbiology at the University of Illinois in Urbana-Champaign. “We know how to tell what bullet came from what particular gun. But when it is bacteria, viruses, or other microorganisms we really don’t have established forensics for that.”

To address the issue, the ASM will hold meetings later this year that may result in a booklet on how to use molecular epidemiology techniques to establish a chain of evidence rather than identify the source of an outbreak, she says.

The methods typically used by outbreak investigators include DNA fingerprinting and pulsed-field gel electrophoresis. But using such methods to link a bioterrorist to a biological weapon would be unprecedented, Salyers notes. “Suppose they find somebody [who] might have perpetrated the [anthrax attacks], and they find some spores on that person or the immediate environment.”

“Trying to prove that that is the [exact strain] will be unprecedented. It is not just a question of finding the person. It is a question of what are going to be the legally binding types of evidence,” Salyers explains.

Another problem in the anthrax attacks is the separation of act and outcome, she says. As opposed to a bomb exploding and leaving an immediate impact, the anthrax mailer had time to dispose of evidence after the mailings.

“You have a perpetration of an act and the consequences of the act separated by nearly a month,” she says. “There has been a lot of time for the perpetrator to cover up tracks. This is very different from putting nerve gas into a subway system, where the cause and effect are very close together,” Salyers adds. ■