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Hospital Employee Health

New This Issue: Bioterrorism Watch

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NY anthrax death puts hospitals on greater alert

Mail handlers wear gloves, raise awareness

A case of inhalational anthrax that killed a New York hospital worker and shut down an outpatient hospital triggered a new look at just what protections are necessary to protect employees from the current bioterrorism threat.

Should mailroom workers wear gloves? What about respirators? Who else might need protective equipment? Though anthrax isn't spread from person-to-person contact, public health experts struggled to understand the distribution of spores.

While clear answers to the anthrax threat proved elusive, hospitals have responded based on the perceived risk at their facility.

Hospitals served by postal facilities that have been contaminated by anthrax implemented special procedures, such as offering gloves and masks or N95 respirators to mailroom workers. Employee health professionals at other hospitals around the country urged restraint and sought to calm fears.

Jeffrey Koplan, MD, MPH, director of the Centers for Disease Control and Prevention (CDC) in Atlanta, deemed the risk of transmission of anthrax to mail recipients from contaminated facilities as "very, very small."

"The risk isn't zero as the mail passes through these facilities," Koplan said at a press briefing. "It's very, very small, but we can't say it's zero because of the contamination that has occurred in some of the facilities. Yet the risk to individual recipients, whether it's in the workplace or at home, is extremely small."

Even so, Koplan acknowledged that a higher level of awareness is warranted. "I'll admit I look at

Also in this issue

COMING IN FUTURE ISSUES

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- Bridging language barriers to protect foreign workers
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[mail] with greater scrutiny than I've ever looked at it before," he said. "If there were something there that . . . didn't have a return address, and it was handwritten, and had any of these [suspicious] characteristics, I sure would call local law enforcement and wash my hands fast, and get that thing covered up."

The CDC is recommending that all personnel who handle mail wear nonlatex gloves. Those working near machinery that could aerosolize particles (such as electronic mail sorters), or those emptying large bags of mail or hand-sorting mail could be at risk for inhalation anthrax and should wear N95 respirators. The U.S. Postal Service announced it purchased 86 million pairs of gloves made of vinyl and nitrile and 4 million N95 respirators. **(For mail handling dos and don'ts, see box, p. 135.)**

"Certainly, if individuals are in a setting and they're concerned, those measures could help protect them," says CDC spokesman **Tom Skinner**.

In addition, the New York City Health Department has requested that all health care providers in the city who are seeing patients with flu-like illnesses get several pieces of information. The checklist includes taking down a thorough employment history, including whether the patient handles mail, and asking about any exposure to suspicious letters or powders in the last one to two weeks. Hospitals also are urged to review their policies for handling mail and review employee health and absenteeism data since Oct. 1, especially among employees who work in or near the mailroom. Any staff with suspicious lesions should be evaluated for testing.

A 61-year-old stockroom employee of the Manhattan Eye, Ear and Throat Hospital in New York City died of severe respiratory symptoms brought on by inhalational anthrax. The woman, who worked near the mailroom in the basement of the hospital and occasionally handled mail, developed chills and muscle aches on Oct. 25. On Oct. 28, she was hospitalized with symptoms of severe breathing difficulty and fluid in her lungs. Despite receiving a combination therapy of three antibiotics, she died three days later.

Initial tests of the mailroom and hospital building did not detect any anthrax spores, and CDC investigators were unsure where the woman's exposure occurred. Investigators were considering the possibility that the hospital worker may have been exposed to cross-contamination from another undetected letter.

"It is going to be a painstaking investigation,

CDC Advice: Be Alert When Opening Mail

The Centers for Disease Control and Prevention in Atlanta offered the following advice on handling mail:

While it is not possible to eliminate the risk of anthrax, the risk to the general public is low and can be further reduced by being alert for suspicious packages and by hand washing after opening the mail. Heightened public health surveillance continues and has been intensified so that anthrax promptly can be recognized and treated. While the risk is considered to be low to individuals from possible contamination in the mail, people should continue to watch for suspicious mail. If a package or envelope appears suspicious, do not open it.

Suspicious packages and envelopes could include some of the following characteristics:

- Inappropriate or unusual labeling
- Handwritten or poorly typed addresses
- Excessive postage
- Misspellings of common words
- Strange return address or no return address
- Incorrect titles or title without a name
- Not addressed to a specific person
- Marked with restrictions, such as "Personal," "Confidential," or "Do Not X-ray"
- Marked with any threatening language
- Postmarked from a city or state that does not match the return address

Appearance

- Powdery substance felt through or appearing on the package or envelope
- Oily stains, discolorations, or odor
- Lopsided or uneven envelope
- Excessive packaging material such as masking tape, string, etc.
- Other suspicious signs:
  — Excessive weight
  — Ticking sound
  — Protruding wires or aluminum foil

Dos and Don'ts for suspicious letters

- Don't:
  — Shake or empty the contents.
  — Carry the package or envelope, show it to others, or allow others to examine it.
- Do:
  — Put the package or envelope on a stable surface; do not sniff, touch, taste, or look closely at it or any contents that may have spilled.
  — Alert others in the area about the suspicious package or envelope. Leave the area, close any doors, and take actions to prevent others from entering the area. If possible, shut off the ventilation system.
  — Wash hands with soap and water to prevent spreading potentially infectious material to face or skin. Seek additional instructions for exposed or potentially exposed persons.
  — If at work, notify a supervisor, a security officer, or a law enforcement official. If at home, contact the local law enforcement agency.
  — If possible, create a list of people who were in the room or area when this suspicious letter or package was recognized and a list of persons who may have handled this package or letter. Give the list to both the local public health authorities and law enforcement officials.

Cutaneous anthrax is a boil-like skin lesion that eventually forms an ulcer with a black center or crust (similar in appearance to some spider bites).The cutaneous form of anthrax responds well to antibiotics if treatment is started soon after symptoms appear.

Individuals should, especially in areas that have been directly affected, review and be familiar with advice provided to all postal patrons by the U.S. Postal Service and follow that advice.

tracing back," says **Eric K. Noji**, MD, MPH, chief of the epidemiology, surveillance, and emergency response branch in CDC's office of bioterrorism preparedness and response. "I think what we have to do is step back and find out her daily activities for the last 12 days [during the incubation period for anthrax]."

However, area hospitals already had been on alert. St. Francis Medical Center in Trenton, NJ, is served by the Hamilton Township mail-processing center, where anthrax was found, and the hospital is serving as an evaluation center for postal workers.

"Each of our [mailroom] employees have been given special education sessions by our safety officers," says **Carol McAloon**, RN, MSN, director of critical care. "They have access to N95 respirators and masks if they desire to wear them. They are not a requirement." In fact, most mailroom workers have chosen not to wear the respirators, though most wear the gloves. All employees have received additional education about bioterrorism, she says. That education helps allay fears, as does the regular disaster preparedness training conducted by the hospital, says McAloon.

Assessing risk is a critical part of any preparedness, says **Susan McLaughlin**, MBA, CHSP, MT (ASCP)SC, a Barrington, IL-based consultant on

health care safety and regulatory compliance. "[Hospitals] have to look at their area, their circumstances. In Washington, DC, you're probably going to look at it differently than you are in the middle of Iowa. "In some areas of the country where there have been incidents of the exposure, [N95 respirators] might be something they'd want to consider."

McLaughlin notes that the use of N95 respirators requires fit-testing of employees.

At hospitals in areas that haven't been affected by anthrax, employee health professionals are taking a low-key approach. For example, at Sewickley (PA) Valley Hospital, the mailroom clerk has the option of wearing gloves. With cases isolated in New York; New Jersey; Washington, DC; and Florida, she deemed the risk to be low and chose not to wear gloves, says **MaryAnn Gruden**, MSN, CRNP, NP-C, COHN-S/CM, employee health nurse practitioner. "[Mailroom employees] know they can do that if they need to or want to."

Employee health professionals are prepared to change their advice as new information evolves from CDC. That sense of flux can be unsettling, acknowledges Gruden, who is president of the Association of Occupational Health Professionals in Healthcare.

"It is worrisome that they're still finding cases," she said in late October. "It's unfolding. Because we've not had the experience with it before, the experts even at CDC are learning as we go along here."

(Editor's note: Up-to-date information on the anthrax scare and bioterrorism is available on the HEH *web site at www.ahcpub.com. Information from the CDC also is available from www.bt.cdc.gov.)* ■

More flu vaccine available now than ever before

Flu, anthrax are separate issues, CDC says

A push to increase influenza vaccine capacity has led to a greater supply than ever before, the Centers for Disease Control and Prevention (CDC) reported.

About 85 million doses have been manufactured, compared to about 70 million doses last year, says **Keiji Fukuda**, MD, MPH, medical epidemiologist with CDC's influenza branch. However, a delay in distribution led to a late start for many hospital-based vaccination campaigns. Fukuda encouraged providers to continue offering vaccines through December and even later. "This year we have a delay situation that is moderate," he says. "Certainly it is less severe than the delay we had last year."

Concern about confusing anthrax symptoms with those of influenza led to a greater demand for the flu vaccine, both among health care workers and the general public. Fukuda sought to separate the influenza vaccine from the anthrax scare, noting that many other viruses cause flu-like symptoms. "Every year there are tens of millions of people who develop flu-like illness — fever, muscle aches, headache," he says. "Those flu-like illnesses are caused by a number of agents. There are still going to be lots and lots of people who develop flu-like illnesses [even with the flu vaccine]."

The delay in distribution of the flu vaccine was largely caused by the decision of Parkedale Pharmaceuticals, in Rochester, MI, to stop producing influenza vaccine for the U.S. market.

However, the production push by the remaining three vaccine manufacturers led to the greater supply, Fukuda says. "We should have plenty of vaccine this year."

He acknowledged that some vaccine distributors raised prices in light of the delay this fall. "There are reports of price gouging that has occurred this year. This is a practice that all of us have worked hard to discourage, but it's a private market out there."

Some employee health professionals reported a greater interest in the flu vaccine among hospital staff. For example, at Sewickley (PA) Valley Hospital, record number of employees received the flu vaccine at the hospital's annual employee benefits fair. "Even last week, my office was a revolving door" with employees seeking the flu shot, says **MaryAnn Gruden**, MSN, CRNP, NP-C, COHN-S/CM, employee health nurse practitioner. ■

In an epidemic of fear, the antidote is education

Miami hospital calms workers as it treats anthrax

When Cedars Medical Center in Miami treated the nation's second pulmonary anthrax case, there was an outbreak of one fast-spreading by-product: fear.

Moving quickly to educate employees and

allay their fears is a critical part of the first response to a bioterrorism event, says **Anexis Lopez**, RN, BHSA, the hospital's director of infection control.

As the anthrax scare unfolded with cases in four states, hospitals around the country mobilized to reassure health care workers and reinforce infection control practices. The Cedars experience illustrates the importance of clear guidance and hospital preparedness.

Shortly after Ernesto Blanco, an employee at American Media in Boca Raton, was assessed for anthrax, Cedars employees began asking about antibiotic prophylaxis. Two employees called and said they were afraid to come to work. Everyone from housekeepers to nurses became worried, even though anthrax isn't spread from person-to-person contact. Lopez immediately went from unit to unit with reassuring information. "The minute we started to [evaluate] this patient for anthrax, we started the education."

Although experts say standard precautions are sufficient when dealing with anthrax cases, Cedars raised the level of protection to droplet precautions when caring for Blanco. Employees entering the room wore masks. "That calmed a lot of anxiety in the beginning," Lopez says. "The CDC [Centers for Disease Control and Prevention] agreed with us on [the added precaution]."

For several years, Lopez had provided hospital units with a simple matrix of bioterrorism agents, listing the risks and precautions. Her monthly newsletters also contained information about bioterrorism preparedness. **(See matrix, inserted in this issue.)**

But when anthrax cases occur, that information needs to be reinforced, she says. "Even though they know what needs to happen, people just panic. I can't imagine if we hadn't been prepared for this. [The anxiety] would have been worse."

With new cases appearing around the country, any sign of white powder can cause fear. In one case, powder found on a medical cart raised an alarm at Cedars Medical Center. Closer inspection showed that it simply was dried-up Maalox.

After the Sept. 11 terrorist attack, hospitals around the country began updating their disaster plans, as biological and chemical terrorism suddenly became a more realistic possibility. **(For more on preparedness, see *Hospital Employee Health*, November 2001, p. 121.)**

The Department of Veterans Affairs (VA) quickly produced pocket cards with biological and chemical agents, their signs and symptoms, appropriate precautions, and possible prophylaxis. **(See copies of cards and biological agent treatment chart, inserted in this issue.)**

"They're just reminders of what you need to do," says **Michael Hodgson**, MD, MPH, director of the VA's occupational health program.

The cards provide detailed guidelines about whom to call and what to do if an unusual cluster of illnesses occurs. Swift identification of the first cases of a biological terrorism attack allows not only for proper treatment of the victims, but for adequate protection of health care workers and the general public. "Stay calm is the best advice anybody can get or give," he says. "The issue, as always, is that when you are worried you don't think as clearly."

Smallpox and plague, both highly contagious, are likely to incite more fear than anthrax. But infection control procedures, such as using negative pressure rooms, cohorting patients, and using respirators, can protect against occupational exposure. Hospitals also should be prepared to handle patients who suffer from chemical exposure, whether it's caused by an industrial accident or a terrorism event, Hodgson adds. "The bottom line for all of this, once you've [decontaminated] what you need to decontaminate, they're patients like anybody else."

CDC: Get flu vaccine to allay anxiety

Amid the anthrax scare, the emergence of the flu season may lead to some increased anxiety. That's because inhaled anthrax may present with flu-like symptoms. Hospitals, which long have sought to raise the immunization rate of health care workers, now have a new and compelling impetus.

"It's going to be interesting to see if more people are going to be more willing to take [the vaccine]," says **Vicky McGavack**, RN, COHN-S, manager of occupational health services at Hoag Memorial Hospital Presbyterian in Newport Beach, CA.

Meanwhile, the CDC ordered enough smallpox vaccine to immunize the general population. In a bioterrorism event, health care workers would be among the first to receive the vaccine, says CDC spokesman **Tom Skinner**. The CDC developed a smallpox response plan that would go into effect with the first identified cases of the disease.

Smallpox is highly contagious, often fatal, and has no effective treatment. But the CDC stopped short of advocating widespread vaccination

because of the rare but potentially fatal side effects of the smallpox vaccine.

"My personal opinion is that smallpox vaccination should be an option. It should be available to those individuals who understand the risks and benefits," comments **Stephen Cantrill**, MD, associate director of emergency medicine at Denver Health Medical Center. Cantrill participated in a bioterrorism exercise last year that dealt with a hypothetical spread of plague.

"Would I be vaccinated? Without question. But that's a personal decision," he says.

The anthrax cases, while frightening, presented public health officials with a more benign scenario of bioterrorism. The CDC mobilized within hours to provide antibiotics to those who were potentially exposed to anthrax in Florida, notes Hodgson. That illustrated the nation's capability to react swiftly, he says. "I'm no longer so concerned that people need three days of antibiotics until the public health response gears up."

Hospital disaster preparedness already had come under increasing scrutiny from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in Oakbrook Terrace, IL.

"This is not a new concern for JCAHO," says **Geoff Kelafant**, MD, MSPH, FACOEM, medical director of the occupational health department at the Sarah Bush Lincoln Health Center in Mattoon, IL. "It was a concern before Sept. 11. I'm sure it's going to be put way up on the front burner now."

The Joint Commission's new standard on emergency preparedness became effective Jan. 1, requiring hospitals to "establish and maintain a program to ensure effective response to disasters or emergencies affecting the environment of care."

As of Sept. 11, Joint Commission surveyors have increased their focus on biological and chemical terrorism as possible disaster scenarios. In October, Kelafant says surveyors who visited his hospital made it clear that "this is something JCAHO was looking at very carefully."

How do you coordinate with local authorities to report unusual patterns of illness? How do you verify that the isolation rooms are working under negative or positive pressure? Those questions now have new implications.

"I think people should reliably expect they're going to asked [such questions]," says Kelafant, who is chairman of the medical center occupational health section of the American College of Occupational and Environmental Medicine in Arlington Heights, IL.

The anthrax cases have spurred communities to address some of the weaknesses revealed in the Denver drill, such as communication and coordination, says Cantrill. That may be the "silver lining" of the incidents.

"I think this has been overall very good for the medical community," he says. "It has brought bioterrorism up on the radar."

Yet even as new cases of anthrax occurred, the fear of exposure remained much greater than the risk itself. At hospitals around the country, everyone from mail clerks to clinical personnel began asking about precautions.

At Sarah Bush Lincoln Health Center, mailroom workers asked if they should wear gloves to protect against any letters that might contain a suspicious powder. But Kelafant had to consider the implications of gloving one group of workers and not another.

"What about the end-users of the mail? Are we going to put the whole chain of mail users in gloves and masks?" he asks. "We decided to identify suspicious packages and letters and set them aside, then decide what to do with them. I think that's the best [way to handle it]." ■

New Year's gift: Rule offers record-keeping relief

EHPs laud OSHA's new standard

Here's a rare event: Employee health professionals (EHPs) are looking forward to the start of new regulations. On Jan. 1, new record-keeping rules and forms will go into effect that will clarify the reporting of injuries and illnesses.

The U.S. Occupational Safety and Health Administration (OSHA) actually is being lauded for an easy-to-read standard that includes numerous examples and definitions.

"The original regulations were confusing. For many, many years, we had heard there would be improvements made," explains **Annette Haag**, MA, RN, COHN-S/CM, FAAOHN, an occupational health and safety consultant in Simi Valley, CA.

"The best improvement made on this particular standard was the new format [OSHA] decided to use — a user-friendly format," she adds.

When is an injury considered first aid only, which means reporting is not required? How do you count lost workdays? When do you stop

counting lost workdays?

All of those questions clearly are answered by OSHA. And the answers, in many cases, differ from those in the old standard.

For example, OSHA has been very specific in defining first aid, notes **Sandy Winzeler**, MN, MPH, ANP, COHN-S, employee health nurse practitioner at Emory Hospitals in Atlanta. **(For more help on the rule, see resources, at right.)** "[First aid] encompasses so much more than it used to. Some of the things that we used to record by law now are not considered recordable."

Meanwhile, OSHA has delayed the implementation of two controversial provisions until Jan. 3, 2003. For the year 2002, employers won't need to designate musculoskeletal disorders (MSD) in a separate column on the OSHA 300 log. Those injuries will continue to be recorded the same way as in the past. OSHA also delayed and will reconsider the rule's definition of MSDs.

OSHA also postponed the new record-keeping provision on hearing loss. The record-keeping rule would have set the standard threshold shift of hearing acuity at an average of 10 decibels when measured at 2,000, 3,000, and 4,000 hertz in one or both ears. For the next year, OSHA has instructed employers to record work-related shifts in hearing of an average of 25 decibels or more at 2,000, 3,000, and 4,000 hertz in either ear.

While the new rule will make record keeping easier in many ways, hospitals will likely report a higher number of injuries and illnesses. All needlesticks involving contaminated sharps are recordable, even if they don't require prophylaxis or vaccination.

The OSHA 300 log can be used as the needlestick log required by OSHA's revised bloodborne pathogen standard, as long as it contains complete information on the device, brand, and incident. But many EHPs say they plan to continue to maintain a separate needlestick log, in addition to a briefer notation on the OSHA 300.

"In a hospital [setting], where you have quite a few bloodborne pathogen exposures, I think it would be helpful to keep a separate log," says Winzeler.

Meanwhile, EHPs will make new determinations of what belongs on the OSHA 300.

As an example of how record keeping will change, Winzeler cites the case of an employee with a minor laceration. If you used a Steri-Strip to keep the wound edges closed, under the old standard the injury would have been recorded. Now, OSHA says that's not necessary unless the wound requires stitches or antibiotics.

"You get down to the whole reason why we're tracking these injuries to begin with," she says. "We're really not interested in the really minor things. We're trying to track and trend significant injuries and illnesses."

If an employee sustains a bruise and an employee health nurse recommends soothing it with ice, that minor injury would not be recordable. But advice for repeated use of ice would have made it recordable under the old standard, says Winzeler, who is an instructor for the record-keeping seminars offered by the American Association of Occupational Health Nurses in Atlanta.

OSHA isn't tracking "lost workdays" anymore.

OSHA Record-Keeping Standard Resources

OSHA offers the following contacts in regional offices for clarification on the record-keeping standard:

- ✔ **Region 1** (CT, ME, MA, NH, RI, VT)
  Shirley Boulware
  Telephone: (617) 565-9856
- ✔ **Region 2** (NJ, NY, Puerto Rico)
  Kevin Brennan
  Telephone: (212) 337-2339
- ✔ **Region 3** (DE, District of Columbia, MD, PA, VA, WV)
  Jim Johnston
  Telephone: (215) 861-4900
- ✔ **Region 4** (AL, FL, GA, KY, MS, NC, SC, TN)
  Sven Rundman
  Telephone: (404) 562-2281
- ✔ **Region 5** (IN, IL, MI, MN, OH, WI)
  Leslie Ptak
  Telephone: (312) 886-7034
- ✔ **Region 6** (AR, LA, NM, OK, TX)
  Brenda Mitchell
  Telephone: (214) 767-4736, ext. 238
- ✔ **Region 7** (IA, KS, MO, NE)
  Mark Banden
  Telephone: (816) 426-5861, ext. 255
- ✔ **Region 8** (CO, MT, ND, SD, UT, WY)
  Dave Herstedt
  Telephone: (303) 844-1600, ext. 309
- ✔ **Region 9** (AZ, CA, HI, NV)
  Technical Assistance Line: (800) 475-4019
- ✔ **Region 10** (AK, ID, OR, WA)
  Lynda Glaspey
  Telephone: (206) 553-5932, ext. 8081

But the agency has defined "days away from work" and "restricted work" days due to injury to include any recuperation time — even if those days fall during a weekend, vacation, or other off-duty time.

Here's an example of how that will change the recording of injuries: A nurse strains her back as she helps a patient transfer from a bed to a chair. An employee health nurse or physicians advises her to use cold packs and over-the-counter anti-inflammatories. The injury happens on a Friday, and she isn't due back to work until Monday.

Under the old standard, the repeated use of cold packs would make the injury recordable. However, the two days of recuperation would not entail lost workdays.

With the new standard, the cold packs and anti-inflammatories would be considered first aid. But if a licensed health care professional advised the employee that she needed two days to recuperate — that she couldn't perform her usual duties for those two days — then the injury would be recorded with two days of lost time.

"If you know that person really should be off those two days to get better, or if you feel they could be [at work] but be restricted from lifting and bending, it should be reflected like that," says Winzeler. "It's really incumbent on physicians to be very clear as to whether the person actually could have worked or not. If they could have worked, [they need to note] whether they could have done their routine functions or not."

The agency capped the number of days away from work or restricted days at 180. After that, no further tracking is necessary. At the end of the year, the EHP may estimate the days away or restricted days related to any existing injuries and close the log.

The determinations about what's recordable have been extended to illnesses, as well. OSHA now doesn't distinguish between injuries and illnesses in the recording rules, notes Haag.

"Before you had to decide whether an injury required first aid only or medical treatment. You did not have to record first aid injuries," she explains. "But you had to record all diagnosable illnesses. Now you treat an illness the same way you would treat an injury. You have to decide if that illness is significant," Haag says. Illnesses would include dermatitis and work-related asthma.

The OSHA 300 also includes special recording criteria for occupational transmission of tuberculosis. If an employee is exposed to someone with a known case of tuberculosis and later has a positive skin test or a diagnosis of TB, you must check a box labeled "respiratory condition."

If further investigation shows that the TB exposure occurred outside the workplace — such as from an infected family member or acquaintance — the record can be deleted, the OSHA standard says.

Until hospitals have several years of experience with new forms and new definitions, it will be difficult to track trends in injuries and illnesses. The tally on the OSHA 300 log can't be compared directly with previous OSHA 200 records.

"We're going to have to have this log in place for a few years before we can really compare apples to apples," says Winzeler. But she notes that EHPs still can look at important indicators, such as cost per case. Ultimately, the new log will provide valuable information, she says.

It's information that top administrators also must acknowledge. The new rule requires a company executive to certify that the log is accurate and complete.

"By signing it, they're saying they have reviewed it, they understand it, and they realize what their lost and restricted days [are in total]," says Winzeler.

[Editor's note: OSHA will offer a satellite broadcast and simultaneous live webcast on Nov. 29 from 1 p.m. to 3 p.m. For information, see the web site: www.osha-slc.gov/record keeping/index.html. The American Association of Occupational Health Nurses in Atlanta offers occasional workshops on record keeping. See their web site at www.aaohn.org or call (770) 455-7757.] ■

Early HCV treatment may prevent chronic disease

Stunning study boosts early testing, follow-up

Hospital employee health professionals (EHPs) are reconsidering their follow-up of employees exposed to hepatitis C in light of new research that shows that early treatment can prevent chronic infection.

In an article in the *New England Journal of Medicine*, German researchers reported that 42 of 43 patients who completed a 24-week series of interferon therapy had undetectable levels of HCV RNA and normal liver enzyme levels.[1]

Although the report does not apply to post-exposure prophylaxis (PEP), it could affect the treatment of employees who seroconvert.

Currently, the Centers for Disease Control and Prevention (CDC) in Atlanta recommends HCV antibody testing at four to six months, but suggests that HCV RNA testing may occur at four to six weeks, if desired.

In counseling patients after exposure, clinicians now may tell employees that "there is considerable evidence that interferon therapy might be beneficial" in treating acute infection, says **Ronald H. Goldschmidt**, MD, director of the family practice inpatient service at San Francisco General Hospital and co-director of the PEPline post-exposure hotline.

Those employees may choose to have RNA testing and more frequent monitoring, he says. Goldschmidt also says clinicians should be aware of the need for close follow-up.

"Clinicians managing occupational exposures need to be as aware of the risk of hepatitis C as they are of HIV," he says. "This is critically true now that there appears to be effective treatment for acute hepatitis C.

"We recognize that the study doesn't answer all the important questions [about HCV treatment], but health care workers need to know that treatment of acute hepatitis C is an important option. They need to talk to their clinicians about it."

Many employee health professionals had taken a stance toward treating early HCV infection.

"I had decided to be very aggressive and monitor people and treat as soon as there's evidence of disease," says **Geoff Kelafant**, MD, MSPH, FACOEM, medical director of the occupational health department at the Sarah Bush Lincoln Health Center in Mattoon, IL.

Kelafant, who is chairman of the medical center occupational health section of the American College of Occupational and Environmental Medicine in Arlington Heights, IL, conducts his first tests at about four weeks after exposure.

Although he has had no seroconversions, his protocol calls for treatment at serologic evidence of infection. "If I had a patient of mine that converted, I would very strongly recommend [that person] get [interferon] therapy," Kelafant says.

The article caused a ripple of excitement because of its strong findings in favor of early treatment. In fact, the Massachusetts Medical Society released the article on Oct. 1, six weeks before its publication in the Nov. 15 issue, citing "potential clinical implications."

CE questions

21. As cases of anthrax emerged this fall, why did the CDC stress the importance of influenza vaccination?
    A. Influenza vaccine can provide protection against anthrax.
    B. The anthrax vaccine and the influenza vaccine can be given together.
    C. Influenza vaccination boosts the immune system, which helps people avoid anthrax infection.
    D. Early anthrax symptoms are flu-like and preventing cases of the flu can reduce anxiety.

22. In a study reported in the *New England Journal of Medicine*, German researchers reported that 42 of 43 patients with acute hepatitis C who completed a 24-week series of interferon therapy had undetectable levels of HCV RNA and normal liver enzyme levels. According to the authors, this means that:
    A. Hepatitis C can be cured with interferon treatment.
    B. Treatment of acute hepatitis C can prevent chronic infection.
    C. Exposed health care workers should receive interferon as a post-exposure prophylaxis.
    D. The side effects of interferon treatment are not significant.

23. According to **Jeffrey Koplan**, MD, MPH, the director of the Centers for Disease Control and Prevention, the chance of contracting anthrax from contaminated mail is:
    A. "nonexistent"
    B. "very, very small"
    C. "significant"
    D. "substantial"

24. If a hospital employee sees a letter that seems suspicious in light of the anthrax threat, he or she should:
    A. shake it to see if there's powder inside
    B. carry it to a supervisor
    C. immediately open it with a letter opener
    D. wash his or her hands and notify a supervisor

While typically 70% to 85% of those with acute HCV infection progress to chronic infection,[2] 98% of those receiving the full treatment regimen in the study resolved their infection.

"It is likely that about 30% of our patients

would have had self-limited disease, regardless of whether they received interferon alfa-2b," acknowledge the authors, who conducted the study at the Hanover Medical School in Germany. "So far, there are no means to identify such patients at presentation. Since the current treatment for chronic HCV infection eliminates the virus in only about half of cases, we suggest that all patients with acute hepatitis C should be treated," the researchers concluded.

However, inherent limitations of the study raised a number of other questions.

David K. Henderson, MD, deputy director for clinical care at the Warren G. Magnuson Clinical Center of the National Institutes of Health in Bethesda, MD, notes that 14 of the 44 study subjects were occupationally exposed health care workers. "They're not separated out in the paper. I would love to know exactly how they were managed." He also noted that the researchers reported that the average time from exposure to "signs and symptoms" of infection was 54 days, and the average time to start of therapy was 89 days.

That actually is a longer period than would usually occur in the monitoring of exposed health care workers, who could receive testing as early as 28 days after exposure.

As far as those showing "signs and symptoms," which could include jaundice, fever, and weight loss, Henderson notes that their cellular immune response might predispose them to respond to early interferon treatment. "I know of no other paper on the treatment of hepatitis C infection that shows this kind of [positive] result. The best numbers are a 40% or 50% cure rate. This is a substantial difference and incredibly encouraging. [But] we don't know exactly what it means, and we should not leap to the conclusion that preemptive therapy works."

The CDC already had been scheduled to reconsider its recommendations through a National Institutes of Health Consensus Development Conference on Management of Hepatitis C in June 2002. But the findings of this study do not conflict with the current guidelines, notes **Miriam J. Alter**, PhD, chief of the epidemiology section in the division of viral hepatitis at the CDC.

The updated recommendations, published in the June *Morbidity and Mortality Weekly Report* (MMWR), noted that "intervention with antivirals when HCV RNA first becomes detectable might prevent the development of chronic infection." However, it's not clear how effective the treatment is in patients who haven't showed any signs of infection and who have normal serum alanine aminotransferase (ALT) levels, Alter says. All the patients in the German study had elevated ALT levels. "When you identify health care workers early in acute infection after exposure, they're still asymptomatic. They may not even have ALT elevations," she says.

Although only one person in the German study halted treatment, Alter noted that interferon can have significant side effects.

"We don't know whether treating early in the course of chronic infection or disease might be just as effective as treating during acute hepatitis C. Should we be using this regimen or another regimen that could be just as useful? What about the side effects? These are all unknown. The unknowns are the same now as they were when we wrote the *MMWR*," she says.

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1. Jaeckel E, Cornberg M, Wedemeyer H, et al. Treatment of acute hepatitis C with interferon alfa-2b. *N Engl J Med* 2001; on-line publication: www.nejm.org.
2. Centers for Disease Control and Prevention. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. *MMWR* June 29, 2001; 50(RR11):1-42. ■

Reader Questions

Q&A: Do new employees need a test for HBV titers?

Recently, *Hospital Employee Health* offered answers from experts on frequently asked questions about employee immunizations. We've since received other questions from readers. Here they are, with a response from **Miriam J. Alter**, PhD, chief of the epidemiology section in the division of viral hepatitis at the Centers for Disease Control and Prevention in Atlanta.

Q. A new employee says she received the hepatitis B vaccine five years ago, but she has no documentation and never was tested for immune response. Should we test her for an HBV antibody response? What should we do if she shows no evidence of immunity?

A. Employees who were not tested within two months after completion of the series should not be tested unless it is part of postexposure

management. In persons who respond to the vaccine, anti-HBs titers may wane over time, although they are still protected from hepatitis B. Booster doses or periodic serologic testing to monitor antibody concentrations are not recommended. If an exposure occurs and that employee's immune response is not known, the CDC recommends testing for HBV antibodies. If the test is positive, no further treatment is necessary. If the test is negative and the source is known to be positive for HBV, the employee should receive one dose of HBIG and a vaccine booster. If the test is negative and the source status is unknown, the CDC recommends giving the employee a vaccine booster and rechecking for titer in one to two months.

Q. An employee previously showed immunity to HBV after a three-shot series. Several years later, she has a bloodborne exposure involving an HBV-positive patient. Should she be tested for an HBV antibody response?

A. No treatment, and no testing, is recommended for exposed employees who are known responders to the HBV vaccine. A responder is a person with adequate levels of serum antibody to HBsAg (i.e., anti-HBs>10 mIU/mL).

Reference

1. Centers for Disease Control and Prevention. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. *MMWR* June 29, 2001; 50(RR11):1-42. ■

NIOSH issues information brochure on glutaraldehyde

As the National Institute for Occupational Safety and Health (NIOSH) continues to work toward a new recommendation on safe limits for glutaraldehyde, the agency published a brochure with health warnings for health care workers. **(See insert in this issue. The brochure also is available at www.cdc.gov/niosh/2001-115.html.)** A more extensive technical manual, which will include a chapter on glutaraldehyde as well as other hazards, is nearing completion.

Glutaraldehyde has been implicated in cases of respiratory sensitization and may be a factor in the high rate of occupational asthma among health care workers, according to **Edward Lee Petsonk**, MD, senior medical officer in the division of respiratory disease studies at NIOSH in Morgantown, WV. **(See related article, *Hospital Employee Health*, February 2001, p. 13.)**

The NIOSH brochure alerts health care workers to the following symptoms of glutaraldehyde exposure and encourages to report the symptoms:

- throat and lung irritation;
- asthma, asthma-like symptoms, and breathing difficulty;
- nose irritation, sneezing, and wheezing;
- nosebleed;
- burning eyes and conjunctivitis;
- rash — contact and/or allergic dermatitis;
- staining of the hands (brownish or tan);
- hives;
- headaches;
- nausea.

NIOSH recommends local exhaust ventilation

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that provides at least 10 air room exchanges per hour. Employees should wear personal protective equipment when working with glutaraldehyde, including goggles, face shields, and gloves and aprons made of nitrile or butyl rubber. Latex gloves do not provide adequate protection, NIOSH says.

As medical studies showed a link between glutaraldehyde and occupational asthma, other countries, such as the United Kingdom, lowered their exposure limits.

The American Conference of Governmental Industrial Hygienists reviewed the medical literature and the actions of other countries in 1997 and lowered its ceiling threshold limit value to .05 ppm, noting that it is an "airborne concentration that should not be exceeded during any part of the work shift."[1]

NIOSH is working on a new recommended exposure limit (REL), and the Occupational Safety and Health Administration (OSHA) is developing a permissable exposure limit (PEL). OSHA tried to establish exposure limits to glutaraldehyde as part of a 1989 air contaminants standard.

However, in 1992, the 11th Circuit Court ruled that OSHA hadn't met its regulatory burden of showing substantial risk of harm from the current exposure limits to a variety of chemicals. The court voided the standard and then sent it back to OSHA for further work.

In the case of glutaraldehyde, that meant the .2 ppm standard never became effective, and OSHA currently has no regulation requiring monitoring and maximum levels for the disinfectant.

The focus on glutaraldehyde is just one part of a broad NIOSH project. A manual titled *Special Hazard Review: Occupational Hazards in Hospitals and Health Care Facilities* will contain information from the health effects literature on specific hazards as well as preventive strategies.

The first issue, expected to become available sometime next year, will contain chapters on violence, stress, ergonomic stressors, waste anesthetic gases, nitrous oxide, glutaraldehyde, antineoplastic agents, ethylene oxide, tuberculosis, nonionizing radiation, latex allergy, and needlesticks. These chapters, although technical in nature, will be brief, a member of the NIOSH education staff says.

Reference

1. American Conference of Governmental Industrial Hygienists. *Documentation of the Threshold Limit Values and Biological Exposure Indices*, 6th Ed. 1999; Publication 0206,

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. ■

BIOTERRORISM WATCH

Preparing for and responding to biological, chemical and nuclear disasters

Clinicians must be voice of reason, reassurance now that bioterrorism battle has been joined

The threat is real, but we are far from defenseless

A new era of bioterrorism has begun with the intentional anthrax scares that have left several people dead and many more exposed as this issue went to press.

But amid the shrill coverage of the widening anthrax investigations, the scramble for gas masks and the expected hoarding of Cipro, there must be a voice of calm and reason. That voice must be your own.

Infection control professionals, hospital epidemiologists, and other key clinicians involved in health care bioterrorism readiness and response must set the tone for a panicky public and an uneasy health care work force, emphasizes veteran epidemiologist **William Schaffner**, MD, chairman of preventive medicine at Vanderbilt University School of Medicine in Nashville.

"We have to re-instill a sense of confidence for people who work in the health care system," he says. "Start with the doctors. They are the ones who are going to be more panicked than the nurses."

Restoring calm to health care community

The current situation is reminiscent of the early stages of the HIV epidemic, when there was much anxiety about the communicability of the disease and whether even casual contact would spell a death sentence for health care workers.

In that chilling time of alarmist reactions and burning mattresses, Schaffner recalls that ICPs, epidemiologists, and other clinicians, stepped into the fray to provide calming confidence and accurate risk data.

"I'm beginning to think that we may be in a similar position now," he says. "We could have a very powerful educational and reassuring effect. Everybody's anxious about this, but I think we can diminish the level of anxiety," Schaffner adds.

Infection control methods in place

Health care workers must be educated about bioterrorism agents and provided reassurance that the patient isolation precautions developed by the Centers for Disease Control and Prevention (CDC) are extremely effective, urges Schaffner.[1]

"The barrier precautions are going to work for bioterrorism. Once you get to chemical [weapons] then you get into the whole 'moon suit' issue. But for bioterrorism, we don't need that," he says.

For example, systems of barrier precautions such as gloves, gowns, and masks to isolate patients infected with all manner of infectious diseases are already in place in virtually all U.S. hospitals.

"They work," he says. "Look, we all know pulmonary tuberculosis is communicable. I'm an infectious disease doctor, have been for 30 years. I've seen a lot of patients with tuberculosis, but I have also been meticulous about my use of [face masks and respirators]. My tuberculin test continues to be negative."

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

A Bioterrorism Time Line

1155 Barbarossa uses the bodies of dead soldiers to poison the wells at the battle of Tortona.

1346 Mongols catapult corpses of plague victims into the city of Kaffa to infect the defenders.

1763 British commander Sir Jeffrey Amherst ordered the transfers of blankets used by British smallpox victims to Native American tribes, ostensibly as a gesture of goodwill, with the intention of inducing illness.

1970 The United States ends its programs of developing biological agents for use in warfare. The offensive use of such weapons was forbidden by U.S. policy under executive orders of President Richard Nixon.

1972 Soviet Union signs off on Biological and Toxin Weapons Convention, but continues a high-intensity program to develop and produce biological weapons at least through the early 1990s. Hundreds of tons of weaponized anthrax spores are stockpiled, along with dozens of tons of smallpox and plague. Many of these agents are reputed to have been specifically designed to be resistant to common antibiotics.

1984 Members of the Rajneesh cult contaminated salad bars in Oregon with salmonella, resulting in the infection of 751 people. The Paris Police raided a residence suspected of being a safe house for the German Red Army Faction. During the search, they found documentation and a bathtub filled with flasks containing *Clostridium Botulinum.*

1990s Japan's Aum Shinrykyo cult plans attacks using biological agents, specifically, anthrax and botulinum toxin. While these biological attacks were not successful, cult members later implemented the release of sarin nerve gas in the Tokyo subway system.

1995 A U.S. microbiologist with right-wing ties orders bubonic plague cultures by mail. The ease with which he obtained these cultures prompts new legislation to ensure that biologic materials are destined for legitimate medical and scientific purposes.

1998 A variety of feigned exposures to anthrax spores occurred in several U.S. cities including Indianapolis, where a full-scale response by emergency services and public health occurred before the episode was found to be a hoax.

Sources

1. Stewart C. *Topics in Emergency Medicine: Biological Warfare. Preparing for the Unthinkable Emergency.* Atlanta: American Health Consultants; 2000.

2. Bosker G. Bioterrorism: An update for clinicians, pharmacists, and emergency management planners. *Emergency Medicine Reports* (in press) 2001. ■

And anthrax, of course, is not communicable from person to person, reminds Schaffner, who investigated a case of occupational anthrax in an animal-hide worker when he was a epidemiologist for the CDC in the late 1960s.

"The bacteria do not cause a conventional pneumonia," he says. "They replicate locally and then release toxins. Because the bacteria never replicate to very high numbers the person is not communicable. It is not so much an infection as it is an intoxication."

Inordinate fear of anthrax could cause another problem — hoarding and misuse of Ciprofloxacin and other antibiotics. That tactic eventually could contribute to emerging resistance in pathogens such as *Streptococcus pneumoniae,* Schaffner notes.

"It is one thing for a hospital and the health department to develop an inventory in the event of an emergency," he says. "I do not recommend that individuals do that. I'm quite concerned that with antibiotics in their medicine cabinets there will be a temptation to just use it now and again for inadequate reasons in inadequate doses. If there was a recipe for antibiotic resistance — that's it."

More terror than toll

While the anthrax mailing campaign now under way sends out another shock wave with every news report, the tactic will likely result in more terror than actual toll. The rapid administration of antibiotics has offset illness following exposures, the disease is not communicable from those actually infected, and everyone is now on high alert for suspicious mailings.

Indeed, if the wave of anthrax mailings continues, postal-treatment technologies may become a growth industry.

Regardless, anthrax is problematic as a bioweapon because only a certain micron size of the inhaled spore will lodge in the upper lungs where it can release its toxins, says **Allan J. Morrison Jr.**, MD, MSc, FACP, a bioterrorism expert and health care epidemiologist for the Inova Health System in Washington, DC.

"If it is too large, it won't go in," says Morrison, a former member of the U.S. Army Special Forces. "If it's too small, it goes in and moves about freely without ever lodging. This is not as easy as getting a culture, growing it in your home, and the next day having infectious microbes.

"The sizing, preparation, and ability to deliver such a weapon are extremely difficult," he adds.

The Aum Shinrykyo cult in Tokyo attempted at least eight releases of anthrax or botulism during 1990 to 1995 without getting any casualties, he recalls. **(See time line, p. 2.)** Variables such as humidity can come into play, clumping up spores even if they are perfectly sized for inhalation. Anthrax spores bound for human targets are also at the whims of ultraviolet light, rain, and wind dispersal patterns, Morrison says.

"It is a very hostile climate for microbes on planet earth." Morrison says. "The intent may be widespread, but the ability to deliver weapons grade agents is going to be restricted to a very small subgroup. And even among them, they still will require optimal climatic conditions to carry it out. There will be causalities, as in war, but the distinction here is that there has not been widespread infection."

While anthrax is the current weapon of choice, the direst scenarios usually turn to the most feared weapon in the potential arsenal of bioterrorism: smallpox.

"Invariably, I have seen smallpox described as 'highly infectious,'" Schaffner says. "It's not. That is erroneous." For example, during the global eradication efforts in the 1960s, African natives infected with smallpox were often found living with extended families in huts, he adds. "It would usually take two to three incubation periods for smallpox to move through an extended family."

"It doesn't happen all it once. This was a critical concept in the strategy to eradicate smallpox. If you could find smallpox, you could vaccinate around that case and prevent further transmission. If it had been a frighteningly [rapid] communicable disease, that strategy would never have worked," Schaffner explains.

In addition, some medical observers question the certitude of the general consensus that all those vaccinated decades ago are again susceptible to smallpox. They argue that those immunized during the eradication campaign may at least have some greater protection against fatal infection.[2]

Regardless, rather than dropping like flies, as many as 70% of those infected with smallpox actually survive and then have lifelong immunity.

While there are many other agents to discuss and prevention plans to outline in the weeks and months ahead, perhaps the greatest protective factor is the unprecedented level of awareness in the health care system. The world has changed so much since Sept. 11th that hospitals are probably more prepared for bioterrorism than they have ever been. Everywhere, lines of communication have been opened with health departments and affiliated clinics, emergency plans have been reviewed and hot-button phone numbers posted on the wall.

"We're on alert," says **Fran Slater**, RN, MBA, CIC, CPHQ administrative director of performance improvement at Methodist Hospital in Houston. "We are *all* on alert."

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1. Garner JS, the Centers for Disease Control and Prevention Hospital Infection Control Practices Advisory Committee. *Guideline for Isolation Precautions in Hospitals. Web site: http://www.cdc.gov/ncidod/hip/ISOLAT/isolat.htm.*
2. Bosker G. Bioterrorism: An update for clinicians, pharmacists, and emergency management planners. *Emergency Medicine Reports* (in press) 2001. ■

Should clinicians get smallpox vaccinations?

Questions arise, stockpile expansion fast-tracked

The recent decision to accelerate production of a new smallpox vaccine is raising the complex question of whether health care workers — front-line soldiers in the war against bioterrorism — should be immunized against the disease.

As opposed to the current anthrax attacks, a biological release of smallpox would result in incoming patients with an infectious disease. Even health care workers directly exposed to anthrax could be treated with ciprofloxacin and several other antibiotics, so the anthrax vaccine is not a likely candidate for health care.

On the other hand, legitimate questions have been raised about whether health care workers will stay on the job during a smallpox outbreak unless they and their families are rapidly vaccinated. The only known stocks of smallpox virus are held by the United States and Russia, but many bioterrorism experts have warned for years that another nation or group might have secret stocks.

"I think if smallpox [vaccine] became available, we should definitely immunize all the health care workers," says **Martin Evans**, MD, hospital epidemiologist at the University of Kentucky Chandler Medical Center in Lexington. "A lot of people think [health care workers] ought to

be high on the list because they are part of the response team if there was an outbreak in the community. Not to sound self-serving, but I think we ought to immunize the medical community."

But the question currently is somewhat moot because the Centers for Disease Control and Prevention (CDC) is not wavering from its established policy of mobilizing the available vaccine only if smallpox is released. "I'm sure CDC wants to conserve its current stocks for dealing with an outbreak so it could immunize contacts," Evans says. "If [the agency has] already used [its stock] by immunizing all the health care workers in the country, then it won't be able to respond."

15 million doses stockpiled

Currently, there are some 15 million doses of the old smallpox vaccine available, according to Secretary of Health and Human Services **Tommy Thompson,** who recently announced plans to accelerate production of a new smallpox vaccine. Forty million new doses of vaccine are expected to be available by mid-to-late 2002, moving the project up considerably from its original completion date of 2004 or 2005.

The manufacturer of the new vaccine is Acambis Inc. (formerly OraVax) — based in Cambridge, UK, and Cambridge and Canton, MA. The new vaccine will be a purified derivative of the same strain of cowpox virus (vaccinia) that was used in the United States previously, because the old vaccine's efficacy was clearly demonstrated by direct exposures to those infected. While the method of immunization through scarification will be essentially the same, the new vaccine will be produced in a mammalian cell culture that contains no animal protein.

Acambis stated on its web site that it would have no other comment on the project other than to confirm it has "accelerated" its production plans. But when the project was first announced in 2000, company officials said they had the ability to scale up production well beyond the requested 40 million doses. They were even scouting for other global markets. That means the capability to produce smallpox vaccine in abundance is on the horizon, and the question of immunizing health care workers will invariably arise. *Bioterrorism Watch* was unable to get a CDC response on the question as this issue went to press, but CDC director **Jeffrey Koplan**, MD, MPH, outlined the agency's position in an Oct. 2, 2001 Health Alert posted on a CDC web site.

"Smallpox vaccination is not recommended and, as you know, the vaccine is not available to health providers or the public," Koplan said. "In the absence of a confirmed case of smallpox anywhere in the world, there is no need to be vaccinated against smallpox. There also can be severe side effects to the smallpox vaccine, which is another reason we do not recommend vaccination. In the event of an outbreak, the CDC has clear guidelines to swiftly provide vaccine to people exposed to this disease. The vaccine is securely stored for use in the case of an outbreak."

One factor in favor of the CDC's position to rapidly deploy the vaccine — rather than do widespread vaccinations — is that immunization should still be effective several days after a smallpox exposure. In the smallpox global eradication campaign, epidemiologists found they could give vaccine two to three days after an exposure and still protect against the disease. Even at four and five days out, immunization might prevent death. Still, though the new vaccine will be improved in many ways, the hazards and risk factors of introducing cowpox into the human body are expected to be roughly the same as those documented with the old vaccine.

"We are looking at probably about one death per million primary vaccinations," says **D.A. Henderson**, MD, director of the Center for Civilian Biodefense Studies at Johns Hopkins University in Baltimore. "We are looking at one in 300,000 developing post-vaccinal encephalitis — an inflammation of the brain, which occasionally is fatal and sometimes can leave people permanently impaired."

Based on those estimates, if the new stockpile of 40 million doses is eventually rolled out, approximately 40 of those immunized will die, and another 133 will develop encephalitis. In addition to those severe outcomes, the arm lesion created during inoculation can be very large and painful, serving as a reservoir to self-inoculate the eyes or even infect immune-compromised patients.

The downside is real, but as more vaccine becomes available immunization will certainly be discussed at hospitals in previously targeted areas such as New York City and Washington, DC. If they are not immunized in advance, health care workers are going to want vaccine very quickly if they are expected to take care of smallpox patients, says **Allan J. Morrison Jr.**, MD, MSc, FACP, health care epidemiologist for the Inova Health System in Washington, DC. "Forget about smallpox patients. We're talking about taking care of any patients." ■

Hospital Employee Health
2001 Index

Glutaraldehyde

Occupational Hazards in Hospitals

The following excerpts are from a brochure published by the Department of Health and Human Services, National Institute for Occupational Safety and Health (NIOSH).

Glutaraldehyde is used as a cold sterilant to disinfect and clean heat-sensitive equipment, such as dialysis instruments; surgical instruments; suction bottles; bronchoscopes; endoscopes; and ear, nose, and throat instruments. This chemical also is used as a tissue fixative in histology and pathology labs and as a hardening agent in the development of X-rays. Glutaraldehyde is a colorless, oily liquid with a pungent odor. Hospital workers use it most often in a diluted form mixed with water. The strength of glutaraldehyde and water solutions typically ranges from 1% to 50%, but other formulations are available. Trade names include Cidex, Sonacide, Sporicidin, Hospex, Omnicide, Metricide, and Wavicide.

WHAT HEALTH EFFECTS CAN EXPOSURE TO GLUTARALDEHYDE CAUSE?

The following health effects have been reported in hospital workers exposed to glutaraldehyde:

- Throat and lung irritation
- Asthma, asthma-like symptoms, and breathing difficulty
- Nose irritation, sneezing, and wheezing
- Nosebleed
- Burning eyes and conjunctivitis
- Rash — contact and/or allergic dermatitis
- Staining of the hands (brownish or tan)
- Hives
- Headaches
- Nausea

If you experience any of these symptoms when working with glutaraldehyde, report them to your supervisor or safety officer.

WHO MIGHT BE EXPOSED TO GLUTARALDEHYDE IN HOSPITALS?

Workers in hospitals who might be exposed to glutaraldehyde include the following:

- Hospital staff who work in areas with a cold sterilizing procedure that uses glutaraldehyde (for example, gastroenterology and cardiology departments)
- Hospital staff who work in operating rooms, dialysis departments, endoscopy units, and intensive care units where glutaraldehyde formulations are used in infection control procedures
- Central service (supply) workers who use glutaraldehyde as a sterilant
- Research technicians, researchers, and pharmacy personnel who either prepare the alkaline solutions or fix tissues in histology and pathology labs
- Laboratory technicians who sterilize benchtops with glutaraldehyde solutions
- Workers who develop X-rays

WHEN ARE WORKERS MOST LIKELY TO BE EXPOSED TO GLUTARALDEHYDE IN HOSPITALS?

Workers can be exposed to glutaraldehyde by breathing it or by skin contact during the following procedures:

- Cold sterilization of instruments in endoscopy and surgical units when glutaraldehyde solution is poured into or out of the sterilizing pans, and when sterilized equipment is removed from the sterilizing pans
- Disinfection of histology/pathology laboratory table tops
- Mixing and activation of various glutaraldehyde solutions
- Tissue fixation in histology labs
- Development of X-rays

HOW CAN I PROTECT MYSELF FROM EXPOSURE TO GLUTARALDEHYDE?

You can protect yourself by using the following control methods and work practices:

- Use local exhaust ventilation (capture velocity of at least 100 feet per minute) and at least 10 room air exchanges per hour.
- Keep glutaraldehyde baths under a fume hood where possible.
- Use only enough glutaraldehyde to perform the required disinfecting procedure.
- Avoid skin contact: Use gloves and aprons made of nitrile or butyl rubber (latex gloves do not provide adequate protection).
- Wash gloved hands after handling glutaraldehyde.
- Wear goggles and face shields when handling glutaraldehyde.
- Seal or cover all containers holding glutaraldehyde solutions.
- Attend training classes in safety awareness about use of and exposure to glutaraldehyde.

SAFETY TIPS

- Become familiar with and be able to recognize sources of glutaraldehyde exposure.
- In case of skin or eye contact, wash with water immediately. Clean up spills immediately.
- Refer to ANSI/AAMI [1996] for further information about emergency procedures in the event of a large spill.

CASE REPORT

Several nurses were working in an area where glutaraldehyde was stored in 1-liter baths on countertops and was used to disinfect bronchoscopes. They complained of hives, chest tightness, and watery eyes. Evaluation of the work area indicated that there was a separate (independent) recirculating ventilation system designed to provide 10% outside air. The nurses used no personal protective equipment (such as gloves). Measures were then taken to reduce exposures. These included changing glutaraldehyde containers to airtight models, using appropriate gloves, and installing local ventilation hoods for glutaraldehyde stations. One month after the implementation of these measures, the nurses' symptoms subsided. (Charney W. "Hidden Toxicities of Glutaraldehyde." In: Charney W, Schirmer J, eds. *Essentials of Modern Hospital Safety.* Chelsea, MI: Lewis Publishers Inc.; 1991, pp. 71-81.)

FOR MORE INFORMATION

To receive the complete Glutaraldehyde brochure, or documents and information about occupational safety and health topics, contact the National Institute for Occupational Safety and Health:

- NIOSH Publications Dissemination,
  4676 Columbia Parkway, Cincinnati, OH 45226-1998.
  Telephone: (800) 35-NIOSH (356-4674).
  Fax number: (513) 533-8573.
  E-mail: pubstaft@cdc.gov.
  Web site: www.cdc.gov/niosh.

Source: National Institute for Occupational Safety and Health, Washington, DC. Publication No. 2001-115, May 2001.

Treatment of Biological Agent Exposure

AGENT	CLINICAL SIGNS AND SYMPTOMS	TREATMENT	OTHER	SECONDARY TRANSMISSION
Anthrax (spore)	Fever, malaise, non-productive cough, progressing to dypsnea, stridor, shock. Incubation 1-6 days.	Prophylaxis/treatment: ciprofloxin, doxycycline, PCN licensed vaccine. IV therapy: ciprofloxin doxycycline, PCN licensed vaccine.	High mortality (>90%) even with treatment.	None except aerosolized body fluids.
Pneumonic Plague (bacteria)	High fever, chills, headache, hemophysis, toxemia, dyspnea, stridor, bleeding diathesis. Incubation 2-3 days.	Prophylaxis/treatment: vaccine, doxycycline, TMP/sulfamethoxazole. IV therapy: streptomycin (>1 yo), gentamicin, chloramphenicol.	Antibiotic treatment effective if begun early.	Strict isolation needed. Isolation mandatory for at least the first 48 hours of treatment.
Tularemia (bacteria)	Regional lymphademepathy, fever, chills, headache, malaise, cutaneous ulcers. Incubation 2-10 days.	Streptomycin, gentamicin. Adult prophylaxis: doxycycline.	Low mortality (about 5%).	Rare, body fluid precautions only.
Q Fever (bacteria)	Fever, cough, pleuritic chest pain. Incubation 10+ days.	Tetracycline, doxycycline.	Low mortality.	Does not require universal precautions.
Smallpox (virus)	Malaise, fever, rigors, vomiting, headache, backache; 2-3 days later lesions appear and quickly progress from macules to papules to pustular vesicles. Incubation 16-17 days.	Supportive — vaccine available from CDC. Immune globulin may be available from CDC. No antiviral medication available.	Supposed to be extinct (doubtful).	Highly contagious.
Viral Equine Encephalitis	Supportive. No antiviral medication exists.	Ribaviron, supportive care.	Isolate patients in single room with an adjoining anteroom stocked with PPE. Negative air pressure if possible.	Body fluids. Otherwise infectious by vector (mosquitoes).
Viral Hemorrhagic Fevers	Fever, malaise, myalgias, headache, vomiting, diarrhea, easy bleeding, petechiae, shock.	Ribaviron, intensive care, convalescent plasma (Argentine HF), vaccine (yellow fever), blood replacement products for DIC.	Decontaminate with hypochlorite or phenolic disinfectants.	Transmitted by bodily fluids. Strict barrier-nursing techniques. Limit patient transfers: may increase risk for secondary transmission.
Botulism (toxin)	Ptosis, weakness, dizziness, dry mouth, blurred vision, diplopia, descending paralysis. Incubation 24-36 hours.	Several antitoxins are available and effective if administered early. CDC vaccine good only for A and B.	Disinfect with hypochlorite and/or soap and water. Supportive long-term mechanical ventilation.	None.
Ricin (toxin)	Weakness, fever, cough, pulmonary edema, incubation 18-24 hours.	Supportive — oxygenation and hydration. No antitoxin or vaccine available.	Disinfect with hypochlorite and/or soap and water.	None. Derived from caster beans.
Staphylococcal Enterotoxin B (toxin)	Fever, headache, chills, myalgias, cough, nausea, vomiting, diarrhea. Incubation 3-12 hours.	Supportive — oxygenation and hydration. Ventilator support may be required.	Disinfect with hypochlorite. Most victims recover.	Use PPE.

Source: Robert Suter, DO, MHA, FACEP, Questcare Emergency Services, Plano, TX.

BIOTERRORISM: Infection Control Practices for Patient Management

Patient Management	BACTERIAL AGENTS	Anthrax	Brucellosis	Cholera	Glanders (rarely seen)	Bubonic Plague	Pneumonia Plague	Tularemia	Q Fever	VIRUS	Smallpox	Venez, Equine Encephalitis	Viral Encephalitis	Viral Hemor, Fever	BIOLOGICAL TOXINS	Botulism	Ricin	T-2 Mycotoxins	Staph, Enterotoxin B
Isolation Precaution																			
Standard Precautions for all aspects of patient care		X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X
Contact Precautions			X								X			X					
Airborne Precautions					X						X								
Use of N95 mask by all individuals entering room					X						X								
Droplet Precautions							X					X							
Wash hands with antimicrobial soap			X	X							X			X					
Patient Placement																			
No restrictions		X						X								X	X	X	X
Cohort "like" patients when private room unavailable				X		X	X		X				X						
Private room			X	X	X	X	X				X	X		X					
Negative Pressure					X						X								
Door closed at all times					X						X								
Patient Transport																			
No restrictions		X						X	X				X			X	X	X	X
Limit movement to essential medical purposes only			X	X	X	X	X				X	X		X					
Place mask on patient to minimize dispersal of droplets					X		X				X	X							
Cleaning, Disinfection of Equipment																			
Routine terminal cleaning of room with hospital approv. Disinfectant upon discharge.				X	X			X	X		X	X	X			X	X	X	X
Disinfect surfaces with bleach/water sol. 1:9 (10% sol.)/Hospital Disinfectant		X	X			X	X							X					
Dedicated equipment that is disinfected prior to leaving room			X								X			X					
Linen management as with all other patients		X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X
Discharge Management																			
No special discharge instruction necessary		X		X	X			X	X			X	X			X	X	X	X
Home care providers need to be taught principles of Standard Precautions		X	X			X	X							X					
Not discharged from hospital until determined no longer infectious							X				X			X					
Patient usually not discharged until 72 hours of antibiotics completed							X												
Post-mortem Care																			
Follow principles of Standard Precautions		X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X
Droplet Precautions							X												
Airborne Precautions											X								
Use of N95 mask by all individuals entering the room											X								
Negative Pressure											X								
Contact Precautions											X			X					
Routine terminal cleaning of room with hospital approv. Disinf. Upon autopsy			X	X	X			X	X		X	X	X			X	X	X	X
Disinfect surfaces with bleach/water sol. 1:9 (10% sol.)/Hospital Disinfectant		X	X			X	X							X					

STANDARD PRECAUTIONS – Standard Precautions prevent direct contact with all body fluids (including blood), secretions, excretions, Non-intact skin (including, rashes) and mucus membranes. Standard Precautions routinely practiced by healthcare providers include: Handwashing, gloves when contact with above, mask/eye protection/face shield while performing procedures that cause splash/spray, and gowns to protect skin and clothing during procedures.

NEGATIVE PRESSURE ROOMS ARE:

NEGATIVE PRESSURE AREAS:

IMPORTANT PHONE NUMBERS:

Infectious Disease Service:
Infection Control:
Bioterroism Emergency Number:
CDC Emergency Response Office: 770-488-7100

Source: Cedars Medical Center, Miami.

Confirmation of cases

- Contact your local poison control center
- Contact your local industrial hygienist or safety officer
- Department of Justice Domestic Preparedness National Response Hotline (800-424-8802)
- If you need further help in clinical diagnosis, call CDC hotline (770-488-7100)
- Review US Army Chemical Casualty Care handbook (http://ccc.apgea.army.mil)

Decontamination considerations

- Chemical warfare agents usually require removal of clothing and decontamination of the patient with soap and water
- Treating contaminated patients in the emergency department before decontamination may contaminate the facility

Institutional reporting

- If reasonable suspicion of chemical attack, contact your hospital leadership (Chief of Staff, Hospital Director, etc)
- Immediately discuss hospital emergency planning implications

Public Health Reporting

- Contact your local public health office (city, county, or State)
- If needed, contact the FBI(for location of nearest office, see http://www.fbi.gov/contact/fo/info.htm)

The information in this card is not meant to be complete but to be a quick guide; please consult other references and expert opinion, and check drug dosages, particularly for pregnancy and children.

CHEMICAL TERRORISM GENERAL GUIDANCE* Pocket Guide

Diagnosis: Be alert to following

- Groups of individuals becoming ill around the same time
- Any sudden increase in illness in previously healthy individuals
- Any sudden increase in the following non-specific syndromes
  - Sudden unexplained weakness in previously healthy individuals
  - Hypersecretion syndromes (like drooling, tearing, and diarrhea)
  - Inhalation syndromes (eye, nose, throat, chest irritation; shortness of breath)
  - Skin-burn-like skin syndromes (redness, blistering, itching, sloughing)
- Unusual temporal or geographic clustering of illness (for example, patients who attended the same public event, live in the same part of town, etc.).

Understanding exposure

- Exposure may occur from vapor or liquid droplets and less likely contamination of food or water
- Chemical effects are dependent on:
  - volatility and amount of a chemical, which infuence exposure
  - water solubility (higher solubility leads to more mucosal and less deep lung deposition and toxicity)
  - increased fat solubility and smaller molecular size increase skin absorption

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VA access card: http://www.oqp.med.va.gov/cpg/cpg.htm

DoD access card: http://www.cs.amedd.army.mil/qmo

Produced by the Employee Education System for the Office of Public Health and Environmental Hazards, Department of Veterans Affairs.

CHEMICAL TERRORISM AGENTS AND SYNDROMES (INCLUDING BIOLOGIC TOXINS)

Agents	Onset of symptoms	Symptoms	Signs	Clinical Diagnostic Tests	Decon-tamination	Exposure route and treatment	Differential diagnostic considerations
Nerve agents	Vapor: seconds Liquid: minutes to hours	**Moderate exposure**: Diffuse muscle cramping, runny nose, difficulty breathing, eye pain, dimming of vision, sweating, **High exposure**: The above plus sudden loss of consciousness, flaccid paralysis, seizures	Pinpoint pupils (miosis) Hyper-salivation Diarrhea Seizures	Red blood cell or serum cholinesterase (whole blood) **Treat for signs and symptoms; lab tests only for later confirmation** Collect urine for confirmation and dose estimation	Rapid disrobing, Water wash with soap and shampoo	**Inhalation & dermal absorption** Atropine (2mg) iv or im 2-PAMCl 600mg injection or 1.0 g infusion over 20-30 minutes Additional doses of atropine and 2-PAMCl depending on severity, Diazepan or lorazepam to prevent seizures if >4 mg atropine given Ventilation support	Pesticide poisoning from organophosphorous agents and carbamates cause virtually identical syndromes
Cyanide	Seconds to minutes	**Moderate exposure:** Dizziness, nausea, headache, eye irritation **High exposure**: Loss of consciousness	**Moderate exposure:** non-specific findings **High exposure**: convulsions, cessation of respiration	Cyanide (blood) or thiocyanate (blood or urine) levels in lab **Treat for signs and symptoms; lab tests only for later confirmation**	Clothing removal	**Inhalation & dermal absorption** Oxygen (face mask) Amyl nitrite Sodium nitrite (300mg IV) and sodium thiosulfate (12.5g IV)	Similar CNS illness results from: Carbon monoxide (from gas or diesel engine exhaust fumes in closed spaces) H_2S (sewer, waste, industrial sources)
Blister Agents	12-72 hours Range: 2 minutes – 8 days	Burning, itching, or red skin Mucosal irritation (prominent tearing, and burning and redness of eyes) Shortness of breath Nausea and vomiting	Skin erythema Blistering Upper airways sloughing Pulmonary edema Diffuse metabolic failure	Often smell of garlic, horseradish, and mustard on body Oily droplets on skin from ambient sources No specific diagnostic tests	Clothing removal Large amounts of water	**Inhalation &, dermal absorption** Thermal burn type treatment Supportive care For Lewisite and Lewisite/Mustard mixtures: British Anti-Lewisite (BAL or Dimercaprol)	Diffuse skin exposure with irritants, such as caustics, sodium hydroxides, ammonia, etc., may cause similar syndromes. Sodium hydroxide (NaOH) from trucking accidents
Pulmonary agents (phosgene etc.)	1 – 24 (rarely up to 72) hours	Shortness of breath Chest tightness Wheezing Mucosal and dermal irritation and redness	Pulmonary edema with some mucosal irritation (more water solubility = more mucosal irritation)	No tests available but source assessment may help identify exposure characteristics (majority of trucking incidents generating exposures to humans have labels on vehicle)	None usually needed	**Inhalation** Supportive care Specific treatment depends on agents	Inhalation exposures are the single most common form of industrial agent exposure (eg: HCl, Cl_2, NH_3) Mucosal irritation, airways reactions, and deep lung effects depend on the specific agent, especially water-solubility
Ricin (castor bean toxin)	18 – 24 hours	**Ingestion:** Nausea, diarrhea, vomiting, fever, abdominal pain **Inhalation:**, chest tightness, coughing, weakness, nausea, fever	Clusters of acute lung or GI injury; circulatory collapse and shock	ELISA (from commercial laboratories) using respiratory secretions, serum, and direct tissue	Clothing removal Water rinse	**Inhalation & Ingestion** Supportive care For ingestion: charcoal lavage	Tularemia, plague, and Q fever may cause similar syndromes, as may CW agents such as Stapylococcal enterotoxin B and phosgene
T-2 mycotoxin	2-4 hours	Dermal & mucosal irritation; blistering, necrosis Blurred vision, eye irritation Nausea, vomiting, and diarrhea	Mucosal erythema and hemorrhage Red skin, blistering Tearing, salivation	ELISA from commercial laboratories Gas chromatography/Mass spectroscopy in specialized	Clothing removal Water rinse	**Inhalation & dermal contact** Supportive care For ingestion: charcoal lavage	Pulmonary toxins (O_3, NO_x, phosgene, NH_3) may cause similar syndromes though with less mucosal irritation.

Confirmation and technical support

- Alert local diagnostic laboratory
- To confirm cases, contact in-house or consulting infectious disease specialist
- Department of Justice Domestic Preparedness National Response Hotline (800-424-8802)
- If you need further help in clinical diagnosis, call CDC hotline (770-488-7100)
- Refer to the Army Handbook of Medical Management of Biological Casualties (http://www.nbc-med.org/others/).

Decontamination considerations

- Decontamination of patients usually not required for biological agents
- Clothing removal & biosafety bagging is recommended
- Handle equipment used according to standard infection control practices (see infection control practitioner or APIC website at www.APIC.org).

Institutional reporting

- If reasonable suspicion of biological warfare agent exposure, contact hospital leadership (Chief of Staff, Hospital Director, etc)
- Immediately discuss hospital emergency planning implications

Public Health Reporting

- Contact local public health office
- If unable to reach local public health officer, contact CDC: 770-488-7100
- If needed, contact the FBI (for location of nearest office, see http://www.fbi.gov/contact/fo/info.htm)

**** The information in this card is not meant to be complete but to be a quick guide; please consult other references and expert opinion, and check drug dosages, particularly for pregnancy and children.***

BIOLOGICAL TERRORISM GENERAL GUIDANCE Pocket Guide

Diagnosis: Be alert to the following --

- Groups of individuals becoming ill around the same time
- Sudden increase of illness in previously healthy individuals
- Sudden increase in the following non-specific illnesses:
  - Pneumonia, flu-like illness, or fever with atypical features
  - Bleeding disorders
  - Unexplained rashes, and mucosal or dermal irritation
  - Neuromuscular illness
- Simultaneous disease outbreaks in human and animal populations
- Unusual temporal or geographic clustering of illness (for example, patients who attended the same public event, live in the same part of town, etc.).

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October 2001

VA access card: http://vaww.oqp.med.va.gov

DoD access card: http://www.cs.amedd.army.mil/qmo

Produced by the Employee Education System for the Office of Public Health and Environmental Hazards, Department of Veterans Affairs.

Some Potential Biological Warfare Agents

Disease	Incubation	Symptoms	Signs	Diagnostic tests	Transmission and Precautions	Treatment (Adult dosage)	Prophylaxis
Inhaled Anthrax	2-6 days Range: 2 days to 8 weeks	Flu-like symptoms Respiratory distress (*Cutaneous Anthrax: Initial itching papule, then 1-3 cm painless ulcer, then necrotic center; fever)	Widened mediastinum on chest X-ray (from adenopathy) Atypical pneumonia Flu-like illness followed by abrupt onset of respiratory failure	Gram stain ("boxcar" shape) Gram positive bacilli in blood culture ELISA for toxin antibodies to help confirm	Aerosol inhalation *No person-to-person transmission* Standard precautions	Mechanical ventilation Antibiotic therapy Ciprofloxacin 400 mg iv q 8-12 h Doxycycline 200 mg iv initial, then 100 mg iv q 8-12 h Penicillin 2 mil units iv q 2 h -- possibly add gentamicin	Ciprofloxacin 500 mg or Doxycycline 100 mg po q 12 h ~ 8 weeks (shorter with anthrax vaccine) Amoxicillin in pregnancy and children Vaccine if available
Botulism	12-72 hours Range: 2 hrs – 8 days	Difficulty swallowing or speaking (symmetrical cranial neuropathies) Symmetric descending weakness Respiratory dysfunction No sensory dysfunction No fever	Dilated or un-reactive pupils Drooping eyelids (ptosis) Double vision (diplopia) Slurred speech (dysarthria) Descending flaccid paralysis Intact mental state	Mouse bioassay in public health laboratories (5 – 7 days to conduct) ELISA for toxin	Aerosol inhalation Food ingestion *No person-to-person transmission* Standard precautions	Mechanical ventilation Parenteral nutrition Trivalent botulinum antitoxin available from State Health Departments and CDC	Experimental vaccine has been used in laboratory workers
Plague	1-3 days by inhalation	Sudden onset of fever, chills, headache, myalgia **Pneumonic:** cough, chest pain, hemoptysis **Bubonic**: painful lymph nodes	**Pneumonic:** Hemoptysis; radiographic pneumonia -- patchy, cavities, confluent consolidation **Bubonic:** typically painful, enlarged lymph nodes in groin, axilla, and neck	Gram negative coccobacilli and bacilli in sputum, blood, CSF, or bubo aspirates (bipolar, closed "safety pin" shape on Wright, Wayson's stains) ELISA, DFA, PCR	*Person-to-person transmission in pneumonic forms* Droplet precautions until patient treated for at least three days	Streptomycin 30 mg/kg/day in two divided doses x 10 days Gentamicin 1-1.75 mg/kg iv/im q 8 h Tetracycline 2-4 g per day	Asymptomatic contacts or potentially exposed Doxycycline 100 mg po q 12 h Ciprofloxacin 500 mg po q 12 h Tetracycline 250 mg po q 6 h all x 7 days Vaccine production discontinued
Tularemia "pneumonic"	2-5 days Range: 1-21 days	Fever, cough, chest tightness, pleuritic pain Hemoptysis rare	Community-acquired, atypical pneumonia Radiographic: bilateral patchy pneumonia with hilar adenopathy (pleural effusions like TB) Diffuse, varied skin rash May be rapidly fatal	Gram negative bacilli in blood culture on BYCE (Legionella) cysteine- or S-H-enhanced media Serologic testing to confirm: ELISA, microhemagglutination DFA for sputum or local discharge	Inhalation of agents *No person-to-person transmission but laboratory personnel at risk* Standard precautions	Streptomycin 30 mg/kg/day IM divided q 12 h for 10-14 days Gentamicin 3-5 mg/kg/day iv in equal divided shoulders x 10-14 days Ciprofloxacin possibly effective 400 mg iv q 12 h (change to po after clinical improvement) x 10-14 days	Ciprofloxacin 500 mg po q 12 h Doxycycline 100 mg po q 12 h Tetracycline 250 mg po q 6 h All x 2 wks Experimental live vaccine
Smallpox	12-14 days Range:7-17 days	High fever and myalgia; itching; abdominal pain; delirium Rash on face, extremities, hands, feet; confused with chickenpox which has less uniform rash	Maculopapular then vesicular rash -- first on extremities (face, arms, palms, soles, oral mucosa) Rash is synchronous on various segments of the body	Electron microscopy of pustule content PCR Public health lab for confirmation	*Person-to-person transmission* Airborne precautions Negative pressure Clothing and surface decontamination	Supportive care Vaccinate care givers	Vaccination (vaccine available from CDC)

Source: Department of Verterans Affairs, Washington, DC.