Medical Surveillance

Key elements of an effective program for employees in healthcare facilities

By Abdalla M. Mutawe

Abstract: *This article identifies the major elements of a medical surveillance program that can be used in healthcare facilities. Issues that can augment the program, such as preplacement examinations, medical screening and immunization programs, are addressed as well.*

A COMPREHENSIVE SITE-SPECIFIC medical surveillance program for a healthcare facility helps to identify hazards, assign responsibilities, and establish and implement relevant protocols. Hazard identification can be achieved through job safety and health analyses, workplace surveys, incident reporting, and post-exposure evaluation and follow-up. Potential exposures to chemical, biological or physical agents must be anticipated, identified, evaluated and controlled. In addition to clinical examinations, and collection and analysis of employee health data concerning certain exposures—such as exposure to hazardous drugs—the program must address management commitment, hazard analysis and employee training found in safety and health programs in other industries.

A medical surveillance program is required by many OSHA standards, including those addressing bloodborne pathogens, ethylene oxide and formaldehyde. Also, a medical surveillance program may be required by consensus industry standards and industry practice regarding issues such as handling and administering hazardous drugs and occupational exposure to mycobacterium tuberculosis (TB).

Understanding the Risks

More than eight million people are employed in hospitals, nursing homes and other healthcare settings. These are dynamic workplaces where employees are potentially exposed to a broad spectrum of hazards unique to their work environments. Estimates suggest that 600,000 to 800,000 accidental percutaneous injuries (injuries from contaminated needles and other sharps) occur annually in healthcare facilities [NIOSH(a) 4-5]. On average, employees at a 100-bed facility may suffer 18 to 26 percutaneous injuries annually exposing employees to potential infection with bloodborne diseases (Perry, et al 32). Estimate suggest that 800 workers became infected with the hepatitis B virus (HBV) in 1995 [NIOSH(a) 4-5]. Additionally, many healthcare employees became infected on the job with the hepatitis C virus (HCV), which is the most common bloodborne pathogen in the U.S., with approximately four million of the general population infected [NIOSH(a) 4-5]. OSHA's Bloodborne Pathogens standard was promulgated to protect employees from exposure to hazards caused by bloodborne pathogens in the workplace [OSHA(b)].

Commonly used chemical sterilants and disinfectants, such as ethylene oxide (29 CFR 1910.1047) and formaldehyde (29 CFR 1910.1048), are regulated by specific OSHA standards. The hazards from other substances such as antineoplastic agents and hazardous drugs are recognized by industry practice. Other hazards such as noise, ionizing and nonionizing radiation are also covered by OSHA standards.

Some OSHA standards and industry guidelines incorporate requirements for a medical surveillance program that encompasses medical and occupational history, physical examination, and laboratory and diagnostic procedures. Table 1 lists OSHA standards with medical surveillance requirements. The intent of the medical surveillance program is to detect any adverse effect or trend caused by the exposure to a hazard or a hazardous substance in order to apply necessary interventions. The program must also focus on early identification and treatment for employees.

Workplace Statistics

Table 2 shows that employees in nursing homes (SIC 805) and those in hospitals (SIC 806) had incidence rates for all occupational recordable injuries and illnesses exceeding that of private industry [BLS(a)]. The incidence rates with lost times for occupational injuries and illnesses are presented in Table 3; these rates also exceeded those of the private sector [BLS(a)]. Nearly half of

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When feasible, engineering controls such as biological safety cabinets are preferred to eliminate hazardous situations.

Defining Medical Surveillance

Medical surveillance is the analysis of health information to identify problems that may be occurring in the workplace that require targeted prevention. Surveillance serves as a feedback loop to the employer. Surveillance may be based on a single case or sentinel event, but more typically uses screening results from the group of employees being evaluated to look for abnormal trends in health status. Surveillance can also be conducted on a single employee over time. Review of group results helps to identify potential problem areas and the effectiveness of existing worksite preventive strategies.

the lost-worktime injuries were caused by overexertion that includes activities such as lifting and repositioning of patients. Many injuries are also caused by slips, trips and falls, contact with objects and exposure to harmful substances. Tables 4 and 5 list the incidence rates per 10,000 employees for the most common events contributing to job-related injuries in 2001 and 2002, respectively [BLS(b)].

Elements of a Comprehensive Medical Surveillance Program

The structure of a medical surveillance program is similar to any other workplace safety and health program. It consists of policies and protocols that assign responsibilities and incorporate procedures which focus on prevention or early detection of adverse effects and application of appropriate interventions.

Management Commitment & Employee Involvement

Based on regulatory standards and industry practice, management's policy must recognize the potential hazards and the need to protect employees through a systematic approach to preventing job-related injuries and illnesses, and giving exposed employees vaccinations, medical surveillance, and early diagnosis and treatment. Management must provide direction and motivation, and allocate adequate resources to administer the program and assign responsibilities for implementation.

Employee cooperation and involvement is vital to program success. New workers must be informed of the surveillance program during orientation. Employee input concerning program changes and implementation can be gathered through participation in safety committees and periodic safety meetings. Employees must be encouraged to report exposure incidents and signs/symptoms of adverse effects to those responsible for administering the program.

Worksite Analysis

Hazard identification can be made by SH&E professionals through comprehensive safety and health surveys, job hazard analyses of procedures and equipment, periodic inspections, and accident and near-hit investigations. Protocols must be developed for reporting exposure incidents and providing post-exposure evaluation and follow-up.

A workplace exposure incident is described in 29 CFR 1910.1030 (bloodborne pathogens) as a parenteral contact or other specific contact with human blood or other potentially infectious materials (OPIM) to nonintact skin, eye, mouth or other mucous membrane. The term OPIM includes semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations in which differentiating between body fluids is difficult or impossible. All exposure incidents must be investigated to find causes and make recommendations to prevent recurrence. The log of work-related injuries and illnesses must be reviewed at least annually to determine rates and trends at the facility and to amend the surveillance program as necessary.

Hazard Prevention & Control

The goal of a medical surveillance program is to identify, evaluate and eliminate or mitigate health risks by eliminating or minimizing exposures. When

feasible, engineering controls are preferred to eliminate hazardous situations. Engineering controls, such as biological safety cabinets, adequate ventilation and negative-pressure isolation rooms, must be periodically inspected and maintained. Other control methods, such as work practice controls, PPE and various administrative controls, can be used in cases where engineering controls are not feasible.

Staff whose responsibilities are to administer the medical surveillance program must be familiar with the facility's emergency response plan. They must participate in pre-emergency planning to anticipate and identify the need for decontamination, isolation, vaccinations and prophylaxis for exposed employees.

Safety & Health Training

Employees covered by the medical surveillance program and their immediate supervisors must receive safety and health training as required by a specific OSHA standard (e.g., bloodborne pathogens) or as required by a specific procedure, such as mixing and administering hazardous drugs. They must be informed and become familiar with the facility's medical surveillance program.

Medical Protocols

Most healthcare facilities require a preplacement medical examination. Several specific OSHA standards apply where employees have occupational exposure to certain workplace hazards (e.g., bloodborne pathogens, ethylene oxide, formaldehyde). In addition, OSHA compliance directives and industry recommendations outline procedures for screening, medical examinations and medical management.

A medical protocol includes collection of information concerning the worker's medical and occupational history. A physical exam must focus on signs and symptoms relevant to the workplace exposure and the target organ. Laboratory studies will be used to detect any changes or altered body function caused by the work-related event.

A coherent system must be made available to track employees for the needed periodic screening and to ensure compliance with vaccination and return appointments. Appropriate software may be necessary for tracking employees' vaccination and medical screening status. Immediate supervisors should encourage employees to participate and assist them in obtaining the required vaccines, periodic medical examinations when required, and post-exposure evaluation and follow-up schedule after an exposure incident.

Maintenance of Records

A confidential medical record must be maintained for employees for the duration of their

Table 1

OSHA Standards with Screening/Surveillance Requirements

Standard Title	Section	Paragraph
Acrylonitrile	1910.1045 1926.1145/1915.1045*	n
Arsenic	1910.1018 1926.1118/1915.1018*	n
Asbestos (General Industry)	1910.1001	l
Asbestos (Construction and Shipyard)	1926.1101 1915.1001	m
Benzene	1910.1028 1926.1128/1915.1028*	i
Bloodborne Pathogens	1910.1030 1915.1030*	f
1, 3-Butadiene	1910.1051 1926.1151*	k
Cadmium	1910.1027 1926.1127/1915.1027/1928.1027*	l
Carcinogens (Suspect)	1910.1003-1016 1926.1103/1915.1003-1016*	g
Coke Oven Emissions	1910.1029	j
Compressed Air Environments	1926.803	b
Cotton Dust	1910.1043	h
1,2-Dibromo-3-chloropropane	1910.1044 1926.1144/1915.1044*	m
Ethylene Oxide	1910.1047 1926.1147*	i
Formaldehyde	1910.1048 1926.1148/1915.1048*	l
HazWOPER	1910.120 1926.65*	f
Hazardous Chemicals in Laboratories	1910.1450	g
Lead	1910.1025 1926.62*	j
Methylenedianiline	1910.1050	m
Methylene Chloride	1910.1052 1926.1152*	j
Noise	1910.95 1926.52	g d
Respiratory Protection	1910.134 1926.103*	e
Vinyl Chloride	1910.1017 1926.1117*	k

**Identical to the General Industry Standard.*

Table 2

Incidence Rates for All Recordable Injuries & Illnesses*

Year	1996	1997	1998	1999	2000	2001	2002
Nursing homes (SIC 805)	16.5	16.2	14.2	13.5	13.9	13.5	12.6
Hospitals (SIC 806)	11.0	10.0	9.2	9.2	9.1	8.8	9.7
Private industry	7.4	7.1	6.7	6.3	6.1	5.7	5.3

Source: BLS.

**Calculated from: Total (all recordable) incidence rate* $= \frac{\text{(No. of recordable cases)(200,000 hours)}}{\text{Total no. of hours worked per year}}$

A recordable injury/illness case involves a loss of consciousness, restriction of work motion, transfer to another job or medical treatment beyond first aid. The 2002 data were generated from the new recordkeeping standard.

Table 3

Incidence Rates for Occupational Injuries & Illnesses with Lost Workday*

Year	1996	1997	1998	1999	2000	2001	2002
Nursing homes (SIC 805)	8.3	8.8	8.1	7.6	7.9	7.3	7.6
Hospitals (SIC 806)	4.1	4.0	3.8	4.0	4.1	4.0	4.1
Private industry	3.4	3.3	3.1	3.0	3.0	2.8	2.8

Source: BLS.

**Calculated from:*
Lost-workday injury and illness (LWDII) rate $= \frac{\text{(No. of cases with LDWII combined)(200,000 hours)}}{\text{Total no. of hours worked per year}}$

Note: The 2002 data were generated from the new recordkeeping standard that accounts for days away from work, days of restricted work activity or job transfer (DART).

Incidence rate $= \frac{\text{(DART cases)(200,000 hours)}}{\text{Total no. of hours worked per year}}$

employment plus 30 years after termination. Access to medical records must comply with 29 CFR 1910.1020, Access to Employee Exposure and Medical Records, as well as with requirements of the Health Insurance Portability and Accountability Act.

Hazards in Healthcare Facilities

Bloodborne Pathogens

Healthcare workers are at risk of exposure to bloodborne pathogens. OSHA 29 CFR 1910.1030 applies to occupational exposure to blood or other potentially infectious materials. Post-exposure evaluation and follow-up for HBV, HCV and HIV is required after an exposure incident. OSHA's standard specifically states that HBV vaccination and post-exposure evaluation and follow-up are to be provided according to recommendations of the U.S. Public Health Service current at the time these evaluations and procedures take place.

After an exposure incident, employees must be evaluated for possible infection to HBV, HCV and HIV [CDC(c)]. The source person, if known, must be tested for infection with HBV, HCV and HIV if s/he will consent to provide blood samples. If the source person is not infected with the bloodborne pathogens of concern, baseline testing or further follow-up of the exposed employee is not necessary. However, if the exposed employee requests to be tested, the employer must allow for the necessary blood tests [CDC(c)].

Vaccination & Post-Exposure Evaluation & Follow-Up for HBV

The risk of acquiring HBV from a needle injury contaminated with blood containing HBV, from a source that has tested positive for hepatitis B e antigen (HBeAG) and hepatitis B surface antigen (HBsAG), is 22 to 31 percent with serologic evidence (i.e., testing positive for HBsAG or HBeAG of 37 to 62 percent) [CDC(c)]. HBsAG can be identified in serum as early as one to two weeks and as late as 11 to 12 weeks after an exposure incident. Many healthcare workers who became infected with HBV did not recall a percutaneous injury, although some have recalled caring for a patient who had HBV. Such a finding emphasizes the need for HBV vaccination of healthcare employees [CDC(c)].

The HBV vaccination (recombinant vaccine) consists of three doses. The first and second doses are given four weeks apart. The third dose is normally administered five months after the second dose [CDC(a)]. Although Centers for Disease Control and Prevention (CDC) did not initially recommend a routine booster dose following the HBV vaccination, current recommendations require testing of employees who have patient care responsibilities or blood contact and are at risk for injuries from contaminated sharps [CDC(c)]. Such employees must be tested one to two months after completion of the vaccination series to determine whether they have developed immunity to hepatitis B.

Employees who are not immune (nonresponders) after receiving the first HBV vaccination series must be offered a second vaccination series. A blood test will be performed one to two months after completion of the second series to determine immune response. Employees who do not develop adequate immune response after the second vaccination series must then be informed that they are not immune to hepatitis B and that they are at higher risk of acquiring the disease. These employees must use PPE and

report any exposure incident immediately so that they can be offered the necessary prophylaxis.

Employees with a documented adequate immune response following completion of the vaccination series do not need additional preventive treatment for hepatitis B after an exposure incident. The hepatitis B immune globulin (HBIG) and/or hepatitis B vaccination series is recommended for those with no or inadequate immune response after an occupational exposure incident. When indicated, HBIG must be administered as soon as possible (within one week) following an exposure incident. If two HBIG doses are required, the second dose must be administered approximately 30 days after the first dose.

Post-Exposure Evaluation & Follow-Up for HCV

The risk of acquiring HCV by a needlestick contaminated with blood from an HCV-positive source is 1.8 percent (range zero to seven percent) [CDC(c)]. The risk of transmission of HCV from contact with mucous membranes was not quantified, however, it is less likely to occur [CDC(c)].

After an occupational exposure to blood or OPIM from an HCV-positive source, and after obtaining consent from the exposed employee, testing for HCV is performed as follows: Immediately or as soon as possible, perform a baseline test for anti-HCV and alanine aminotransferase (ALT) activity. A follow-up test for anti-HCV and ALT activity can be performed approximately four to six months after exposure. However, if an earlier diagnosis is desired, the test can be performed at four to six weeks. All positive anti-HCV results must be confirmed by enzyme immunoassay using supplemental anti-HCV testing.

No known vaccine is available for HCV. In addition, no FDA-approved prophylaxis (such as an antiviral agent) is available to prevent HCV infection. Use of immune globulin does not prevent the transmission of HCV. This emphasizes the need to implement appropriate engineering and work practice controls to prevent or minimize exposure to HCV.

Post-Exposure Evaluation & Follow-Up for HIV

The risk of acquiring HIV from a needlestick contaminated with HIV-positive blood is approximately 0.3 percent [CDC(c)]. The chance of acquiring HIV from an exposure involving mucous membrane (splash, spatter or spray) contact with HIV-positive blood is approximately 0.09 percent [CDC(c)].

Following an exposure incident and after obtaining consent, the exposed employee is tested for HIV immediately after the exposure incident (baseline), at six weeks, 12 weeks and six months. An additional test at 12 months after the exposure incident is only recommended under certain circumstances. An FDA-approved rapid HIV-antibody test kit can be used to test the exposure source.

Evaluation of the exposed employee must start immediately after an exposure incident. Employees must be evaluated for post-exposure prophylaxis (PEP). Information available about HIV infection indicates that there is a brief window of approximately 24 hours for the infection to develop at the site of inoculation. Initiation of antiretroviral PEP a few hours after the exposure incident might prevent or inhibit systemic HIV infection. Recommendation for the PEP is based on the severity of exposure and infection status of the exposure source.

Mycobacterium TB

Healthcare facilities are required to assess the risk for transmission of mycobacterium TB at the facility [CDC(a)]. Based on this assessment, a Mantoux test should be made available—upon initial assignment (baseline)—to all employees working in areas that pose potential exposure to mycobacterium TB. This skin test consists of 0.1 ml of purified protein derivative (PPD). The frequency of the PPD test is based on the risk assessment results. Often, facilities admitting fewer than six TB patients in the preceding year are classified as low risk and normally an annual PPD test is sufficient [CDC(a) 10].

For new employees with a negative PPD skin test and with no documented negative PPD test for the preceding 12 months, a second PPD skin test should

Table 4

Incidence Rates for Nursing Homes & Hospitals, 2001*

Event	Nursing Homes	Hospitals	Private Industry
Overexertion	174.1	93.8	45.0
Slip/trip/fall	75.8	40.8	36.2
Contact with objects	48.8	29.4	44.0
Assaults/violent acts	20.4	8.2	2.6
Harmful substances/environment	15.6	10.3	7.5
Repetitive motion	3.4	7.1	7.2
Transportation accident	1.4	3.0	7.4
Fires	0	0.1	0.4
Other	37.4	23.5	18.9
Total	377.1	219.1	169.1

Source: BLS.

**Incidence rates per 10,000 equivalent full-time employees in nursing homes and hospitals with lost-worktime injuries. Calculated from: Lost-workday injury and illness for 10,000 equivalent full-time employee rate =*

$$\frac{\text{(No. of cases with lost-workday injuries and illnesses)(200,000 hours)(100)}}{\text{Total no. of hours worked per year}}$$

Table 5

Incidence Rates for Nursing Homes & Hospitals, 2002*

Event	Nursing Homes	Hospitals	Private Industry
Overexertion	203.5	96.6	43.1
Slip/trip/fall	82.6	45.7	35.2
Contact with objects	56.3	33.7	43.1
Assaults/violent acts	18.2	12.5	2.7
Harmful substances/environment	15.2	11.3	6.8
Repetitive motion	4.5	6.3	6.6
Transportation accident	1.0	3.5	7.1
Fires	0	0	0.3
Other	29.7	22.8	17.6
Total	411.3	232.4	162.6

Source: BLS.

**Incidence rates per 10,000 equivalent full-time employees in nursing homes and hospitals with lost-worktime injuries. Calculated from: Lost-workday injury and illness for 10,000 equivalent full-time employee rate =*

$$\frac{\text{(No. cases with lost-workday injuries and illnesses)(200,000 hours)(100)}}{\text{Total no. of hours worked per year}}$$

Note: The 2002 data were generated from the new recordkeeping standard that accounts for days away from work, days of restricted work activity or job transfer (DART).

be offered within one to three weeks following the first test. This two-step test is necessary to confirm the presence or absence of previous TB infection. Employees with positive skin test results must be evaluated for TB. Chest X-ray and acid-fast bacilli (AFB) sputum testing may be necessary to rule out active TB for employees with symptoms resembling those associated with the disease. In addition, employees with positive PPD test reaction (latent TB infection) must be evaluated for preventive therapy.

Unprotected exposure/contact with a patient who has active TB must be investigated. A PPD test must be administered to exposed employees as soon as possible after the exposure. If the test is negative, a second test is administered 12 weeks after the exposure was terminated.

Hazardous Drugs

NIOSH defines hazardous drugs as those having one or more of the following characteristics:

1) carcinogenicity;
2) teratogenicity or other developmental toxicity;
3) reproductive toxicity in humans;
4) organ toxicity at low doses in humans or animals;
5) genotoxicity;
6) structure and toxicity profiles of new drugs, which mimic existing drugs determined to be hazardous by the above criteria [NIOSH(b) 18-19].

Hazardous drugs include antineoplastics and chemotherapy drugs that meet NIOSH's definition. A medical surveillance program must cover all employees with potential exposure to these drugs. These employees include pharmacists, nurses, physicians and housekeeping staff.

All employees should be afforded a baseline medical examination that includes history, physical and diagnostic laboratory testing [OSHA(b)]. The frequency of the periodic medical examination is based on the employee's exposure history and must consider the type of hazardous drugs handled by the employee; average hours of daily exposure; PPE used by the employee; type of engineering controls; and any unusual circumstances such as spills and clean-up operations. The medical exam can be conducted annually or every two or three years as deemed necessary by the healthcare provider.

A comprehensive physical exam with emphasis on the target organs that may be affected by the hazardous drugs must be made available to exposed employees. It must consider the reproductive system and any history of malignancy. Signs and symptoms presented by the employee should be evaluated and compared to those likely caused by exposure to hazardous drugs (McDiarmid).

Preplacement and periodic medical exams may include a complete blood count with differential and a reticulocyte count. They may also include tests to determine liver and kidney function; urine test to determine damage to the kidneys or bladder; and any other laboratory tests necessary for the comprehensive medical evaluation.

OSHA Subpart Z: Toxic & Hazardous Substances

Sections of this subpart may apply to healthcare facilities if employees are exposed to the air contaminants. Ethylene oxide and formaldehyde are the most commonly used chemicals at these facilities.

Ethylene Oxide

Ethylene oxide is usually used as a sterilant for surgical equipment and other medical supplies. OSHA's standard for ethylene oxide [29 CFR 1910.1047 Paragraph (f)(2)(i)] requires a written compliance program to reduce employee exposure to or below the permissible exposure limit (PEL) of 1 ppm and the excursion limit (5 ppm). When required, the written program must be updated at least annually. Employees with exposure exceeding the action level (0.5 ppm) for 30 days or more in one year must be afforded a medical surveillance program. This program consists of initial and periodic medical examinations including medical and work history, physical examination and laboratory studies.

The medical and work history and the physical exam will evaluate any adverse effects to the eyes and skin, and to the pulmonary, hematologic, neurologic and reproductive systems. To evaluate an employee's ability to wear a respirator, the physical examination should include evaluation of cardiovascular function, a chest X-ray and a pulmonary function test.

Formaldehyde

In healthcare facilities, formaldehyde is used as a formalin solution to fix and preserve tissues such as in biopsy specimens. Other applications may include use in specific laboratory procedures and disinfection of hemodialysis machines. The OSHA standard for formaldehyde is 29 CFR 1910.1048.

A formaldehyde hazard communication program must be implemented. In addition, a medical surveillance program must be made available for employees exposed to formaldehyde at concentrations exceeding the action level (0.5 ppm) or the short-term exposure limit (STEL) of 2 ppm. The program consists of a medical disease questionnaire and, if necessary, a medical examination at the time of the initial assignment (baseline) and at least annually thereafter for those employees with exposure above the action level or STEL. In addition, the medical disease questionnaire must be made available to employees with signs and symptoms associated with overexposure to formaldehyde. Medical exams should also be made available to employees determined to need them based on information in the medical disease questionnaire.

The physical examination will evaluate any irritation or sensitization to the skin and the respiratory system. The examination will also include an evaluation for any irritation to the eyes. Employees who are required to wear a respirator must be afforded a baseline and an annual pulmonary function test.

Physical Agents

Exposure to noise, ionizing and nonionizing radiation must be considered in the medical surveillance program as well. Employees at a heliport, laundry facility, landscaping and other support facilities such as woodworking and metal fabrication and maintenance shops are often exposed to noise levels at or above 85 decibels measured on the A scale, for eight-hour time-weighted average, which requires immediate implementation of a hearing conservation program. An effective program would include noise monitoring, annual audiometric testing and annual employee training.

Employees exposed to ionizing radiation must be provided with personal monitoring equipment to monitor their exposure dose. Employees must be informed of the radioactive material or radiation in their work area, safety instructions and devices to minimize exposure.

A medical surveillance program for employees exposed to laser beams may include a preplacement physical examination that includes medical and occupational history (ANSI/LIA). This exam and any periodic medical examinations must focus on an employee's ocular condition. The eye examination may include any past eye injuries or diseases.

Other Employee Safety-Related Issues

Safety of employees at healthcare facilities is an ongoing challenge because of the many new and existing infectious diseases, such as antibiotic-resistant bacteria, severe acute respiratory syndrome and bioterrorism agents, such as anthrax and smallpox. Medical surveillance programs complement engineering and work practice controls and PPE. Clear policies must be established and implemented to encourage employees to report any signs and symptoms of work-related illness. Procedures must also cover post-exposure evaluation and follow-up, treatment and isolation precautions for the affected employee.

Conclusion

A comprehensive medical surveillance program is essential for protecting employees in a healthcare facility. It allows for early detection of any changes in employees' health status relevant to occupational exposure and helps administrators implement the necessary interventions to prevent a serious occupational illness. It is augmented with other prevention methods such as workplace vaccination and post-exposure evaluation and follow-up procedures. ■

References

ANSI/LIA. American National Standard for Safe Use of Lasers. Z136.1-2000. Orlando, FL: Laser Institute of America, 2000.

Bureau of Labor Statistics (BLS)(a). "Workplace Injuries and Illnesses: Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Selected Industries and Case Types, 1996-2002." Washington, DC: U.S. Dept. of Labor, BLS, 2003.

BLS(b). "Workplace Injuries and Illnesses: Incidence Rates for Nonfatal Occupational Injuries Involving Days Away from Work per 10,000 Full-Time Workers by Industry and Selected Events or Exposures Leading to Injury or Illness." Washington, DC: U.S. Dept. of Labor, BLS, 2001, 2002.

Centers for Disease Control and Prevention (CDC)(a). "Guidelines for Preventing the Transmission of Mycobacterium Tuberculosis in Healthcare Facilities." *Morbidity and Mortality Weekly Report.* Oct. 28, 1994: 8-49.

CDC(b). "Immunization of Healthcare Workers." *Morbidity and Mortality Weekly Report.* Dec. 26, 1997: 3-4.

CDC(c). "Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV and HIV, and Recommendations for Post-Exposure Prophylaxis." *Morbidity and Mortality Weekly Report.* June 29, 2001: 1-32.

McDiarmid, M. "Medical Surveillance for Antineoplastic Drug Handlers." *American Journal of Hospital Pharmacy.* May 1990: 1062-1064.

NIOSH(a). *Preventing Needlestick Injuries in Health Care Settings.* NIOSH Publication No. 2000-108. Washington, DC: U.S. Dept. of Health and Human Services, CDC, NIOSH, Nov. 1999.

NIOSH(b). *Preventing Occupational Exposure to Antineoplastic and other Hazardous Drugs in Healthcare Settings.* NIOSH Publication No. 2004-102. Washington, DC: U.S. Dept. of Health and Human Services, CDC, NIOSH, 2004.

OSHA(a). "Controlling Occupational Exposure to Hazardous Drugs." Section VI, Chapter 2. *Technical Manual.* Washington, DC: U.S. Dept. of Labor, OSHA, 1999.

OSHA(b). Occupational Exposure to Bloodborne Pathogens. 29 CFR 1910.1030. Washington, DC: U.S. Dept. of Labor, OSHA, 1991.

Perry, J., et al. "2001 Percutaneous Injury Rates." *Advances in Exposure Prevention.* 6(2003): 32.

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