Medical Surveillance in Work-Site Safety and Health Programs

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Businesses frequently call on family physicians to provide employee health services at the work site or in the clinician's office. These services include medical screening (detection of dysfunction or disease before an employee would ordinarily seek medical care) and medical surveillance (analysis of health information to identify workplace problems that require targeted prevention). Such services can transform acute care and routine screening activities into opportunities for primary prevention when they are integrated into the broader framework of work-site safety and health programs. Components of these programs include management commitment, employee participation, hazard identification and control, employee training and program evaluation. For optimal program success, family physicians must communicate with frontline safety officers and have first-hand knowledge of the workplace and its hazards. Professional and technical resources are available to guide the family physician in the role of medical surveillance program coordinator.

Occupational medicine is the branch of preventive medicine devoted to the prevention and management of occupational injury, illness and disability, and the promotion of health and productivity of workers.[1] The family physician who provides occupational medicine services must maintain continuous vigilance for signs of prevention failure. To be an effective participant in an employer's health and safety program, the family physician must visit the work site, observe the jobs being performed, review known hazards with knowledgeable staff, review established legal requirements for medical surveillance, screening and prevention, and talk with employees.[2–5]

Primary Prevention in the Workplace

Primary prevention in the workplace (i.e., preventing known hazards from coming into contact with vulnerable employees) depends on appropriately implemented engineering and administrative controls. For example, properly functioning fume capture hoods and ventilation design can prevent exposures to lead, known effective exhaust ventilation for silica can prevent silicosis, and creative ergonomic materials handling design can reduce the probability of upper-extremity cumulative trauma disorders and reinjury. Family physicians who are involved in occupational medicine services have a unique opportunity to sound an alarm when a workplace has a problem.

Medical Screening and Surveillance

Medical screening is a valuable tool for secondary prevention in the workplace. Screening can detect disease or dysfunction before medical care would ordinarily be sought. Screening tests are administered to asymptomatic persons who are at risk for certain diseases or adverse health outcomes.

Screening has a clinical focus, and its fundamental purpose is early diagnosis and treatment of the person. In some settings, medical screening also affords an opportunity to identify new instances of occupational injury or illness, assess fitness for duty and evaluate the efficacy of personal protective measures.

Employee medical surveillance is an additional strategy for optimizing the health status of persons who work in settings where hazards exist. Medical surveillance involves a careful search for unexpected outcomes that might herald new or uncontrolled hazards in the workplace. It most often refers to the systematic collection, analysis and dissemination of health information on groups of workers.[6,8] For medical surveillance to be an effective warning mechanism, it must be connected to preventive safety and health actions.

Classic examples include hearing-threshold shifts on audiometric testing and rising blood lead levels. Injury data suggesting patterns of tenosynovitis or epicondylitis in particular production areas constitute an important and frequently overlooked source of surveillance information. Similarly, a single case can trigger an alarm in an astute physician. However, eliciting potential workplace connections requires awareness and inquiry into the patient's occupation. Such cases, called “sentinel events,” are also a form of medical surveillance.[9]

Once information about potentially work-related adverse health events is communicated to work-site health and safety personnel, previously unidentified workplace hazards may be discovered. Some notable historical exposure-effect relationships have surfaced in this way. Examples include the relationship between vinyl chloride and hepatic angiosarcoma[10] and the relationship between the pesticide dibromochloropropane and reduced sperm counts.[11] A single case of noise-induced hearing loss might be the trigger for intensified noise abatement.

A comprehensive medical surveillance program contains many different elements. The family physician can facilitate the development and maintenance of a program by securing written management commitment from the employer, determining what specific medical testing is appropriate and what is required by law, educating employees and management about the purpose and benefits of the medical screening elements, reviewing the data collected, communicating results and periodically reviewing the program.

Screening and surveillance serve different but complementary roles in preserving and protecting the health of employees. Effective work-site health and safety programs should include both strategies as a means to evaluate program effectiveness. The family physician has an important clinical role in carrying out both medical screening and surveillance.

Developing a Medical Surveillance Plan

HAZARD ASSESSMENT

Development of a medical screening and surveillance plan is based on an assessment of the physical, biomechanical, biologic and/or chemical hazards to which employees may be exposed and which have the potential to cause adverse health consequences. The family physician can assist in this process by visiting the work site and interviewing health, safety and production personnel, as well as the involved employees.

The physician should observe the work processes in their entirety, evaluate job tasks, review material safety data sheets of relevant chemicals, discuss personal protective measures, conduct a medical literature review as needed and investigate all other relevant information necessary to achieve a full understanding of the hazards and exposures that are present. Published hazard exposure limits are available from a number of governmental and nongovernmental sources *(Table 1)*.

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TABLE 1

Sources: Published Exposure Limits

Occupational Safety and Health Administration (OSHA)

Permissible exposure limits (PELs) and a guide to OSHA standards for screening and surveillance

200 Constitution Ave. NW

Washington, DC 20210

Telephone: 202-693-2300

Web site: http://www.osha.gov (http://www.osha.gov)

American Conference of Government Industrial Hygienists

Threshold limit values (TLVs) and biological exposure indices (BEIs)

1330 Kemper Meadow Dr.

Suite 600

Cincinnati, OH 45240

T[illegible] 513.742.2020

EMPLOYEE ELIGIBILITY DETERMINATION

For certain chemical substances, medical surveillance, including which employees must be enrolled, is prescribed by law.[12,14] Standards are set by the Occupational Safety and Health Administration (OSHA).[15]

When OSHA has set no standards for a specific substance, the principal employees to include in screening and surveillance programs are those at risk for adverse health effects as a result of definite or anticipated exposure to the substance. The employer, along with the family physician, must assess all employees when deciding which ones should be assigned to the high-risk group (*Table 2*). Employees assigned to a high-risk group because of their a priori risk of disease or dysfunction should be enrolled in proactive screening on a periodic and continuing basis.

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TABLE 2

Factors in Assigning an Employee to a High-Risk Group for Surveillance

Type(s) of exposure
Dose or level of exposure
Duration of exposure*
Likelihood of exposure
Consequences of exposure

Anticipated frequency of exposure

**—Short-term, high-level exposure may result in different clinical outcomes than long-term, low-level exposure.*

SCREENING ACTIVITIES

The family physician is often called on to provide and coordinate screening of employees.[5,16] Typically, the physician's responsibilities involve hands-on physical assessment or ancillary testing. Tasks might include, for example, performing preplacement or periodic spirometry on employees wearing negative-pressure half-face respirators for work in the finishing section of an automobile repair shop, obtaining blood cholinesterase levels in employees who work with pesticides in a landscaping business, obtaining annual complete blood counts and electrocardiograms in oncology nurses who are exposed to toxic chemotherapeutic agents, or performing skin examinations on members of a road-paving crew with seasonal exposure to asphalt, tar, creosote and other hydrocarbon materials.

In the context of work-site safety and health programs, the employer may ask the family physician to perform nonclinical tasks, such as helping to design appropriate screening content or an overall surveillance strategy. In designing screening content, the physician should refer to standard clinical preventive screening resources[17–19] and, when necessary, occupational screening guidelines.[20]

Attention to sensitivity, specificity and predictive value is particularly important in occupational screening programs. Times when screening should be considered are listed in *Table 3*. According to a position statement from the American College of Occupational and Environmental Medicine, medical surveillance should not be used for the purposes of hiring and firing.[21]

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TABLE 3

Screening Intervals

At the time of first hire or first exposure (preplacement or baseline)
Periodically as required by regulation or as recommended by the physician
When exposure or employment ends (termination)

After accidental or unanticipated exposure

In complex situations, additional expertise may be sought from board-certified occupational medicine physicians, toxicologists or epidemiologists. Health professionals knowledgeable in the field of occupational medicine can be found through various professional organizations and other associations (*Table 4*).

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TABLE 4

Occupational Health Professional Organizations and Associations

American College of Occupational and Environmental Medicine

Organization of physicians who champion the health and safety of workers, workplaces and environments

1114 N. Arlington Heights Rd.

Arlington Heights, IL 60004-4770

Telephone: 847-818-1800

Web site: http://www.acoem.org (http://www.acoem.org)

Association of Occupational and Environmental Clinics

Nonprofit organization committed to improving the practice of occupational and environmental health through information sharing and collaborative research. Associated clinics have agreed to a specific list of policies regarding patient rights.

1010 Vermont Ave. NW

Suite 513

BIOLOGIC MONITORING

In the context of surveillance, biologic monitoring refers to the collection and analysis of blood, urine, sputum or other body fluids and tissues to look for evidence of exposure to chemical hazards in the workplace.[22] Depending on the chemical of interest, biologic monitoring may evaluate the unchanged chemical in body fluids, a metabolite of the original chemical, an enzymatic alteration, a physiologic effect or a secondary clinical finding. Examples include obtaining a blood lead level and/or zinc protoporphyrin level in a worker with known lead exposure, obtaining a urinary phenol level in a worker with benzene exposure and obtaining a red blood cell cholinesterase level in a worker with organophosphate pesticide exposure.

The American Conference of Governmental Industrial Hygienists publishes guidelines and reference values (biologic exposure indices) for biologic monitoring.[23]

Communicating Results

Feedback of individual and group results completes the surveillance cycle. The family physician who is involved in a work-site medical surveillance program must communicate results to several stakeholder groups. In doing so, confidentiality must be ensured.[24]

The family physician should prepare a written individual summary report for each employee who participates in the medical surveillance program. A copy of this report, which might be entitled “Disposition Statement,” “Physician's Written Opinion” or something similar, should be given to the employee and explained in detail. The employer should be given a similar report but with confidential clinical information “blinded.” The following information should be covered in the employer's written report on an employee: the employee's fitness for duty; the employee's medical capability to wear personal protective equipment; recommended medical removal protection, if appropriate; comparisons with previous medical screening and surveillance data; clinical follow-up recommendations; and recommended accommodations relating to the Americans with Disabilities Act.

Collective findings for the employee group(s) enrolled in the surveillance program should be condensed into a feedback report. The group report should address overall findings and trends (normal or abnormal), as well as information on sentinel health events or clusters of employees demonstrating some abnormal facet(s) of health. Recommendations for strategies to prevent or reduce the likelihood of adverse health effects should also be included in the report. To ensure confidentiality, the physician should use job codes, job titles or other exposure surrogates instead of the names of individual employees.

Periodic meetings should be held to discuss group findings and their relevance to work-site hazards. These meetings should include relevant employer representatives, such as personnel involved in industrial hygiene, safety, environmental issues, on-site medical provision and management. It is

imperative that the coordinating family physician participate in these meetings. These forums provide the greatest opportunity for a meaningful exchange of information between the clinician and the work site, as well as the integration of surveillance program parts into the whole.

The group findings should also be presented orally or in writing to the employees. An opportunity for discussion should be provided.

The goal of the feedback process is to ensure that the activities of the family physician performing screening tasks are linked to the rest of the surveillance effort. The feedback process facilitates and encourages continuous review of work-site exposures and the health outcomes of such exposures, and it also provides a mechanism for continuously improving health and safety performance. As appropriate, action-planning steps should be established to remedy matters of concern.

Program Quality

Assuring quality in a medical surveillance program is essential to its success. Quality assurance begins with the employer identifying an appropriately trained and experienced physician to engage in the program. Desired physician credentials include evidence of specific training and experience in occupational health. Nonphysician occupational health professionals should be similarly trained and experienced.

As mentioned previously, family physicians are often called on, preferentially or out of necessity, to participate in work-site surveillance programs. Physicians with an interest in this area can obtain additional training.

A second element in continuous quality improvement is data collection (i.e., ancillary tests, biologic monitoring) that conforms to recognized standards of acceptability, reproducibility, calibration and technician certification. For example, spirometry should be performed in accordance with the American Thoracic Society's criteria for acceptability and reproducibility,[25] and testing should be done by personnel who have taken an instructional course approved by the National Institute for Occupational Health and Safety. Audiometry should be performed by technicians with training from the Council on Accreditation of Occupational Hearing Conservation, and laboratories that analyze biologic samples should have certification from the American College of Pathologists.

The family physician who is overseeing the surveillance effort must take the lead in ensuring that quality issues relating to medical screening and surveillance are adequately addressed. This step is important because when otherwise healthy persons are screened, end points of significance are usually more subtle than they are in overtly symptomatic persons. Adhering to available guidelines also facilitates epidemiologic review because of the quality and integrity of the data obtained.

Generic Safety and Health Programs and Medical Surveillance

OSHA has announced its intention to publish its version of a generic safety and health program sometime in the year 2000. The draft version[26] does not include explicit required medical surveillance but notes that medical screening and surveillance are legitimate examples of information that can be used to help understand the effectiveness of safety and health programs.

The Authors show all author info

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