Proceedings of the Asbestos Symposium for the Countries of Central and Eastern Europe

4–6 December 1997, Budapest, Hungary

PEOPLE AND WORK • RESEARCH REPORTS 10

Screening and surveillance of workers exposed to asbestos

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Introduction

Diseases resulting from overexposure to asbestos persist in both industrialized and developing countries, despite substantial knowledge about both their causes and the means for their prevention. **Disease prevention can be achieved through control of worker exposure by application of engineering principles.** Control technologies can be supplemented by administrative strategies and the use of personal protective equipment. Medical screening and surveillance are secondary strategies which are also integral parts of an overall disease prevention strategy. Medical screening and surveillance can be useful additions to aggressive primary prevention efforts directed toward exposure control. Any particular programme for health screening and surveillance will reflect the specific work circumstances as well as the general legal and economic environment in which it is established.

This paper is an effort to provide information useful for the establishment of an effective health screening or surveillance programme. This material has been drawn from a more comprehensive document which has been published recently (1).

Definitions

Medical screening denotes the use of medical testing for presumptive identification of disease in an individual at a time before medical care ordinarily would be sought, and when an available intervention can favourably affect the health of the individual. Medical screening is the administration of a test or series of tests (such as laboratory tests, medical examinations, and questionnaires) to individuals in order to detect organ dysfunction or disease at a point when intervention, such as reduction or elimination of exposure and/or medical treatment, would be beneficial. Positive screening tests may indicate the presence of disease or a strong likelihood of disease and the need for confirmatory testing. Screening is conducted before an individual would normally seek medical care and should detect disease in a "preclinical" stage. Goals of medical screening in a particular workplace may vary. However, the ultimate goal of medical screening should be the secondary prevention of disease, i.e., the identification of illness at a stage when its evolution can be reversed, arrested, or slowed.

Medical screening is intended to benefit the individual worker; however, medical

screening may also be used to benefit other workers in the same or similar workplaces if cases of occupational disease are seen as "sentinel events". In these instances, the recognition of an occupational disease such as asbestosis indicates that exposure controls have failed and further investigation is warranted. Investigation of the workplace and of the health of co-workers can lead to the discovery of previously unrecognized disease, the identification of offending exposures, and ultimately reduction or elimination of hazardous work circumstances.

Detection of disease in an individual through medical screening indicates deficiencies in environmental controls that might otherwise go unnoticed. Periodic medical screening of workers must be tied to intensive efforts at environmental monitoring and control.

Surveillance involves the periodic collection, analysis, and reporting of health-relevant information for purposes of prevention. In contrast to individually-directed screening, surveillance is directed toward improvement of health in populations and is an essential component of public health practice.

Medical surveillance involves the use of health screening data for surveillance purposes. It is distinguished from hazard surveillance. Surveillance involves the periodic collection, analysis, and reporting of health relevant information to assist in disease prevention. Surveillance systems are established to achieve one or more of the following goals:

- Tracking trends in disease incidence across industries, over time, and between geographic areas
- Defining the magnitude or relative magnitude of a problem
- Identifying new hazards, risk factors, or at-risk populations
- Targeting interventions
- Evaluating prevention efforts/interventions

Medical screening information can be the raw data of a surveillance system if the screening data are collected over time, analysed periodically, and reported to those in a position to advocate or act in support of change, as well as to those exposed. Other data of potential use in quantifying illness and injury include workers' compensation claims, health insurance statistics, government records of worker illness and injury, hospital discharge information, disease registries, national health surveys, death certificates, and physician reporting. Effective health surveillance systems are characterized by their simplicity, flexibility, acceptability, and timeliness. Surveillance systems should be sensitive indicators of the level of disease in the population at risk.

Ultimately, the utility of medical surveillance is related to programme participation and the adequacy of data collection, analysis, dissemination, and intervention. Surveillance programmes are incomplete without application of data to efforts at disease prevention and control. Disseminating such information so that it is generally available is an important step in achieving its application to prevention and control. Reports which are exclusively internal in administrative agency, company, or union files do not fulfil this goal. The value of a surveillance system increases the longer it is in place, due to the cyclical process of data collection, analysis, and reporting.

Disease and test characteristics

In order to be a reasonable target for medical screening, a disease should cause significant morbidity or mortality, must be identifiable at a presymptomatic stage before the individual would ordinarily seek medical care, must respond to an acceptable, available, effective intervention or treatment and must be prevalent in the population undergoing screening.

The tests used must be acceptable to those at risk for disease, have acceptable sensitivity, specificity, and predictive value in the screened population, be available at reasonable cost, and be sufficiently standardized to be performed with consistency, accuracy, and reproducibility.

The diseases caused by exposure to asbestos fibres include asbestosis, pleural fibrosis (with discrete or diffuse pleural thickening), benign pleural effusions, chronic bronchitis, chronic airflow limitation, malignant mesothelioma, respiratory track cancers, and gastrointestinal cancers (2). Of these, all but pleural plaques and benign pleural effusions are potential targets for screening. Tests which have been proposed and evaluated for screening include questionnaires, physical examinations, chest radiography, other imaging techniques such as computerized tomography, measures of lung function, sputum examination, bronchoscopy and broncho-alveolar lavage, and stool examination for occult blood.

The degree of asbestosis, chronic bronchitis, and airflow limitation in asbestos-exposed workers are related to the intensity and duration of exposure, even though all conditions can progress following the cessation of exposure to asbestos. Theoretically at least, the progression of these conditions may be reduced if exposures are stopped after early identification. Many therefore use conventional radiographs with standardized interpretation using the ILO system for classification of radiographs for pneumoconiosis (3) and periodic spirometry along with questionnaires to screen for these conditions. Newer imaging techniques have not been sufficiently standardized nor has their use been validated as providing superior information to the conventional radiograph, although this may change as technologies improve. Currently their use is not recommended for screening. Bronchoscopy is excessively invasive, and the use of sputum cytology has not been demonstrated to add value to screening programmes on a mass basis. Malignant mesothelioma has not been sufficiently responsive to available therapies to justify screening. The benefits of screening for respiratory tract cancers have been difficult to demonstrate to date. Large bowel cancer does respond to early intervention, and screening has been successful in some populations. Cultural or educational factors may influence the acceptability of the test. Test sensitivity and specificity vary with specific methods and test kits employed and may also be influenced by other factors such as diet, drug use, alcohol consumption patterns, and rates of intestinal parasites.

While the sufficient benefit to the individual to justify mass screening for asbestos-related diseases may not have been demonstrated, there have been successful population-based prevention programmes built on ongoing surveillance of exposed workers with aggressive workplace interventions when any disease is identified.

Programme elements

In addition to focusing on appropriate disease(s) and identifying reasonable tests to use in screening for these diseases, other issues must be addressed before the establishment of a program of medical screening, including:

The **availability of suitable personnel** to administer screening tests and interpret results, and appropriate equipment, staff, and facilities to perform, interpret, and follow-up on tests

- The **frequency** of screening examinations
- The appropriate **dividing point** between normal and abnormal for the screened population
- **The actions that will be taken following abnormal test results, including:**
    - Confirmation of the test result
    - Notification of workers in writing of the test results and their significance
    - Notification of employers and workers of aggregate results with personal identifying information removed from test information
    - Workplace reevaluation and modification
    - Reduction of exposure for the affected worker
    - Worker and employer education
    - Medical care/treatment and follow-up counselling
    - Notification of other workers in similar industries also at increased risk of disease
- The level of risk, if any, from the testing programme
- The perceived value of the overall programme to workers
- Resources available.

In addition to the appropriate selection and performance of medical tests, an occupational medical service engaged in screening or surveillance activities must make provision for the following programme components:

- **Qualified occupational health professionals**

- **Recordkeeping**

Medical records should be kept in a secure and confidential manner, separate from general personnel and employment records. Records should be comprehensive, including information obtained over time from periodic examinations. Employee exposure information should be part of the programme record. Surveillance programmes must develop and maintain a record system of occupational exposure and medical screening data so that group data, time and group trends, and comparisons over time and between categories of workers can be retrieved and analysed in an ongoing and timely fashion.

- **Quality assurance**

Performance of medical testing requires ongoing systematic quality assurance in order to increase the accuracy and validity of test results and to promote comparability of results over time. The latter is critical for programmes of surveillance where group secular trends are of particular interest. Records of quality assurance, technician training, and equipment maintenance should be retained.

- **Confidentiality**

Concerns about confidentiality and the potential adverse consequences for employment that could result if individual test data are inappropriately disseminated may discourage workers from accepting important services. *The International Code of Ethics for Occupational Health Professionals* adopted by the International Commission on Occupational health (ICOH) provides the following guidance:

The obligations of occupational health professionals include protecting the life and the health of the worker, respecting human dignity and promoting the highest ethical principles in occupational health policies and programs. Integrity in professional conduct, impartiality and the protection of the confidentiality of health data and of the privacy of workers is part of these obligations (4).

Recommendations

Prevention of diseases resulting from exposure to asbestos in the workplace depends primarily on compliance with health protective exposure limits, strongly supported by effective legal standard setting and enforcement. Health screening can benefit workers experiencing adverse effects from cumulative exposures under past and current conditions and can be a useful supplement to primary prevention efforts. Surveillance activities can track trends in disease incidence, identify areas for intensive intervention, and aid in the evaluation of prevention efforts.

Preventive efforts are enhanced by the periodic collection, analysis, and reporting of medical screening data. Hence, it is strongly recommended that surveillance programmes be implemented or maintained in conjunction with all screening programmes.

When current or past exposures to potential hazardous levels of asbestos are confirmed, medical screening and surveillance for non-malignant diseases should be considered. All workers at risk of disease resulting from their exposure, based on the best available evidence, should be included in the screening programme, although resource limitations may dictate inclusion of only those at greatest risk based on current exposure monitoring and past exposure estimation.

Since health surveillance is a critical public health tool for disease prevention in populations of exposed workers, the availability of the programme should be legally mandated, with enforcement efforts tied to programme performance. Depending on circumstance, the employer or a government agency should be responsible for making arrangements for the surveillance of the health of workers. In countries where participation is voluntary, disincentives to participation should be identified and removed, and incentives for participation should be considered. All programmes should aim at achieving complete participation.

Test frequency should depend on the level of health risk based in part on an assessment of the intensity and duration of current and past adverse exposures and disease patterns in the population. Although it might be ideal to quantify exposure on the basis of occupational hygiene data and develop test schedules based on such an exposure index, this is rarely, if ever, possible. Test schedules, including the frequency of testing following cessation of exposure, inevitably reflect local circumstances. The availability of resources for the performance, analysis, and reporting of test results may influence test frequency, as testing should not be substituted for aggressive exposure monitoring and control.

An expert committee assembled by the World Health Organization with the cooperation of the International Labour Office formulated general recommendations for screening of mineral dust exposed workers, based on the assumption that workers were initially free of symptoms or signs of disease, and that effective exposure controls are in place. The committee recommended the following testing for early detection of non-malignant respiratory disease in asbestos exposed workers:

A chest radiograph [classified using the ILO method (3)] should be performed at baseline, then every three to five years for workers with less than 10 years since first asbestos exposure; every 1 to 2 years for workers with over 10 years since first asbestos exposure; and annually for workers with over 20 years since first exposure. Frequency may be adjusted depending on the age of the worker and duration of dust exposure. A radiograph classified as ILO category 1/0 is considered abnormal. Ideally a respiratory symptom questionnaire, physical examination, and spirometry should be performed annually; alternatively, they should be performed at the same frequency as the chest radiograph. Ideally, health surveillance should be lifelong.

No single set of guidelines is applicable to all situations. Generally, the feasibility of adopting a particular programme will depend substantially on the specific conditions of the country, region, or industry in which the programme will be conducted. No matter what the specific circumstances, however, it is critical that programmes for screening and surveillance should only be implemented after effective measures for primary disease prevention such as engineering controls of hazardous exposures and hazard monitoring are in place.

References

1. Wagner GR. Screening and surveillance of workers exposed to mineral dusts. Geneva, World Health Organization, 1996.
2. Wagner GR. Asbestosis and silicosis. Lancet 1997;349:1311–5.
3. International Labour Office. Guidelines for the use of ILO International Classification of Radiographs of Pneumoconioses. Geneva, ILO, 1980.
4. International Commission on Occupational Health. International Code of Ethics for Occupational Health Professionals. Singapore, International Commission of Occupational Health, 1992.

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