VI. Hazard Surveillance in Occupational Disease

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Introduction

Definition and Description of Overall Objectives

Hazard surveillance is the assessment of secular trends in exposure to toxic chemical agents in the workplace and to other hazards responsible for disease and injury. In a public health context, hazard surveillance identifies work processes or individual workers exposed to high levels of specific agents in particular industries and job categories. This enables timely intervention that will prevent occupational illness and its attendant morbidity and mortality.

As with disease surveillance, a hazard surveillance strategy is developed in three distinct steps: 1) data collection, including information on industry demographics, patterns of chemical use, and workplace exposures; 2) method development and data analysis; and 3) preventive action.

First, data collection on industry demographics should include the use of systematic industry codes, e.g., the Standard Industrial Classification (SIC), job categories, details on the industrial process, and related information on unionization, age of the facility, and the size of employment. Hazard information includes the identity and quantity of chemicals in use. Second, an analytic method must be created for evaluating the demographic, exposure, and toxicity information to meet surveillance objectives. For public health intervention, the hazard data should also include exposure as a function of job category or occupation. Finally, the outcomes of analysis should be tied to developing preventive actions that will limit exposure and thereby reduce the incidence of occupational disease and mortality.

When problems are identified, this information will enable development of intervention strategies that range from fine tuning of industrial hygiene controls to regulatory activity. The data will help characterize problems and assess the effectiveness and impact of overall prevention or regulatory strategies. Data on the extent of exposure to a given substance can also clarify the magnitude of the occupational disease burden associated with that substance. To predict future burdens from occupational disease would require data on dose-response relationships, disease endpoints, quality of the evidence, and the time-course of resulting illness and disease from exposure to a particular substance.

Intervention and prediction of the burden of occupational disease are two principal objectives of hazard surveillance. Exposure data must be considered when planning the use of resources, e.g., targeting inspections, planning such clinical services as emergency room capability, and developing targeted educational programs. Finally, in certain circumstances the data may provide information for epidemiologic studies that will evaluate dose-response relationships and suggest further research where the level of suspicion is insufficient to require intervention.

Benefits of Hazard Surveillance

Hazard surveillance is timely in identifying populations at risk of occupational diseases associated with continuous exposure (predominantly diseases with relatively long latency periods). Identifying workers at risk by assessing exposure may substantially reduce the burden of occupational disease through early intervention to reduce exposure. Surveillance techniques for chronic disease lack this primary-prevention aspect of hazard surveillance.

Where exposure data are as detailed as the job category level, hazard surveillance permits identifying exposures at the industrial-process level. This is important for identifying and evaluating control strategies. It also helps identify the number of employees per job category so that proportional sampling will allow determination of general exposure patterns and the burden of occupational disease. Identifying exposures by job categories can also help reduce misclassification in epidemiologic studies that rely on historical sampling data. Comparing hazard surveillance data across job categories in a particular environment enables the most problematic exposure areas to be identified and forms the basis for follow-up activity. Exposure data over time are widely significant for identifying both the continuing adequacy of control strategies and poorly controlled exposures across an industry or specific job category. Hazard surveillance complements the surveillance of occupational disease. The 1977 report* of a NIOSH task force on surveillance, chaired by Dr. Alexander Langmuir, concluded:

> "The surveillance of hazards and diseases cannot proceed in isolation from each other. The successful characterization of the hazards associated with different industries or occupations in conjunction with toxicologic/medical information relating

NOTE: Author affiliations and addresses are listed on p. 7.

*Craft B, Sundin G, Spirtas R, Behrens V: Draft report of a task force on occupational health surveillance. Cincinnati: National Institute for Occupational Safety and Health, 1977. (Unpublished) to the hazards can suggest industries or occupational groups appropriate for epidemiologic surveillance.

"Conversely, unusual health patterns in certain industries or occupations elucidated by surveillance of health effects will be more fully explained by surveillance of the potentially causative agents. A few disease entities are sufficiently cause-specific to diminish the need for hazard surveillance. Some agents are sufficiently effect-specific to make the task of illness surveillance relatively straightforward. There is a vast middle ground where exposures are complex and health effects diverse, that lends itself to resolution only through the combined efforts of cause-and-effect surveillance."

Existing Data Systems for Hazard Surveillance

National Occupational Hazard and Exposure Surveys

NIOSH pioneered the first approach to hazard surveillance in developing and applying the National Occupational Hazard Survey (NOHS) and the more recent National Occupational Exposure Survey (NOES).[1] These systematic surveys of industries resulted in exhaustive lists of substances and an estimated number of workers exposed. They are the only comprehensive attempts to date to estimate the nature and distribution of hazardous materials in industrial and commercial work environments. Cohort studies can have great value when NIOSH has identified substances that are used significantly in industry and for which there are toxicologic but limited human data. The survey data can also help direct epidemiologic investigations to the work locations most suitable for studying the health effects of particular substances.

The only industrial hygiene measurements of exposure in the two NIOSH surveys involved noise levels; chemicals identified in the surveys for each industry represented only potential exposures. NOHS recorded whether exposures were subject to engineering controls, whether personal protective equipment was required, and whether potential exposure of workers was full-time or part-time.

OSHA Integrated Management Information System

The second approach to hazard surveillance involves using computerized exposure information gathered in the Occupational Safety and Health Administration (OSHA) Integrated Management Information System (IMIS) during OSHA compliance investigations.†[2,3] This data set has the advantage of being the only computerized data available in the United States that include actual levels of exposure. To date, OSHA has used IMIS data only to establish inspection priorities.

Between 1972 and 1979, exposure measurements in broad categories for OSHA-regulated substances were recorded only as proportions of the permissible exposure limit. Since 1979, actual exposures have been included, as has the job title (uncoded) of the worker sampled.

The series of files in IMIS are linked by inspection number and contain information on the facility inspected, the inspection itself, test samples taken (both direct reading and laboratory samples), and any citations issued. Other information includes the name and address of the facility; the standard industrial classification (SIC); inspection type (e.g., general schedule, complaint, or follow-up); and demographic variables such as geographic region, total employment of the facility, number of workers affected by the inspection, and union status of the facility.

IMIS consists of various reports and records of federal OSHA inspections, but neither the Mine Safety and Health Administration (MSHA) nor most states with OSHA programs of their own contribute data to this system. Although "state plan" states must provide such data to meet the requirement that they be "at least as effective as" federal OSHA, the pace of compliance has been slow. Thus, surveillance of silica exposures in the stone quarrying and cutting industry, located predominantly in Vermont and North Carolina, cannot be accomplished using IMIS. Also, silica exposures in foundries cannot be accurately estimated because such states as Michigan, with a large workforce employed in foundries, are not part of IMIS. At some time in the future, all states are expected to contribute to IMIS.

Coal Mine Sampling Data from MSHA

The Mine Safety and Health Administration supervises a sampling program[4a,4b] that is, in certain respects, ideal for hazard surveillance. The MSHA exposure assessment program covers virtually all underground and surface coal miners who are exposed regularly or intermittently to coal dust. The frequency for exposure monitoring depends on the potential exposure level, but it is usually more often than quarterly. Individual companies collect the samples using approved sampling techniques and send them to an MSHA center for measurement and recording. Because all samples are reported continuously to the regulatory agency, these data can be used for hazard surveillance in their present form. Currently, approximately 200,000 coal miners employed in approximately 12 large coal mine companies and a large number of smaller mines are covered by this sampling program.

Limitations of Existing Data Collection

Only two databases with potential value for hazard surveillance are currently available in the United States. The limitations of other information sources for chemical use and exposure are described in the report to the Department of Health Services, State of California mentioned earlier in this paper.† The discussion here will focus only on the NIOSH NOES/NOHS and the OSHA IMIS.

NIOSH NOES/NOHS Data

NOHS and NOES identify only potential chemical exposures in work settings. Although these systems can identify the use of a given material, they cannot provide information to determine whether that particular use is within a standard or other pertinent exposure level. Changes in levels cannot be explored on a regular basis, although a comparison of NOHS and NOES may give some indication of change. Estimates of the number of workers associated with use of a substance are possible, but information on only the presence and not the effectiveness of environmental or personal protective equipment is available.

Although these problems were recognized when the surveys were developed, they were offset by the value of these surveys for other uses. These are the most comprehensive systems available that identify where possible exposures may occur, but they cannot be used to characterize exposures for projecting the risk or the potential burden of occupational disease.

†Froines JR, Dellenbaugh CA, Seabrook SS, Wegman DH: A profile of occupational health experience in Los Angeles County, 1984. Los Angeles Southern Occupational Health Center, University of California. (Unpublished report to the Department of Health Services, State of California)

Despite these substantial limitations, the large number of substances identified in NOHS and NOES offer a substantial advantage. This advantage is realized through the use of data in the NIOSH Registry of Toxic Effects of Chemical Substances (RTECS), which covers approximately one-third of the substances found in NOHS and NOES. The other two-thirds not included in RTECS are such things as physical agents, biologic agents, and chronic trauma hazards. An important problem about the scope of data available in RTECS should, however, be recognized. RTECS includes substances believed to be of toxicologic importance to humans, and this involves approximately 80,000 substances. Most of these substances are included, however, because of data derived from examining only acute toxicity. Relatively few substances have been subjected to chronic studies because such studies are expensive and are limited primarily to suspected carcinogens. The agents for which substantial human toxicity data are available are almost all included in the 400 substances regulated by OSHA. They are, therefore, in the IMIS system.

OSHA IMIS Data

Several problems exist with the use of the OSHA IMIS for surveillance. These include:

- The number of chemicals included is limited to only those substances regulated by OSHA (approximately 400). This limitation may not be as important as it first appears, however, because these materials are generally recognized as reasonably widespread in industrial use and as the most hazardous to human health. American Conference of Governmental Industrial Hygienists Threshold Limit Values have been established for all of them. A more important limitation is the unequal attention given to the 400 substances. Indeed, after 15 years of industrial hygiene compliance sampling, 75 percent of the data in the current system relate to only 15 substances.
- There is a limit on the industries investigated. The small staff historically assigned to the OSHA compliance activity has significantly limited the number of workplaces that could be investigated. Thus, only a relatively small proportion of most industries is represented in the database.
- Some states fail to report to IMIS.
- There is a lack of systematic entering into IMIS of *all* data collected in compliance inspections.
- The failure to collect job-title information according to a common system is a serious limitation.
- An uncertainty exists of whether the inspection process, or even the method of selecting industries for inspection, results in data that are reasonably representative. OSHA seeks to assess the compliance with existing standards rather than to determine the overall distribution of exposure to given chemicals in industry. Although IMIS represents the only exposure data available, any possible bias must be evaluated before the value of these data for estimating the overall distribution of exposures can be determined. This, too, may not be as important for surveillance as it seems because identifying and tracking worst case situations focuses attention on problem areas. It does, however, affect the use of these data for estimating the nationwide magnitude of problems with a particular substance.

The OSHA inspection process should be examined before reviewing the use of IMIS data for hazard surveillance. Four criteria are used to select industries for inspection: general inspection schedule, complaints, accident investigations, and follow-ups—the latter two being very small in number. In the past, general schedule inspections have been derived from an algorithm that identifies high priority SICs on the basis of the number and severity of health hazards and employment size. A random-number generator is used within high-hazard SICs to determine the actual inspection order. This limits any inappropriate periodicity in the general schedule over time.

The second and largest category involves inspections in response to complaints. Theoretically, complaints would relate to specific identifiable problems, and violations would reflect the specific problem named in the complaint. Jones and co-workers†† have suggested, however, that complaints may not direct inspectors to the most important exposures. Compliance officers may address only the specific complaint named in an inspection and thereby miss or undersample other important exposures.

The sampling process itself may be a source of bias in IMIS data. OSHA requires that representative jobs be selected and that sampling be conducted for employees having the highest exposures. The knowledge that an inspector is monitoring exposure may, however, affect work practices, the use of ventilation, and other factors that could minimize measured exposures. It is difficult, therefore, to predict whether a set of exposure measurements will over- or underpredict actual exposures. Finally, Jones and coworkers have pointed out that although inspectors are required to report all compliance samples in IMIS, some fail to do so. This could result in an upward bias if the samples not systematically reported showed little or no exposure.

Jones and co-workers have reviewed these issues in some detail. They conclude that the issue of whether a bias exists is ambiguous. Although their empirical results suggest that a reporting bias is not a major problem, they do consider it plausible that some bias occurs in the sampling process. Unfortunately, no test is available using existing data to assess the direction or magnitude of such a bias. It may, in fact, be extremely difficult for industrial hygienists to predict which individuals have the highest exposures (Dr. R. Spear, personal communication). Given such factors as behavior alterations during inspections and the extreme variability among compliance officers in their approach to sampling, it is reasonable to assume that some bias may be present in exposure measurements. However, the magnitude of such a bias has not been measured, and its direction may vary. Additional studies are clearly needed in this area. In the meantime, our own analysis has led us to conclude that IMIS is useful for surveillance.

Both databases described here (NOHS/NOES and IMIS) have potential value despite their acknowledged limitations. Additional research is needed to evaluate further their efficacy for surveillance.

Hazard Surveillance Models

Before discussing alternative hazard surveillance systems, we should briefly discuss other existing data sources

††Jones CA, Weld L, Gary W, Greenlee P, Wiarda E, Chul HJ: Methods for analyzing compliance with OSHA health standards, with application to the asbestos case. Final report 1986 (NIOSH grant no. IR030H02135-01).

that may be useful in hazard surveillance and ways to improve the systems discussed above. A central requirement for developing hazard surveillance models is to determine where information on chemical use and exposure can be obtained.

Chemical Use

Four potential databases are available that might help identify chemical use. The information they provide may, in fact, overlap. The first two have been discussed at length, NOES/NOHS and IMIS. The other two result from the Emergency Planning and Community Right to Know Act of 1986 (within the jurisdiction of the Environmental Protection Agency) and the Hazard Communication Standard (within the jurisdiction of OSHA). The Right to Know Act, passed as part of the Superfund reauthorization, is a potentially rich source that could be explored for data on chemical use, but initially its organization, structure, and accessibility may be a problem. The OSHA Hazard Communications standard requires that employers maintain material safety data sheets for certain chemicals found in particular establishments. The chemicals for which these data sheets are required are listed in references to the standard. Data generated from this standard could constitute an ongoing survey.

Chemical Exposure

IMIS—To maximize the effective use of the IMIS database for surveillance, some of the problems noted above must be addressed. The scope of coverage for the industries inspected should be expanded, and greater attention should be given to the material safety lists employers are required to maintain so that the maximum number of substances to be sampled can be defined. State data should be included in their entirety, and data entries should be complete.

The most difficult problem is the philosophical difference between the goal of OSHA (i.e., determining compliance with standards) and that of surveillance (i.e., assessing the actual distribution of exposures in a workplace). We believe that any bias is limited and that the data are useful for surveillance. Additional sources of information are required that use approaches explicitly designed for surveillance. Meanwhile, it is appropriate that NIOSH and OSHA establish a joint taskforce to determine how the industrial hygiene field manual could be modified to provide greater direction for compliance officers in designing sampling strategies that maximize the potential for assessing variance in the data and for assuring completeness of the gathered data. A systematic approach is also required for collecting job category information.

NIOSH Health Hazard Evaluations

NIOSH industrial hygienists collect a substantial number of samples in many Health Hazard Evaluations (HHEs). Although NIOSH conducts far fewer HHEs than OSHA compliance inspections, the data have both more depth and more within-the-plant breadth. Thus far, this valuable resource has not been used effectively. Results of the HHEs should be organized into an accessible database, and the data should be integrated with information collected by OSHA and stored in IMIS.

The sampling strategy designed for an HHE is fairly similar to that employed by OSHA to define a problem; however, the data collected may not be representative of what would be obtained from a random sample design. It is unlikely that NIOSH could accommodate surveillance needs in the context of conducting HHEs, but small modifications of the sampling protocol and subsequent reporting may facilitate using the data beyond the scope of specific HHEs. Candidates for modification might include information on the number of employees, how many are in specific job categories, the job categories themselves, other exposures, and an estimate of the representativeness of collected data. Information for some of these is already collected, but further consideration should be given to how this rich source of information can be expanded.

Alternative Hazard Surveillance Systems

Environmental Monitoring through the Existing 6(b) Process for Standards

Within the existing framework of work environment standards, a means exists to develop hazard data sufficient for a variety of surveillance needs. Such a system could exploit those sections of the standards that call for environmental monitoring of regulated substances. Currently, this would apply to those materials for which permissible exposure limits (PELs) have been set through the OSHA 6(b) rulemaking process. These substances include acrylonitrile, asbestos, arsenic, benzene, coke oven emissions, cotton dust, ethylene oxide, formaldehyde, lead, and vinyl chloride. These requirements are based primarily on routine monitoring of exposures that exceed a given action level (usually 50 percent of PEL). Currently, no report of this sampling is mandated; the company need only maintain records so that a compliance officer can review them during a compliance visit. If such monitoring data were collected and reported to OSHA in a reliable, systematic, and routine fashion, they could form the basis of an important segment of a hazard surveillance system.

The level of information necessary and sufficient for surveillance can be determined by examining what might be achieved if complete information were available on any given substance. The health risk for most 6(b) substances is usually cancer (only lead and cotton dust are exceptions), and the relevant exposures are usually of the long-term, cumulative type.

Exposure to benzene is a typical example. An ideal data set on benzene would provide specific exposure data for each exposed worker according to that individual's job within the plant and where that job occurred. The information would be specific for each industry that uses benzene within each state or region. If such information were recorded and accessible, it would be possible to determine how many persons were subjected to any level or range of benzene exposure, with the information specific to geographic areas, industries, plants, jobs, and individuals. Problems could be located by geographic region, plant size, type of use, duration of use, etc., all based on characteristics associated with individually recorded exposure measurements.

Although such an ideal set of information is unobtainable, exposure information could be collected on a sample of facilities so that exposure patterns by job category for specific industries could be estimated on a regional or national basis. Reports of workplace exposures could currently be required, for example, from a sample of companies that carry out environmental monitoring to comply with 6(b) standards. Whether surveillance results were used to target prevention efforts or to estimate the burden of occupational disease, some level of detail on job category would be necessary. Other important variables include plant size, the degree of unionization, and plant age (for example, annual capital investment or annual maintenance dollars in relation to the size of the workforce). Such a surveillance scheme is most appropriate for exposures associated with chronic health conditions in which an eight-hour time-weighted average is likely to be the most pertinent environmental measure. Whether it would be appropriate for exposures that cause acute symptoms or disease with short latency in which exposures may involve short-term peaks is yet to be determined.

Unfortunately surveillance was not a goal when OSHA designed environmental monitoring requirements for the 6(b) standards promulgated since 1974. Again benzene is a good example. The benzene standard requires an employer to conduct initial monitoring for benzene exposure. No additional monitoring is required if the initial determination is below the action level, but subsequent exposure monitoring is required if the initial measure is above the action level or the PEL. (The frequency of subsequent monitoring depends on the actual level.) Data from such subsequent monitoring could be used for surveillance if results were weighted to account for differences in sampling frequency and adjusted to account for the population of workers exposed below the action level who will not be sampled periodically.

The use of environmental monitoring data as presently constituted also poses an uncertainty as to what proportion of a work population the measured levels actually represent. In addition, no provision in any of the standards requires an employer to develop a sampling plan that describes the basis of the monitoring strategy. Finally, because environmental monitoring focuses on identifying excessive exposure, a potential lack of representativeness exists.

These problems are not insurmountable, and existing standards could be modified to improve the effective use of these data for surveillance. The generic standard described below relies on a self-conscious design that provides a basis for assessing exposure rather than compliance.

Developing A Generic Approach

Any surveillance system based on standards is currently limited to substances with specific requirements for environmental sampling. PELs adopted from the 1968 American Conference of Governmental Industrial Hygienists Threshold Limit Value (ACGIH TLV) list are not accompanied by any environmental monitoring requirements. Considerable attention has focused on the importance of a standards-completion project that adds requirements (e.g., environmental and biologic monitoring, medical surveillance, respiratory protection, and training) to broaden the scope of consensus standards without conducting individual rulemaking for each substance. If environmental monitoring requirements could be established through a generic monitoring rule, hazard surveillance would be possible for almost 400 chemical substances. Such a generic rule would be of great value in itself, and the additional function it would have for hazard surveillance and for estimating the burden of substance-specific related disease should stimulate serious consideration for its promulgation.

To develop a generic standard, it is necessary to recognize the twofold objectives: compliance and surveillance. To serve both objectives, the organization and frequency of sampling must be considered along with any special requirements of surveillance that go beyond those of compliance. We can reconcile the needs of both objectives in the following proposal.

We propose that environmental monitoring be subdivided into two components: 1) existing environmental monitoring that requires initial monitoring, followed by periodic monitoring when the action level or PEL has been exceeded; and 2) additional environmental monitoring that would be required regularly but less frequently for surveillance. To characterize the full distribution of exposures, these comprehensive surveys would be conducted based on national random samples without regard to the action level.

Compliance

Standards that currently require environmental monitoring for compliance do not specify a formal sampling program nor do they take advantage of a job-category concept. The terms "category" or "exposure zone" derive from the work of Corn and Esman who defined exposure zone as follows: "Employees in a facility are apportioned to exposure zones based on process, work tasks, and contaminant source and removal similarities in such a manner that when a sufficient number of employees are sampled in each zone, the information obtained describes the exposure levels for all employees within a predetermined interval variation and statistical confidence."[5] The term "job group" used throughout their paper refers to the above approach. A compliance objective could be met more satisfactorily if a more rational sampling scheme were specified. The current practice for environmental monitoring relies on professional judgment to identify areas or jobs that may require intensive sampling. It is proposed that judgment be exercised primarily in classifying jobs into categories (exposure zones). When the categories are established and the number of workers per zone identified, a strategy of representative, random sampling weighted toward highly exposed workers in each zone could be carried out. Thus, the first step in developing a generic standard requires that employers review their industrial processes, establish exposure zones, and develop representative sampling strategies.

Regular environmental monitoring could then be conducted according to this plan as required by the standard. Initial comprehensive monitoring would be followed by monitoring at designated frequencies where the action level is exceeded.

Surveillance

A generic standard will also meet surveillance objectives if a representative survey of exposure is conducted periodically in a randomly selected sample of facilities. The number of plants to be surveyed for any given material will depend on the level of detail for which projections are desired.

The sample will necessarily require fewer large plants than small ones, but the plants to be included will be determined by a scheme modeled on one the Bureau of Labor Statistics used to secure estimates of injury and fatality rates. The sampling scheme will likely be based on information about the number of workers per job category per plant size per industry type per state and also on data from NOES for the number of employees "exposed" to each chemical substance.

The sampling unit would be an individual plant. Once selected into the sample, each plant would supply all environmental data collected according to requirements of the specific standard, including defined job categories. The number of plants selected will depend on a) the level of detail desired (national, state, industry type, plant size, etc.); b) size of plant; and c) the number of plants that fall into each size category (e.g. <10, 10–49, 50–249, 250–500, >500 employees).

Data collected through this sampling network would be summarized to provide information on the magnitude of the problem, a means of comparing progress over time, and a means of comparing excesses in exposure for individual substances. Thus, the distribution of exposures could be evaluated for each substance under surveillance, and trends in improvement or deterioration of control could be monitored for each. An evaluation of how each substance compares with other hazardous materials would allow the establishment of relative priorities for intervention.

The hypothetical distribution for four substances is presented in Table 1 as an example of results that might be developed from such a a scheme. Based on these data, 90 percent of the workers exposed to benzene have exposures below the PEL, 75 percent of those exposed to lead are below the PEL, and only 50 percent of those exposed to cotton dust are below. Asbestos exposure, by contrast, has been well controlled, and in this hypothetical case, all but 10 percent of the workers are exposed to less than 15 percent of the PEL.

An obvious concern with data generated this way is the possibility that monitoring will not be conducted appropriately and that test samples will not be evaluated with adequate quality control. To help address these concerns, sampling programs should be evaluated during routine compliance inspections and assistance should be provided at that time to correct inadequacies. To spot check the effectiveness of each program, compliance officers might also collect samples during their routine visits to parallel samples collected in the facility's own program. To ensure adequate quality control, it is proposed that all environmental samples be sent to laboratories that have been certified (for example, by the American Industrial Hygienists Association) and that sample results be copied and sent to OSHA.

TABLE 1—Regulated Substances according to Percent of the PEL (hypothetical data)

	Percent of PEL:			
Percent of Exposed Workers	Benzene (50t)*	Asbestos (2000t)*	Cotton (125t)*	Lead (280t)*
10	10	1	10	5
25	20	5	50	20
50	50	8	100	80
75	80	12	200	100
90	100	15	300	120
100	150	150	600	300

*Estimated number of workers (in thousands) exposed nationally
PEL = Permissible Exposure limits.

Summary and Conclusion

We have reviewed existing data sources available for conducting hazard surveillance. Both the NIOSH NOHS/NOES and the OSHA IMIS can have significant value for hazard surveillance that is designed both to establish priorities for various preventive strategies—including intervention, research, and planning—and to complement disease surveillance. These systems also have certain limitations that affect their overall value in these regards.

We have proposed alternative hazard surveillance systems that would expand the database on actual exposures in the workplace by requiring that industry systematically conduct environmental monitoring for defined substances and then provide the data to OSHA and NIOSH for use in hazard surveillance.

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