EPIDEMIOLOGY OF ARSENIC
SOME COMMENTS ON LONG-TERM HEALTH EFFECTS OF ARSENIC EXPOSURE

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A B S T R A C T

Objectives of the Conference on Arsenic pertaining to the Epidemiology of Arsenic will be discussed. Improved methods for developing occupational health data to enable more rapid identification of adverse health effects related to chemical exposure will be suggested. Also, a model for linking industrial hygiene and medical records will be outlined.

Before introducing the speakers in this session I would like to briefly emphasize several of the stated purposes of this conference. The participants have been asked to evaluate the extent and reliability of available information on the health effects of arsenic. Dr. Russell Peterson's remarks* at the luncheon today attest to the seriousness with which we should approach this subject.

Since a variety of modes of occupational exposure to compounds containing arsenic have long been recognized, the literature available for review is fairly extensive and involves the use of numerous epidemiologic approaches. In evaluating long-term health effects, the following will be discussed by the speakers.

1. An assessment of characterization of work exposure, which may be composed of identification of compounds in the environment, measurement of exposed intensities, including peak exposures, and duration of employee exposure at specific exposure levels, will be reviewed.

2. There should be an acceptable method of defining exposed and control populations.

3. The assessment of health parameters should consider such problems as latency and include a description of the methods used to determine the presence or absence of the health characteristics of interest.

4. Analysis should specify and use co-factors such as age, cigarette smoking history and exposure to other chemicals in defining health risks.

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*See page 285 for Dr. Peterson's remarks

This type of information may be difficult to obtain in many cases; however, the results of studies must be interpreted in view of these kinds of considerations.

Participants have been called upon to discuss the additional data which may be needed in order to make further judgments with respect to the health effects of arsenic and necessary programs for obtaining these data. In this context, I would like to briefly sketch a strategy that has enabled the Dow Medical Department to more efficiently conduct observational studies.

A problem that has received much of our attention is the linking of industrial hygiene data to individual employees, since characterization of the work environment is so important in occupational health studies. Figure 1 diagrams the flow of information between industrial hygiene and medical functions through the personnel system in our company.

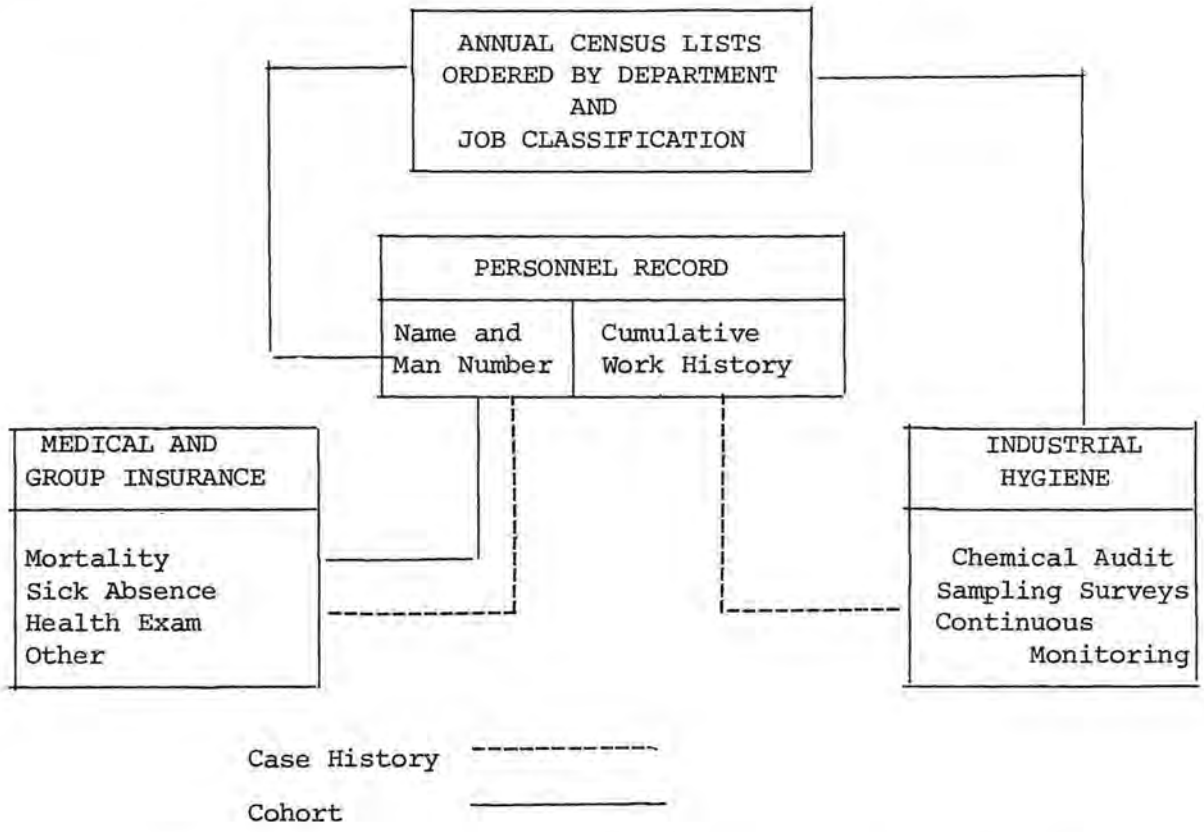

Figure 1 Flow of industrial hygiene and medical information for cohort and case history studies

Personnel records are fundamental to the linking process and two source documents have been particularly important, the periodic census lists prepared for each department and the personnel work record containing the employee's cumulative work history. In carrying out medical surveillance studies, the first step was a thorough review of the existing and planned industrial hygiene work. This usually leads to the identification of areas of concern from which the exposed population can be drawn, using the personnel system. Once the population is defined, work histories and industrial hygiene reports are obtained so that individual exposure histories can be reconstructed. The procedure that I have outlined here has been included in a publication on exposure to arsenicals.

Once exposure data have been linked to the individual, it is generally not difficult to obtain appropriate health data from medical department files, which, in this case, have been partially computerized. Major obstacles limiting our accomplishments to date have been the lack of computerized industrial hygiene information and personnel files, and limited industrial hygiene resources.

Two steps are being initiated to overcome these difficulties. The first step is the involvement of plant personnel in the measurement and evaluation of exposures, and this is being enlarged. It is expected that more complete coverage of the workplace will result if personnel can be called upon to monitor their own operations under the guidance of trained industrial hygienists. Computerization of the monitoring results will be necessary to insure that the data generated will be of maximum use to the medical department in years to come. The second step will consist of computerizing the cumulative work histories of all former and current job changes for each individual during his employment with the company.

The net result of these steps will:

1. Eliminate the tedious manual extraction of work history and exposure information.

2. Provide a mechanism for identifying cohort populations directly from the data base.

3. Provide clinicians with a summary of the exposure history for each employee.

These approaches merit the consideration of industry and will be of value in dealing with many problems of occupational interest. At the same time, it is most important to realize that medical surveillance systems should not be considered a primary line of defense against occupational health hazards. Animal toxicology, good engineering practices, and employee education are fundamental to assure a safe work environment.

With these remarks, I would like to introduce the first speaker, Mr. Warren Ferguson, Director of Occupational Safety and Health at the Allied Chemical Company. Mr. Ferguson.

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