Data Recording System for Industrial Hygiene Information
—Environmental Condition Records and Medical Examination Records of Workplaces—

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Abstract: A surveillance system for gathering and analyzing working environment measurement records as well as the medical examination records kept in most workplaces every year has been implemented. With few exceptions, these records have never been adequately used as statistical data being processed by a central administrative organ. Research samples are limited to the workplaces under anything but good conditions, of industrial health management for the present. Besides this, we have only two types of records, those being utilized for screening of pneumoconiosis and a health effect of organic solvents, as the initial medical examination data. It might be of considerable interest that questionnaire items contain the data on medical certificates that are presented by workers when they take sick leave. This system would be able to provide fruitful material as to such an important theme in the industrial health services field as the relationship between the working environment and health in the future.

Key words: Surveillance system—Working environment—Pneumoconiosis—Organic solvent Poisoning—Medical certificate

INTRODUCTION

Some basic rules for workers' safety and health included in the Labor Standards Law, which was enacted shortly after World War II, gave rise to a variety of subsidiary laws being successively put into force. Since the 1960's, however, it has been emphasized that any reform of the measures promoting industrial safety and health should be carried out entirely on the basis of the increase in industrial accidents as well as the qualitative change of the industrial structure caused by the high economic growth of Japan consequently. Industrial Safety and Health Law was enforced as an independent statute in 1972. There are a number of main points in this law, such as some clarification of the structure of responsibility within enterprises, establishing many standards to prevent health hazards and
tightening up regulations governing toxic substances. Several of its principal measures regarding industrial health are described below;

- Appointment of a health supervisor.
- Appointment of an industrial physician.
- Taking working environment measurements.
  ("Working environment measurement" means a design, sampling and an analysis carried out in respect of atmospheric environment and other working environment for grasping the actual conditions of working environment.)
- Carrying out general medical examinations (periodically as well as at the time of employment or transfer to another job).
- Carrying out medical examinations on special items among workers exposed to toxic substances (specialized medical examination).
- Authorization of an expert officer in industrial health.
- Formulating a hygiene improvement program for specified workplace, namely, Specified Workplace for Hygienic Management.
  ("Specified Workplace for Hygienic Management" is defined as the workplace designated by Prefectural Labor Standards Office with the object of making composite improvements in its facilities, health care education and industrial hygienic management.)
- Authorization of an industrial health consultant.

An item-by-item outline of actual industrial health service activities should be roughly described. Workers take the medical examinations at definite intervals, such as once or twice a year, and the results are then recorded in the personnel cards for periodical medical examination. An annual summary of these results is presented by the employer to the Labor Standards Inspection Office or the competent authority for the enterprise. In addition to this, it is required that workers exposed to toxic substances take a specialized medical examination on specifically selected items according to toxic substances, and the results are recorded nearly every six months. In the case of workers exposed to mineral dusts, however, such checks are undertaken yearly or every three years for those with pneumoconiotic findings or no findings, respectively. An industrial physician takes part in the medical examinations and health care management and gives orders or advice to the health supervisor who is appointed from among the employees and undergoes health care management training. In addition to the medical examinations mentioned above, the workplaces in which toxic substances are utilized in a variety of processes are required to measure the concentrations in the air, and the results are recorded. Should either the medical examinations and the working environment measurements be insufficient or unsatisfactory, making improvements in the hygienic service program would be required of the employer. And, as Specified Workplace for Hygienic Management, it might be inspected if necessary by an expert officer from the Labor Standards Inspection Office. On such an occasion, an industrial health consultant who is a specialist takes the role
of analyzing the hygienic problems in the workplace and giving guidance based on any such analysis in preparing for the necessary improvements. The employer should keep records of medical examinations or working environment measurements for periods of varying from three to seven years according to each kind of record.

With this system of industrial health administration, the annual report of the periodical medical examination, that is, a summary of data presented by most workplaces, might be the only information available for industrial health administration services. Because of this, it is probable that, at present, no one could really ascertain the state of employees' health in a certain workplace or the health effect of the working environment. Thus, it is imperative for us to create a system for collecting, storing, maintaining and analyzing data, mainly of medical examination and working environment results kept by most workplaces, in order to cope with this difficulty.

**PROCEDURES**

*Purpose and effects of the system*

It is clear that the purpose of the system is to contribute to raising various problems or taking measures against them, through some statistical data and results of analysis obtained from collecting, storing and maintaining such records as those of working environment measurement, the status of working environment improvement and the condition of employees' health, which are kept in every workplace. There will be several developments when the system is fulfilling its function.

- Establishment of an amendment of substantial densities for regulation and any classification based on them for toxic substances.
- Determination of how the working environment conditions can be improved in some workplaces.
- Ascertaining the health problems caused by controlled and non-controlled toxic substances.
- Studying the validity of a variety of points checked in both the periodical and specialized medical examinations.
- Providing valuable information for research on industrial hygiene.

*Data-gathering process*

A survey of all the workplaces, which total more than six millions throughout the country, might exceed the data processing capacity. Therefore this would be difficult at present, even if a large number of workplaces would be desirable as materials for this kind of research. Consequently, we have selected the Specified Workplaces for Hygienic Management for the moment. The reasons for this are detailed as follows;
Frequent inspection and guidance may be undertaken by an expert officer in industrial health belonging to a Labor Standards Inspection Office. (Accordingly, it is convenient for him to express his intention of carrying out research on the workplaces and he is liable to obtain the necessary cooperation.)

Some problems as to industrial hygiene and the process of related problem-solving may easily come to light because most of these workplaces would have such problems.

The number of workplaces researched may total nearly 700, which is sufficient for the purpose of an analysis.

The Industrial Health Division of the Ministry of Labor is informed of the Specified Workplaces for Hygienic Management designated by the Prefectural Labor Standards Offices during the year concerned and makes a list of them. Based on this list, the National Institute of Industrial Health sends papers containing questionnaires and other items to the designated enterprises. These questionnaire forms are filled in with suitable data from the existing records kept

Fig. 1. Schema of the data recording system for industrial hygiene information.
DATA RECORDING SYSTEM FOR INDUSTRIAL HYGIENE INFORMATION

in each workplace and sent back to the Institute by January 31 of the following year, after which various kinds of data processing efforts are undertaken (Fig. 1).

Forms of questionnaires

We adopted a questionnaire form that can be read by an Optical Character Reader (OCR). This is a device that has the ability to read such handwriting characters as the alphabet, numerals, katakana (phonetic letters) and some other specific symbols. A few benefits can be confirmed when it is applied to the data entry process.

- Reduction of working efforts as well as working hours involved in the data conversion process and of the great cost of data input.
- Ease in identifying converted data with original data because the questionnaire is the data that should be input.
- No requirement for computer operation experience because the writing work is the same as an ordinary clerical task.

There is a miss- or non-reading problem in addition to the difficulty or complexity of laying out the questionnaires as shortcomings offsetting the advantages mentioned above. Considering the variety of persons filling out the forms, reading difficulties are inevitable with this kind of survey. However, we can solve these problems if an operator makes the necessary checks and corrections when the questionnaires are put into the computer.

Five Types of OCR Forms

There are five kinds of forms used for this research.

1. The fundamental part of the questionnaire—a 15-page questionnaire. The details are as follows.
   1.1 Name of enterprise, Address, Labor insurance number, Number of employees.
   1.2 Taking or not taking working environment measurements, Type of person who makes the measurements, Name of working environment measurement agency.
   1.3 Undertaking or not undertaking specialized medical examinations, Names of harmful substances and others, Number of persons who take the examination, Name of medical examination service agency.
   1.4 Taking or not taking periodical medical examinations, Number of persons who take such examinations, Points checked, Number of persons who have abnormal findings, Any guidance to persons after taking it.
   1.5 Requiring or not requiring a medical certificate for workers taking sick leave.
   1.6 Undertaking or not undertaking improvements in the working environment, Motives for improvement, Type of person who decides how to make
improvements, Type of person who takes on the necessary work, Method of improvement, Results of improvement, Expense for improvement work, and others.

2. An individual sheet for the records of working environment measurement—
The workplaces where working environment measurements are taken according to Item 1.2 are supposed to fill out the form according to the outcome of dust or organic solvent measurements.

2.1 Area size of workplace.

2.2 Name of measured substances.

2.3 Method of measurement, Method of analysis.

2.4 Date of sampling.

2.5 Number of sampling points.

2.6 Geometric mean and geometric standard deviation of measured values.

2.7 Mass conversion factor, Content of free silica (both for mineral dusts only).

3. An individual sheet for the records of specialized medical examinations for organic solvent poisoning—the workplaces where a physical checkup based on the Ordinance on Prevention of Organic Solvent Poisoning as the specialized medical examination is carried out according to Item 1.3 are supposed to reproduce the records on this sheet if the workplace has more than 50 employees.

3.1 Sex, Date of birth.

3.2 Type of work, Number of years since being engaged.

3.3 Medical history, Signs and symptoms.

3.4 Results of blood test, Blood pressure, Results of urine test.

3.5 Abnormal or normal findings in the secondary examination, Hippuric acid content in the urine, Diagnosis and guidance by a physician.

4. An individual sheet for the records of the specialized medical examination for pneumoconiosis—The workplaces where a physical checkup based on the Pneumoconiosis Law as the specialized medical examination is carried out according to Item 1.3 are supposed to reproduce the records on this sheet if the workplace has more than 50 employees.

4.1 Sex, Date of birth.

4.2 Type of work, Number of years since being engaged.

4.3 Classification for pneumoconiosis control.

4.4 Radiographic findings.

4.5 Signs and symptoms.

4.6 Pulmonary function test.

4.7 Detailed tuberculosis examination.

5. An individual sheet for medical certificates—The workplaces requiring that employees present a medical certificate when absent for a certain number of days should fill in the names of the medical problems specified.

5.1 Sex, Date of birth.
5.2 Names of medical problems.
5.3 Number of days absent, Results of absences.

Since these papers are accumulated at the institute, the data are compiled into an arranged format and stored in magnetic media. Following this, they are calculated according to some definite subjects and the results are disseminated as administrative material for the industrial health services field. After the papers were accumulated at the end of fiscal 1981, we have published the initial annual report in February of 1983. However, in future, we expect to issue such data with shorter intervals by correcting and supplementing some programs.

DISCUSSION

To date, no effective surveillance system has existed as regards either knowledge of workers' health conditions or supervision of toxic substances. This sort of system may be restricted by the fact that research samples are limited to a single enterprise or a group of enterprises in a definite area and, in other cases, to some enterprises belonging either to a certain type of industry or a certain industrial group. Because the primary object is to obtain administrative information, the samples are presently the Specified Workplaces for Hygienic Management in all parts of Japan, which can be easily controlled administratively. Therefore, a good feature of this system is that the designated workplaces might have a wide regional distribution and represent a fairly broad variety of manufacturing industries, i.e., 90% of all industries appearing in the report. In addition to this, the most important factor is that we can more clearly ascertain the relationship between toxic substances and workers' ruined health in such a hazardous environment through the accumulation of data as to various working environments, together with the data on individual health conditions. Although the workplaces ought to keep the working environment measurement and the medical examination records for three to seven years, these records might be neglected rather than stocked and often cannot be used effectively except for the annual report on periodical medical examinations edited administratively. However, it is certain that making a review of many records by filling out the sheets would have a good effect on the staff in charge of industrial health in the workplace as to an understanding of the working environment and health management services for the employees.

Meanwhile, working environment measurement agencies have begun to take accurate measurements into consideration for no reason other than that the workplace staff would inform a central government organ of the detailed measurement. Besides, it has been recommended that a standard format be used in order to make it easier for the industrial health staff, who has rarely been trained to take an environment measurement, to understand. In this regard, a transfer of formats from an independent type to a certain standard commonly usable all over the country has been thoroughly promoted because many agencies received
inquiries or information about the research from the workplaces.

It is a matter of great anxiety to us that we have received no response from nearly one fourth of the workplaces, although the materials for this research are those workplaces designated by an expert officer in industrial health who has the authority to inspect these workplaces. We might point out the two reasons for this failure to respond: one is that workplaces are inundated with clerical work at the end of the calendar or fiscal year, and the other is that most workplaces are unable to undertake official work and they cannot fill out research forms. This is because a relatively small workplace might be designated as a Specified Workplace for Hygienic Management and it does not have the funds for environment control or health services.

We should expect to obtain some valuable knowledge from the medical certificates being submitted to the workplace when workers take a leave of absence. Workers usually visit a clinic or a hospital if they are in bad health, rather than consult an industrial physician not familiar with them. This goes for medium or small-scale workplaces not employing a full-time industrial physician. Accordingly, there is the great possibility that a medical practitioner having the responsibility for primary care services would be the first to find an illness caused by toxic substances and other factors. Nevertheless, a worker's obligatory presentation of medical certificates is not always executed, the rules being made independently by each workplace, and, in addition, there is no official or legal duty to keep the certificates. Thus it is quite unclear just how valid the information we can obtain from them is.

As for the utilization of OCR, we seldom have complaints about the writing work on the OCR-oriented questionnaires and the reading error are not so numerous as we initially estimated. The layout of the questionnaire forms was modified, with the result that they became easier to fill out. However, so many difficulties remain in this connection, and we need to make the required improvements.

Not only increasing but enriching the data is necessary in future for this system, but, it will be some time before much more data is handled because the information accumulated by this system each year is of diverse character and large in quantity. The authors wish to have the valuable contents of the report put not only to administrative use, but also to various scholarly purposes through continuing the existing activities of the system.

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