ISSN 1021-366X

Department of Health
REPUBLIC OF CHINA

Vol. 10 No. 9/September 25, 1994

Epidemiology Bulletin

Plan for Surveillance of Occupational Diseases in Hospital
One-Year Experience at Veterans' General Hospital-Taipei

1. Introduction

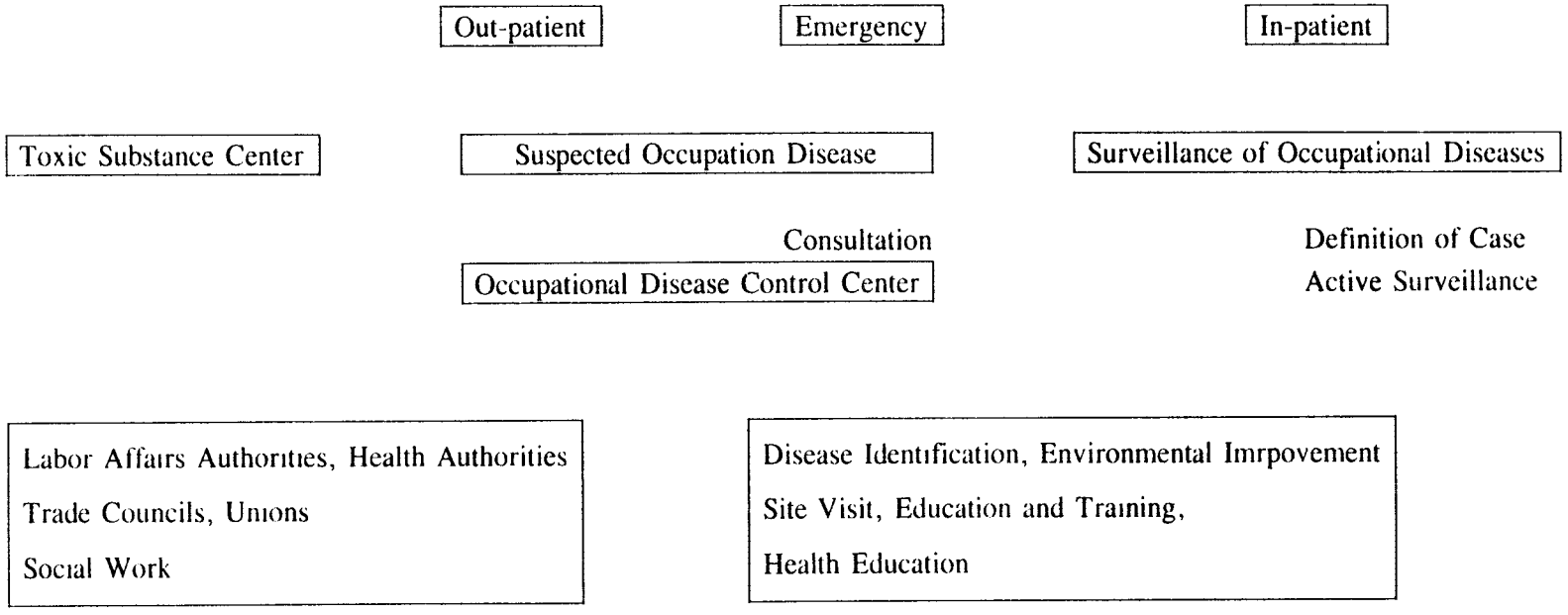
The father of occupational medicine, Bernadino Ramazzini (1633-1714), early mentioned that work was also a cause of disease and that, when taking a history, a physician should routinely ask the patient about his work[1]. It was not, however, until after the Industrial Revolution (1760-1830) that the relationship between work and disease began to receive more serious attention[2].

Though the per-1,000 occupational disease mortality rates of laborers in manufacturing, construction and mining in Taiwan are 5-10 times higher than those for Singapore and Japan[4-6]. With the exception of pneumoconiosis, very few other occupational disease have been reported. Lack of proper education and training in occupational medicine and a shortage of occupational medicine specialists may be among the major reasons that occupational diseases are often treated quite routinely as any other diseases.

Data from surveillance of occupational diseases should include both the diagnosis and the occupational exposure. Diagnoses of hospitalized patients must be accurate, and already computerized. They are a good basic source of information for surveillance of occupational diseases in a Hospital. Through consultation and occupational medicine clinics, occupational medicine has already begun to be promoted in the hospital (see Figure 1).

Surveillance is an approach to achieving control of and eliminating a diseases through long-term collection and analysis of disease information[7-9]. A plan for such surveillance of occupational diseases has been promoted by the Internal Medicine Department of the Veterans' General Hospital-Taipei (VGH-Taipei), with the following objectives: 1) to provide resident physicians with continuing education in Occupational Medicine; 2) to identify and discover potential occupational diseases as reference data for authorities concerned with occupational safety and health; and 3) to prepare for a nationally used occupational disease surveillance system

Figure 1. Plan for Surveillance of Occupational Diseases in Hospital, Veterans' General Hospital-Taipei



2. Materials and Methods

Since 1987, residents have been required to computer input on the medical records of all patients discharged by VGH-Taipei data regarding diagnoses upon admission, diagnoses on discharge, medication and laboratory findings. A surveillance plan for occupational diseases was formulated in August 1992 through the use of the computerized medical record system and findings from consultations.

First the adequacy of information on occupational exposure as currently listed on medical records was reviewed. Admission notes for current in-patients of the Internal Medicine Department-IMD (including Neurology, Dermatology and Chest Medicine) prepared by the residents and nurses were compared with patient's occupational histories.

1) Classification of work-related diseases

Since 1 August 1992, residents have been required to indicate on discharge notes, not only their judgement, of the disease identification but also the relation between the disease and the patient's work. Diseases are classifed into three categories: 1) work-related, by an indication of "Y" for "yes"; 2) "possibly related", or "P"; and 3) "N" for not related.

2) Review of reported cases

Medical records of all IMD in-patients for the period August 1992 and June 1993 were analyzed, by season. Records of diseases considered work-related by resident physicians were reviewed. A disease was considered to be work-related: 1) if disease occurs after occupational exposure; and 2) the relation between the occupational exposure and the disease has been reported in previous literature or the disease is legally regulated as occupational. Diseases possibly related to work are those which could possibly be induced by that work, although the work conditions and exposure of the target patients though a possible relationship may not yet be fully understood. Diseases that are not related to work are defined those found in: 1) unemployed patients; 2) neoplasm patients; and 3) no previous relation between the disease and work type has ever been reported.

Consultation: any cases under consultation are considered occupational disease patients if they are confirmed as work-related.

3. Findings

Survey of Occupational History

In May 1992, there were in the Internal Medicine Department of the Hospital selected

for study 956 beds. A total of 826 patients (86.3%) were actually survey (Table 1, insurance status and age distribution). Of these, 103 (12.5% of those interviewed) patients were recorded by physicians and 783 (94.8%) by nurses as "employed". Retired servicemen, students, housewives, retired persons and unemployed individuals were considered to be unpaid occupations, and the rest occupations, paid occupations their distribution by insurance status is shown in Table 2. Ninety-six patients were recorded by both physician and nurse as employed; of them, 30 were recorded the same occupation and 66 recorded different occupations by either the physician or the nurse (41 recorded as retired servicemen by physicians and yet recorded as unemployed by nurse; the other 25 were recorded differently by the physician and the nurse).

Table 1. Insurance Status by Sex and Average Age

Insurance status	Male (average age)	Female (average age)	Total (average age)
Retired servicemen	421 (69.55)	3 (57.00)	424 (69.46)
Dependents of above	8 (69.67)	36 (62.31)	44 (63.02)
Labor Insurance	101 (47.94)	78 (48.86)	179 (48.34)
Government Employees' Insurance	69 (68.26)	55 (67.76)	124 (65.82)
Civilians department	31 (59.13)	24 (59.79)	55 (59.42)
Total	630 (65.50)	196 (55.50)	826 (63.50)

Note: surveyed in May 1992

Table 2. Recordings by Physicians and Nurses

Insurance status	Physician (n=826)			Nurse (n=826)		
	Paid	Unpaid	Total	Paid	Unpaid	Total
Retired servicemen	3	71	74	34	362	396
Dependents of above	0	1	1	1	42	43
Labor Insurance	9	3	12	90	82	172
Government Employees' Insurance	5	7	12	35	83	118
Civilians department	2	2	'4	35	19	54
Total	19	84	103	195	588	783

Notes: 1. Total number of beds, 965; total number of records, 826.
2. Unpaid: retired servicemen, students, housewives, retired persons, unemployed individuals.
3. Surveyed in May 1992.

Disease Classification and Review of Medical Records

Discharge notes were analyzed every two to three months. Each month, around 1,000 patients were discharged. Work-related disease seemed to decline by season (see Table 3).

Work-related records were also reviewed to try to determine any pattern of the work-related diseases among IMD patients. In the 11 months, a total of 11,343 person-times of patients had been admitted. Of these, 381 (3.3%) were considered work-related patients by resident physicians. Of these, 321 records (84.2%) reviewed, only 12 were found in fact to be work-related patients; 5 were possibly work-related and 304 were not work-related. Table 4 shows work-related diseases by occupation. Out- and in-patients who were considered work-related upon consultation are also listed in Table 4.

Table 3. Recordings by Resident Physicians with Review of Records

	1992 Aug-Oct	1992 Nov-Dec	1993 Jan-Mar	1993 Apr-Jun	Total
No. discharged	2,276	2,249	3,504	3,326	11,352
Recordings by residents					
Work-related (Y)	250	51	62	18	381
Possibly (P)	37	20	37	34	128
Not related (N)	1,989	2,178	3,405	3,271	10,843
No reviewed	201	47	56	17	321
% reviewed	80.4	92.2	90.3	94.4	84.3
Review findings					
Work-related (Y)	3	5	0	4	12
Possibly (P)	4	0	1	0	5
Not related (N)	194	42	55	13	304

Notes: 1. Only patients admitted to the Internal Medicine Department of the VGH-Taipei are included; patients of the Chest Medicine Department are not included.
2. The total number of beds in the Internal Medicine Department is 603 and, in the Chest Medicine Department, is 158. Total number of beds of the Hospital is 2,503 (July 1993).

Table 4. Occupational Disease Cases, Internal Medicine Department, VGH-Taipei (August 1992 — July 1993)

No.	Age	Sex	Status	Diagnosis	Occupation	Site Visit	Co-worker	Continue Original Job
1	63	M	RS	Myocardial Infarction	Laborer	No	1	Don't know
2	42	M	RS	Oxalate poisoning	Pre-painting processing	Yes	1	No
3	29	M	Civilian	Hydrofluoric burn	Truck driver	No	1	Yes
4	37	M	LI	Hydrofluoric burn	Driver	No	1	Yes
5	32	M	FHI	Parathion poisoning	Farmer	No	1	Yes
6	55	M	Civilian	Organic phosphate poisoning	Farmer	No	1	Yes
7	64	M	LI	Organic phosphate poisoning	Farmer	No	1	yes
8	39	F	LI	Exposure to epoxy resin	Making stickers	Yes	1	No
							0	
9	30	F	LI	Allergic dermatitis	Researcher in chemical factory	Yes	3	No
10	26	F	LI	Natrium nitrosum poisoning	Heat processing of springs	Yes	5	Yes
11	36	M	Civilian	Lead poisoning	Dismantling of ships/bridges	No	4	Lost contact
12	33	M	LI	Lead poisoning	Electric wires	Yes	2	Left job
13	28	M	LI	Increased lead exposure	Coloring processing	Yes	5	Left job
							0	
14	50	M	LI	Increased lead exposure	Coloring processing	Yes	5	Yes
							0	
15	66	m	LI	Sulfide hydrogen poisoning	Worker of hot spring restaurant	Yes	2	Yes
16	62	M	LI	Sulfide hydrogen poisoning	Deputy manager of restaurant	Yes	2	Yes

Note:. RS = retired serviceman, LI = Labor Insurance, FHI = Farmer's Health Insurance

4. Discussion

A consensus of occupational diseases has not yet been achieved. Generally speaking, the Council of Labor Affairs and the Department of Health have accepted the diagnostic principles developed by the World Health Organization in 1975 (see Table 5)[10]. The Hospital also accepts these international criteria.

Table 5. Diagnostic Principles of Occupational Diseases, World Health Organization, 1975

1. Occupation is the only cause of disease, such as pneumoconiosis.
2. Occupation is one of the causes of disease, such as pneumobronchitis.
3. Occupation is a contributing factor among many pathogenic factors, such as chronic bronchitis.
4. Occupational exposure can induce or deteriorate already existing disease, such as asthma.

Occupational diseases are also referred to as work-related diseases. Though no unified criteria have yet been established in Taiwan, the Labor Insurance Regulations have, based on the experience in other countries and the actual situation for Taiwan, developed a list of occupational diseases[11] as well as criteria for the review of work induced injuries and diseases of laborers[12], and criteria for some of the more common occupational diseases[13-14]. The present study, in identifying work-related diseases, followed the above-mentioned criteria and the WHO principles.

This survey of occupational history showed that 94.8% of all in-patients had had their occupations recorded. Thus providing medical records with good information for surveillance of occupational diseases. Physicians seemed to ask and record occupations of patients less often than nurses (12.5% for physicians vs. 94.8% for nurses). Some possible reasons are: 1) medical records are kept in English, and some local occupations are not easily named in English; and 2) for nurse notes, occupation is a routine item recording. Recommendations for improved data are: 1) occupation to be recorded in Chinese; and 2) physicians should also treat occupation as a routine item for recording at interview. This recording of occupations should be a standard, and required for assessment of medical records during hospital accreditation. This should encourage physicians' recording of occupation and allow a better overview of work-related health problems.

The occupations of the 96 patients noted by both physicians and nurses, included 25 were recorded differently. The reasons: 1) a patient may have had more than one occupation, but provided allows for only one entry; 2) the definition of occupaton is not clear, does it mean to the one that has been worked on for the longest period, or the one engaged in most often, or the current occupation; and 3) whether unemployment or housework is also considered an occupation is not clearly defined.

An occupational profile is recommended where every job held by a patient after 15 years of age can be recorded by year.

Some scholars recommend a structured occupational history questionnaire[16] including questions on contact with any chemical substances. This may be a good idea, perhaps is not feasible because that the hazard labeling system and the material safety data sheets are still in the process of being established in Taiwan[17], In fact many occupational disease patients may be unfamiliar with which are hazardous substances[7].

Of the 179 person-times admitted to the hospital under Labor Insurance in Table 2, 172 had their occupations recorded. Of these, 82 (47%) came under the unpaid category, a fact which deserves further investigation. Of the 55 person-times admitted in the civilian department, 54 had occupation recordings. Of these, 35 (64.8%) listed in the paid category had no medical insurance again a finding deserving further investigation. When using occupatons classified in the Labor Insurance as indices for study of occupational exposures, the impact of inadequate information should be considered.

From Table 3 shows that in the first three months, many physicians were not quite clear as to what "work-relatedness" meant, therefore, as many as 250 recorded "yes". Discussion with individual, revealed that some physicians had thought that work-relatedness meant the impact that the disease could have upon an individual's ability to work this helps explain some of the "yes" rating. Misunderstanding was reduced, but not totally classified, even after some explanation. Now every new physician on rotation the IMD sections of Family Medicine, Emergency, Chest Medicine and Respiratory Therapy Departments is briefed on the meaning of disease classification. The "not work-related" records were not reviewed to calculate the false negative rate because: 1) physicians' understanding of occupational diseases was in consistent; some physicians reserved opinion about the WHO's occupational diseases diagnostic principles; and 2) the number of records was so great as to be. The number of "work-related" cases though had declined rapidly, the false positive rate was high for each season. Review of records showed that these diagnoses came primarily from physicians still in doubt about the relation between occupation and diseases. How to appropriately use case definition to improve understanding is a major task for the future promotion of accurate surveillance of occupational diseases.

The number of work-related, and possibly work-related, cases identified in the 11-month period is shown in Table 4. Patients came from hospitalized cases as well as these patients sent to the department for consultation and from the Out-Patient service.

Case 1 was recorded as a laborer; he had suffered a myocardial infarction during work. This condition corresponded to the criteria[13] and review principles[12] for occupations related to acute diseases of the circulatory system developed by WHO and the Council of Labor Affairs.

Case 2 was in the business of pre-painting rust-proof processing. Before Machines

to be painted, are immersed in an oxalate pool some 3 meters deep, and without fences. The patient had accidentlly fallen into the pool and inhaled a large amount of oxalate solution, he developed pneumonia and acute renal failure. After two months of treatment (hemodialysis and others), both his lungs and the kidney recovered. Thereafter, the patient developed work-unrelated tuberculous water accumulation of pericardium, and was placed under long-term anti-tuberculosis chemotherapy. This case met the specifiction of Article 3 of the review principles.

Case 3 was a truck driver and helper. Hydrofluoric acid leaked during transportation and burned his fingers. Case 4 was also a driver while removing the rust from windows, a fellow-worker accidentally over-turned hydrofluoric acid. The acid fell on the driver, and causing burns on his scalp and hands. This case met the specifications of the review principles and also Category 4, Item 1 of the List of Occupational Diseases.

Cases 5, 6 and 7, all enagaged in farming, ingested parathion by mistake and inhaled organic phosphate pesticide; he developed acute renal failure and acute organic phosphate poisoning. These cases met the specifications of WHO and also Category 3 Item 2 of the List of Occupational Diseases.

Case 8 had been processing stickers as a household side job for two years. From long-term exposure to epoxy resin, she had developed dermatitis and liver malfunction. Though fatty liver was identified by abdominal ultrasound, and the abnormal ALT and AST could be explained away by the fatty liver, the use of toluene organic solvents in households deserves attention. Ten other co-workers were also tested for ALT and AST without any abnormal findings. This case met the specification of Category 8, Item 9 of the List of Occupational Diseases.

Case 9 was referred by the court for appraisal of an occupational skin disease. The patient had been involved in the analysis and development of organic chemical dyes (Naphthol AS). Two months later, he developed itching and rash on hands, feet and face. Its diagnosis was occupational skin disease by skin test given by a local hospital. After years of lawsuit, the case was referred to VGH for appraisal. Through visits to the work site and testing at the VGH out-patient clinic, and in consideration the finding of the skin test, the case was considered to meet all the four major diagnostic criteria of occupational skin diseases set out by the Council of Labor Affairs, these are: 1) skin disease develops or deteriorates after work; 2) site of the skin disorder is related to exposure in the work environment; 3) substance in question is a known allergen for skin or a substance capable of causing occupational disease; and 4) skin test confirmed the suspected allergic substance to be Naphthol AS The case, therefore, was confirmed as an occupational skin disorder

Case 10 was manufacturing and processing springs at home. Natrium nitrosum, used for the heat treatment of the springs accidentlly contaminated bread. Unwittingly, the patient consumed the bread and developed methemoglobinemia This case met the specification of Article 6 of the review principles

Case 11 was involved with the dismantling ships and iron bridges. After constant

exposure to lead-containing paints and steel plates, he developed lead poisoning. Case 12 used polyvinyl chloride (PVC) to process electric and cable wires. He developed lead poisoning (blood lead concentration at 75 g/dl) after exposure to sulfate lead and lead stearate. The case met the specification of Category 5, Item 12 of the List of Occupational Diseases.

Cases 13 and 14 were co-workers at coloring factory. After contact with lead-containing colors, their blood leads went up to 71 and 94 g/dl respectively without, however, anemia, peripheral nervous disorders, nor abnormal ALT, AST nor creatinine. They were, therefore, diagnosed as lead exposure[19]. No specific measures are yet available in Taiwan to treat workers with a blood lead level higher than 40 g/dl. The 1978 US Lead Standard CFR 1910.1025 specifies that workers at the medical removal protection level should be given leave with pay immediately. For lead workers in Taiwan, similar medical removal protection should be available for health protection.

Cases 15 and 16 worked in a restaurant in a hot spring area. When cleaning the hot spring pool one day, they fainted in a semi-closed bathing area. At a site visit, an NT$ 1 coin changed color when placed in the pool for 7 minutes, when the patient developed conjunctivities, they were diagnosed with sulfide hydrogen poisoning. They met the specification of Category 4, Item 3 of the List of Occupational Diseases.

5. Conclusion

The surveillance plan, properly practiced, is a reporting system for physicians. The advantages are: 1) it is mandatory; physicians are required to judge and classify the condition of each patient at discharge; 2) it is computerized; the practice, based on the computer system for discharge registration, minimized the flow of reporting and all data are stored; 3) the response time is short; many discharged patients are still alive and can be invited for re-examination and follow-up, if need be; 4) they are staff of the hospital, training, education and communication are easier, individual consultation is possible. Disadvantages are: 1) the system depends on the judgement of physicians; suspected cases not reported by physicians will not be noted for inclusion; 2) the mobility of physicians is high, requiring continuing communication on diagnosis is necessary; 3) checking occupation registrations on medical records increases the workload; 4) space allowed for the recording of occupation on the medical record is limited; 5) the type and site of the hospital have some impact on the system. To improve matter, some specific diseases such as high blood lead level and burns can be selected to study their work-relatedness retrospectively. In this way, potential occupational diseases can be further confirmed and identified to make up for shortcomings of the specialists.

A medical center-based surveillance plan for occupational diseases in hospital can be readily established by using the computerized medical records, continuing education of resident physicians and the recordings of nurses to identify potential occupational diseases.

For agencies concerned with occupational safety and health, the understanding of the

causes of occupational injuries and diseases is essential. The occupational disease surveillance in hospitals can effectively and promptly identify occupational diseases. At this time when training in occupational medicine and the supply of medical specialists are short, the practice of learning by-doing can promote the on-job training of medical care in occupational medicine taker, and, at the same time, meet the long-term goal of identifying and controlling occupational diseases. Lacking means for more formal education in occupational medicine, this is an inexpensive and effective public health practice. Data collected can be used to understand the occupational diseases and, at the same time, help public health and labor affairs agencies to forming policies concerning preventive medicine through occupational safety and health action. Lead poisoning, for instance, is a 2,000-year-old occupational disease. Decision-makers can use information collected through the surveillance to adjust control plans to eliminate this accident, and many more recent, occupational disease.

Though the 1974 Law for the Safety and Health of Laborers stipulates an annual physical examination for all laborers, of the physical examination of finding are not standardized, and are primarily dependent upon the judgement of the physicians concerned. Whether grade 2 (requiring re-examination) and grade 3 (requiring treatment) are work-related has not been defined clearly. With occupational medicine specialists in short supply, with physical examination rates low, and that the employer reluctance to admit that their employees many contract occupational diseases, the screening of occupational disease patients through physical examination is probably not practicable.

Through in-hospital surveillance, occupational disease cases can be identified. Diagnosis of occupational disease has to be made with care, as it requires the consensus of all concerned, and also has great impact upon the rights of employers and employees and can certainly provoke expensive litigation. When there is dispute, the case is often referred to the medical center. A surveillance system in a medical center is essential to understanding the current situation of occupational diseases. Support of those organizations concerned with occupational safety and health for each medical center is surveillance system, later extend it to other teaching hospitals, is the most important first step in for inauguration of a national surveillance system for occupational diseases[20] and toward better health for all workers.

Acknowledgement: Thanks are due to Ms C.T. Lin for her with this manuscript.

Prepared by: J. Ger, G.Y. Yang, J.F. Deng (Division of Clinical Toxicology Department of Medicine the Veterans General Hospital-Taipei)

References

1. GER J. The father of occupational medicine and his book (I.II). Taiwan Med J 1992; 35: 1114-1119.
2. Raffle PAB, Lee WR, McCallum RI, et al. Hunter's Disease of Occupations. Hodder & Stoughton, London, 1987.
3 Liu YH, Wang JD. Death due to occupational accidents and cost to society: an

analysis of cumulative mortality rates and years of potential life loss. J Natl Public Health Assoc 1992; 11: 89-101.
4. Wang JD. From conjecture and refutation to the documentation of occupational disease in Taiwan. Am J Ind Med 1991; 20: 557-565.
5. Liou SH. Occupational illness in Taiwan in recent fifty years. National Defense Medical College. Taipei. 1992.
6. Ger J, Huang YS, Yao C, et al. Chloroform-induced hepatic injury — a case report. Chin Med J 1993; 52: 132-6.
7. Rosenman KD. Use of hospital discharge date in the surveillance of occupational disease. Am J Ind Med 1988, 13: 281-289.
8. Thacker SB, Choi KK, Brachman PS The surveillance of infection diseases. JAMA 1983; 249: 1181-1185.
9. Langmuir AD. The surveillance of communicable diseases of national importance. N Engl J Med 1963; 268: 181-192.
10. WHO Study group. Early detection of health impairment in occupational exposure to health hazards. World Health Organization Technical Report Series No. 571, 1975.
11. Council of Labor Affairs. Code of Labor Insurance The list of work-related diseases. 1988.
12. Council of Labor Affairs. The reviewing guidelines of work-related injury and disease. 1991.
13. Chiang HC, Wang JD, Guo YL, et al. Diagnostic criteria of four common occupational disease in Taiwan. Council of Labor Affairs 1992.
14. Guo YL. Diagnostic criteria of six common occupational disease in Taiwan. Council of Labor Affairs. 1992
15. Lee WR, McCallum RI. The Occupational History p229-236 in Raffle PAB, Lee WR, McCallum RI, Murray R. Eds. Hunter's Diseases of Occupation. Hodder and Stoughton, London, 1987
16. The occupational and environmental health committee of the American Lung Association of San Diego and Imperial Counties. Taking the occupational history. Ann Intern Med 1983; 99: 641-651.
17. Council of Labor Affairs. Hazard Communiction Standard. 1992.
18. Liou SH. Statistical date for occupation-related diseases in labor-insured patients. Department of Health, the Executive Yuan (ROC). DOH 81-HP-071 1992.
19. Ger J, Chung HM, Wang JD. Lead poisoning. J Formosan Med Associ(supp) 1989: 88: 402-414.
20. Ger J. Hospital occupational disease surveillance project — the first step to establish work-related reporting system. Taiwan Med J 1993, 36. 1084-1088