

BASIC TRAINING IN ERGONOMICS AT THE INSTITUTE OF OCCUPATIONAL HEALTH
Nils Lundgren

BACKGROUND

One of the primary functions of the Institute of Occupational Health since it was founded in 1966 has been to develop further education within its field. This is intended mainly for personnel engaged in company medical care, such as industrial physicians and nurses, safety officers and industrial hygienists. For all of these categories the studies comprise ergonomics as well as medical, technological, social and behavioural science subjects.

In addition to the above-mentioned groups, it is important to reach those individuals in working life who are normally responsible for developing or planning production and work methods, machinery, tools and equipment and working premises. This large group can be collectively described as technological planners. It includes production technicians, designers, development engineers and other engineers engaged on production development, and also architects and plant engineers.

People in these positions must on the one hand have sufficient knowledge of industrial hygiene risks and other hazards to ensure that sufficient regard is paid to them at the planning stage, and to allow them to collaborate with safety engineers, industrial hygiene workers, etc. Moreover, they must have a more thorough knowledge of a number of optimal questions, which, although not necessarily relating to health and safety, have a significant bearing on man's working ability and his subjective adjustment to work.

Against this background the Institute of Occupational Health introduced in 1968 a two-term basic course in ergonomics for technical planners. In addition to the categories mentioned above, this training is intended also for some types of research personnel and instructors. It has to some extent been modelled on the academic studies in ergonomics which exist in Great Britain, the U.S.A. etc.

The aim has been to create a framework for further training which supplements the orientation courses in ergonomics already available in Sweden at technical colleges, vocational schools and certain Universities, as well as at institutions and companies (see Training in Ergonomics in Sweden", Mimeographed Document AI no.A-111.69).

THE CONTENT OF ERGONOMICS

Ergonomics is a compound word made up of the Greek words ERGON (work) and NOMOS (law). It was first coined in 1949 by the English psychologist H. Murrell as a collective term to denote man's adjustment to work, and the word has gained international currency. (Words such as biotechnology and human factors engineering are synonyms.)

At first it was used mainly in regard to anatomical, physiological and experimental-physiological questions, and these aspects are still the primary content of ergonomics. However, gradually it came to embrace also other disciplines, as for instance industrial and environmental hygiene, differential psychology, the psychology of learning, social psychology, cybernetics and production research.

Parallel with this there has been a trend toward systems ergonomics, by which is meant a system for the comprehensive analysis of the inter-relationship between man, machines and environment. This includes various aspects of the adjustment of man to work by way of suitable vocational counselling, recruiting, instruction, training, placement and following up the adjustment to work. But with applied ergonomics the emphasis has shifted more and more toward the technical and organizational adjustment of work and environment to man's capacity, needs and limitations. The scientific foundation of ergonomics is largely biological but where applied ergonomics are involved it becomes increasingly appropriate to describe it as a technology.

The table in the appendix gives an impression of the content of ergonomics and its practical application (see Hansson, J.E. Lundgren & I. Åstrand: "The study of ergonomics at the Institute of Occupational Health", Mimeographed Document AI, no.A-118.69). It may be understood that there is much overlapping between what is called ergonomics in one context and in another is dealt with under other headings. This, of course, must be taken into account when coordinating the studies of different groups of course participants.

COURSES IN 1968

The first basic course in ergonomics was, naturally, experimental in character, and intended mainly for students in the Stockholm area, being held on one afternoon a week, spread over about 7 months. The course started on January 12 and finished on November 28. It comprised a total of about 140 hours, of which one half was devoted to lectures, symposia and discussion sessions, and the other half to group work carried out at various companies. Extra time was also often spent by the students on group work, in addition to the study of pertinent literature.

Participants:

A total of 32 students attended, of whom one was pursuing University studies and the remainder were employees of companies or institutions.

The break-down according to field of interest was as follows:

Production technology	10
Research and investigation	11
Production development, design	7
Academic studies	2
Industrial safety technology	1
Office planning	1

The break-down of the educational qualifications represented by the students were as follows:

Graduate engineer	3
Diplomaed engineer (Other certificates)	17
Bachelors of Art	6
Faculty of Arts student	1
Certified forester	1
Physical training instructor	1
Designers	3

The students were employees of the following institutions and companies:

Alfa-Laval AB
Institute of Occupational Health
ASEA, Västerås
Atlas Copco AB
Crafoord-Dahlin AB
AB Electrolux

Facit AB
Swedish Air Force Staff
The Forestry Work Research Foundation
College of Physical Culture
Institute of Applied Psychology
The Negotiating Delegation of the Cooperative Movement
Laboratory for Clinical Fatigue Research
AB Marabou
Miljökonstruktörer AB
AB P.A.Norstedt & Söner
Post Office Bank
Operations Bureau of the Post Office Board
Pripp-bryggerierna AB
Product Program AB
Sicklaverken AB
The Royal College of Forestry
The State Technical Research Council -Ergonomics Group
State Power Board
The Swedish Building Industry Association
Svenska MTM-gruppen AB
Svenska Tobaks AB

Lectures, symposia and discussion sessions:

The study plan provided that alternate Thursdays were devoted to lectures, symposia and discussion sessions, and the intervening Thursdays to group work. As regards theoretical instruction the time was allocated as follows:

Introduction; the content and function of ergonomics	4 hours
Functional anatomy	4
Work physiology	4
Work physiology (review)	2
Perception psychology	4
Psychology of learning	2
Social psychology	2.5
Stress	2.5
Planning of ergonomic research and investigations; analysis of systems	6
Bio-cybernetics	2

Machine, method and tool ergonomics	4 hours
Heat and cold	3
Clothing and protective equipment	1
Working time: breaks and stops: shift work	2
Medical industrial hygiene	4
Technical industrial hygiene	4
Noise: vibrations	2.5
Vision: lighting, colour schemes	2.5
Integration of ergonomics at a company	4
Learning factors, physiological aspects	2
" " technical	2
Ergonomics in company medical care and rehabilitation	2
Ergonomics activities in international organizations	2
Symposia on group work	8
Conclusion	1
	<hr/>
Total	77 hours

Instructors:

The following instructors and assistants gave instruction:

(1) From the Institute of Occupational Health:

- A. Ahlmark, Prof.: Medical industrial hygiene: conclusion of course.
- A. Brundell, Lab. Assistant: Group work leader.
- L. Byberger, Dept. Man.: Presentation of Institute of Occupational Health
- G. Gerhardsson, Prof. Technical Industrial hygiene
- I. Grönberg, Eng. Dip.: Group work leader
- B. Gustavsson, Ph.L. Work psychology: Group work leader
- J.-E. Hansson, Senior Research Eng.: Machine, method and tool ergonomics.

Directors of group work.

- G. V. Hultgren, Dr.: Group work leader
- N. Hällgren, Eng.Dip.: Group work leader
- B. Kylin, Lab.Director: Noise and bangs; vibration
- O. Linde, Eng.dip.: Group work leader
- A. Lindholm, Senior Dept. Man. Recording Secretary: Group work leader
- N.Lundgren, Prof. Introduction: Content and purpose of ergonomics.

Age ergonomics; Heat and cold; Clothing and protective equipment; Working hours, breaks and stops, shift work; Group work leaders.

I. Skare: Lab. director: Group work leader.

I. Åstrand: Lab. director: Work physiology.

(2) Other Swedish instructors:

S. S. Bergström, Associate Prof.: Perception psychology.

E. Bolinder, Dr.: Group work leader.

S. Carlsöö: Senior lecturer: Functional anatomy.

B. Gardell: Ph.L. Social psychology.

L. Hamberg: M.D., Group work leader.

T. Ivergård: Ergonomist: Man-machine system: Group work leader.

L. Levi, Dr.: Stress.

M. Magnusson: Dr.: Group work leader.

N. Masreliez, Dr.: Ergonomics and company health services. Group work leader.

H. Ronge, Prof.: Vision factors, lighting, colour schemes.

S. Wallén, Graduate Eng.: Industrial hygiene technology.

A. Westlin, Dept. Director, Industrial hygiene technology.

A. Yllö: Senior physician: Ergonomics activities at a company.

U. Åberg: L.E.: Learning, technical aspects; group work leader.

P.O. Åstrand: Lab. director: Physiological aspects of training and learning.

E. Östlund: Assoc. Prof.: Office ergonomics; Group work leader.

(3) Foreign instructors:

Dr. F. Dukes-Dubos: Ergonomics activities in international organizations.

R. Feenev, M. Eng.: Bio-cybernetics.

Prof. W. T. Singleton: Systems ergonomics.

Dr. D. Whitfield: Allocation of functions.

Group work:

It will be evident from the time allotted to theoretical instruction that each of the many special disciplines could only be briefly covered within the time which could reasonably be devoted to them.

For the category of people attending the classes the real significance of ergonomics is not that they should become specialists in different branches, but that they should in practice be able to integrate the knowledge and measuring techniques relating to the different special disciplines. In other words, it is a question of defining adjustment problems from the standpoint of safety, health, subjective reaction, workability and working possibilities for the particular population (whereby age, for instance, is of great practical relevance). Thereafter it is a question of assessing what can be measured and dealt with alone, and what calls for the services of consultants.

In order to provide an opportunity for training of this nature, it was decided to allocate about half the course time to group work in practical working situations. The participants were divided into five groups, each of which worked solely on one project (except, in one case, two assignments), throughout the course. The projects were chosen for the purpose of providing a wide coverage of practical ergonomic problems. The Institute provided the necessary measuring equipment, group work leaders and "panels of experts" for the symposia on group work which were held from time to time jointly for the entire course. Group work related to the following projects:

- (1) Design of manual rock drills.
- (2) Planning the driver's cab of an electric locomotive.
- (3) Analysis of inspection work in a brewery production line.
- (4) Work place lay-out for an eccentric-shaft press.
- (5) Work place lay-out for work using office machines.
- (6) The handling of heavy mail.

By the courtesy of Atlas Copco, The Swedish State Railways, AB L.M.Ericsson, Pripps Breweries and The General Post Office the projects could be undertaken under practical working conditions and, thanks to the considerable resources made available by these enterprises, could be implemented with thoroughness.

The group projects were very successful and have yielded valuable practical results in several respects. This is largely attributable to the good prior qualifications of the participants and to the collaboration between people from different backgrounds, for instance psychology, physiology, production technology and design.

The written reports of the groups are to some extent obtainable from the Institute of Occupational Health.

Course literature:

The course literature consisted partly of certain basic literature and partly of a large number of special offprints supplied by the Institute, and finally also a mimeographed commentary on all lectures. The basic literature was the following three books:

- (1) Ahlmark, A.: Occupational illnesses and industrial hygiene. Norstedts 1964. Approx. 130 pages, Kr.12:50.
- (2) Edholm, O. G.: Work biology. Aldus/Bonniers 1967. Approx. 250 pages. Kr.12:50.
- (3) Luthman, G.: U. Åberg & N. Lundgren (ed.) Handbook on ergonomics. Almqvist & Wiksell 1966. Approx. 630 pages, Kr.85:-.

A reading programme was set for each 14-day period. This was chosen in order to impart the knowledge needed in preparation for the forthcoming lectures.

Reference library:

A comprehensive reference library was available at the Institute for special studies relating to group work, etc. (A revised list thereon for 1969 is available under the reference Mimeographed Document AI no.A.106.69.)

Testing of knowledge:

In addition to simpler written tests held during the course in the form of several optional questions, a written examination was held at the completion of the course, consisting of fault-detecting and essay-writing on set subjects. On the basis of the results a certificate was issued stating that the course had been completed and that grades had been awarded according to a 5-grade scale.

Evaluation of learning:

After the completion of the course the students were asked to fill in a written questionnaire based on the ATU-scale etc. (see Lagerlöf, E.: Training value of AI basic course in ergonomics for technical planners". Mimeographed document AI no.A.112.69. The responses have provided valuable material for planning the 1969 course.

1969 COURSE

A corresponding course was arranged for the current year, this also being a two-term course. In order that participants from all over the country may attend, the study plan has been concentrated to the following four periods of one week each:

17- 21 February
21 - 25 April
8 - 13 September
17 - 22 November.

Participants

There are 34 participants from broadly the same professional categories as were represented at the previous course. In the interests of collaboration with our neighbouring countries some places were made available to them and as a result there were two students from Finland and one from Denmark.

The professional qualifications of the participants were as follows:

Graduate engineer	7
Other Diplomaed engineer	7
Licentiate in philosophy	1
Certified forester	2
Bachelor of Art	2
Physical training instructor	2
Designer	3

Lectures, symposia and discussion sessions:

Theoretical studies accounted for about half of the study time and were as follows:

Introduction	1 hour
Functional anatomy	4
Bio-mechanics	2
Work physiology	4
Perception psychology	4
Stress	4
Subjective adjustment	4
Heat and cold	4
Vision, lighting, colour schemes	3
Hearing, noise	3
Training, learning, introductory procedures	4
Work and health	4
Systems ergonomics	6

Bio-cybernetics	2 hours
Machine, method and instrument ergonomics	4
Ergonomics and quality control	4
Technical industrial hygiene	6
Working hours, breaks, stops	2
Shift work	1
Ergonomics at the company	4
Symposium on group work at the 1968 course	4
Discussion of current group work	12
Conclusion	1
Reserve time	3
	<hr/>
Total	90 hours

Practical training and group work:

As preparation for group work relating to ergonomics two afternoon sessions during the first one-week course were spent on practical demonstrations and training at the laboratory of physiological, hygiene and technical measuring techniques.

Group work projects are as follows:

- (1) Design of the operator's cabin (dock crane)
- (2) Problems when working in refrigeration rooms.
- (3) Design of a pneumatic hand-grinding machine.
- (4) Tool design and work place lay-out for shipbuilding welding.
- (5) Lay-out of certain pharmacy work places.

SOME COMMENTS

The basic ergonomic training which has been described is now in its second year and hence is still in the ~~process~~^{process} of development. A new course for 1970 will commence in February, for which the study plan will, naturally, be further developed.

As long-term objectives the following questions will be given attention:

- (1) The further development and delineation of the training content on the basis of, inter alia, ~~on~~ the long-term assessments of the course participants, and on expanded collaboration with other institutions.
- (2) The feasibility of devising training which, from the standpoint of the participants, is more flexible as regards time, practical tasks, etc.

- (3) Wider scope for eligibility for at any rate a certain proportion of the course members without very rigid requirements as to formal qualifications.
- (4) Improved financial possibilities for persons without earnings from employment to attend courses (e.g. study grants and allied questions).
- (5) Improved possibilities of incorporating laboratory training and research in the training programme.
- (6) Alignment to academic qualifications (especially with a view to the possibility of participants from non-Nordic countries). The training given may at present be considered to correspond to University courses leading to pass or high pass, depending on the level of examination aimed at, the type of group participation, etc.
- (7) Continued contact with previous trainees. It can be envisaged that a suitable vehicle for this would be the newly-formed Nordic ergonomics society.
- (8) Wider Nordic collaboration in respect to training in ergonomics. We for our part hope to start inviting guest lecturers from the neighbouring countries this year. Discussions have been started on how the different countries can work out uniform norms, and in this way create the possibility for inter-Nordic study exchange.

Enquiries may be made in writing to The Institute of Occupational Health (Attn. Prof. N. Lundgren), Fack 104 01 Stockholm 60, or by

telephone to: Senior Research Engineer J.-E Hansson	08/23 69 00 /191
Senior Research Engineer A. Lindholm	" / 188
Professor N. Lundgren	" / 189

THE STUDY OF ERGONOMICS

Basic subjects	Adjustment of man	Main areas of application Adjustment of work and environment
Functional anatomy; anthropometrics; bio-mechanics	Recruiting, placement, training and learning, following up adjustment to job, rehabilitation	Planning of space utilization Developing working postures, movement cycles, regulators, hand tools, work furniture, floor. Planning of breaks (inter alia micro-pauses). Safety techniques relating to loading hazards.
The physiology of the sensory organs and the nerve system	Recruiting, placement, following up adjustment to job. Vision correction. Protection of hearing.	Lighting technology Colour schemes Acoustics technology Technical noise reduction Audibility problems Safety techniques.
Work physiology	Recruiting, placement, training, following up adjustment to job, rehabilitation. Cost questions	Organizing work. Work rhythm. Breaks and stops planning. Developing methods and tools, and working positions for manual work. Safety techniques for manual work. Risk assessment of atmospheric pollutants.

Basic subjects	Main areas of application	
	Adjustment of man	Adjustment of work and environment
Respiratory and circulatory physiology	See work physiology and climate physiology. Design of respiratory protection techniques.	See work physiology and climate physiology.
Environmental Physiology.	Recruiting, placement, acclimatization, following up adjustment to job. Moisture and electrolytic balance. Clothing, personal protective equipment. Height adaptation.	Heating, cooling and ventilation techniques. Building climatology. Safety techniques with high and low air pressures.
Biological vibration research	Recruiting, placement, following up adjustment to job. Personal protective equipment.	Design of vibrating hand tools. Elimination of whole-body vibration.
Biological rhythm research		Questions of shift work, overtime and irregular working hours.
Perception psychology technical psychology.	Recruitment for machine-operations supervision and control work.	Safety techniques. Development of signal response system, instruments, control work.

Basic subjects	Main areas of application	
	Adjustment of man	Adjustment of work and environment
Information and decision theories: Biocybernetics	Learning methods	Development of operational and manipulative systems and control work. Safety techniques
Psychology of learning: skills analysis	Recruitment, training, placement, following up results of training.	Technical and organizational simplification of learning. Introduction procedures.
Stress research: Social psychology	Purpose and methodology of assessing adjustment to job.	Job description and work design. System for promotion and planned changes in duties. Planning of work premises.
Systems ergonomics	Design of recruitment, training and placement systems	Design of man-machine-environment system. "Age ergonomics". "Handicap ergonomics." Safety techniques: all-round risk analysis.
Social ecology, ethics and organization.	Aims of man's work and environment adjustment. Adjustment criteria. The practical functions of ergonomics. Which job category in working life and in the community shall carry the duty of applying ergonomics? Resources needed and organization. Coordination of ergonomics with other activities which promote adjustment.	



ARBETSMEDICINSKA
INSTITUTET

Ö 5/69

Sven Forssman

RECENT EXPERIENCES OF OCCUPATIONAL HEALTH IN SWEDEN

presented at the Czechoslovakian-Finnish-Swedish Symposium
on Occupational Health, Helsinki, June 1969.

AI 1. 2.1969. 10.000. cir 3964

Arbetsmedicinska Institutet

1969

Postadress
Fack, 104 01 Stockholm 60

Gatuadress
Industrivägen 13, Solna

Telefon
08-23 69 00

Telegramadress
Occupationalhealth



NATIONAL INSTITUTE
OF OCCUPATIONAL HEALTH

RECENT EXPERIENCES OF OCCUPATIONAL HEALTH IN SWEDEN

by

Professor Sven Forssman

Occupational health in Sweden has developed considerably during the last 5-10 years, especially in regard to occupational health services, research and teaching. The organizing of a National Institute of Occupational Health has been a very important factor.

Occupational health services

Industrial health services have gradually changed from medical care to prevention. More than fifty years ago many large industries had industrial medical and safety services aiming at accident prevention and medical care for the workers and often also for their families. When general medical care services were developed, and local hospitals concurrently opened, the need for extensive medical care organized by industrial medical services was reduced; there was gradually more emphasis on prevention, and modern occupational health services were established. The principles of these facilities were laid down and accepted jointly by the Swedish Employers Confederation (SAF) and the Federation of Labour Unions (LO) in 1954. A manual for industrial health services was then published and revised regularly, last edition 1966 (Forssman, S., Gerhardsson, G. & Masreliez, N.: Företagshälsövård, Publikationer från SAF, nr 20, Stockholm 1966).

The aims of industrial health services were:

- a) to protect against occupational hazards,
- b) to promote the best possible adjustment of man to work and of work to man (ergonomics),
- c) to promote and preserve health and working capacity,



RESEARCH EXPERIMENTAL LABORATORY NATIONAL HEALTH IN SWEDEN

Professor Gösta Forsman

Occupational health in Sweden, as developed during the last 5-10 years, especially in regard to occupational health services, research and teaching. The organization of a national institute for Occupational Health has been a very important feature.

Occupational health services

Industrial health services have gradually changed from medical care to prevention. More than fifty years ago many large industries had industrial medical and safety services during a period of expansion and medical care for the workers and often also for their families. When general medical services were developed, the industrial hospitals were gradually opened, the need for preventive medical care emphasized by the industrial medical services was stressed, there was a tendency for the emphasis on prevention and medical care to be transferred to the workers' establishments. The primary health care facilities were established jointly by the Swedish Institute for Occupational Health (SIOH) and the Federation of Labour Unions (LO). The annual report of the Industrial Health Services was then published and revised regularly. In 1967, the Industrial Health Services were transferred to the National Institute of Occupational Health.

Publications from the National Institute of Occupational Health

The aims of industrial health services are:

- a) to protect against occupational hazards;
- b) to promote the best possible adjustment of man to work and to work conditions;
- c) to promote and preserve health and working capacity.

- d) to promote the restoration of health and working capacity as soon and efficiently as possible after injuries or diseases,
- e) to integrate occupational health and industrial production.

According to this manual occupational health services shall embrace the following main activities:

- Technical preventive measures
- Medical preventive measures
- First aid and minor medical treatment
- Rehabilitation

A formal and detailed agreement on occupational health services was accepted by the Swedish Employers Confederation and the Federation of Labour Unions in 1967. The main four activities of occupational health services - i. e. those of the industrial hygiene and safety engineer and the staff medical officer - were the same, but the functions were specified as follows:

- " to assist in the planning and execution of changes in the workers' environment with regard to ergonomics, conditions relating to industrial hygiene, measures taken to prevent industrial injuries and matters relating to equipment for personal protection;
- to conduct or assist in technical analyses of chemical and physical factors which may cause industrial injuries, to make requisite tests in order to determine for instance the level of noise and the degree of air pollution and to analyze places of work from the point of view of ergonomics and other aspects of adaptation;
- to assist in giving opinions on the staff planning of the enterprise and in such connection to see to it that the health of newly recruited employees is checked and that regular health checks are made of those groups who stand in special need of such attention, such as minors, elderly people and employees subject to special occupational hazards or exposed to the risk of maladjustments;
- to give advice to the management and to employees in connection with the transfer of workers;
- to promote efficient measures for the rehabilitation of workers after illnesses and other disablements;

- to assist in organizing first aid in case of sudden illness or accidents;
- to assist in organizing industrial safety activities and in the work done by the industrial safety committee, such as for instance preparing annual reports and, whenever necessary, to advise and instruct the industrial safety committee and the safety officers;
- to survey the health level at the enterprise, for instance by means of the registers showing absences at the enterprise and statistics on illnesses and industrial injuries and, in addition;
- to assist in the educational activities at the enterprise.

The tasks of the staff medical officer and the staff nurse may further be said to comprise the following activities:

- to perform the tasks of an inspecting medical officer;
- to give or organize vaccinations;
- to furnish advice in matters of ill health caused or made worse by work and, if agreed upon, to administer ambulant care to workers in respect of injuries incurred by accidents and;
- to administer medical care to the employees if agreed upon and with due regard taken to the principle of a free choice of physician, preference thereby to be given to case where treatment can be given while the patient is still at work or where the special knowledge of working environment and professional tasks gained by the occupational health service may considerably contribute towards a speedy rehabilitation."

Both organizations agreed to promote the development of occupational health services according to these principles.

In order to undertake a national survey of occupational health the Government appointed three committees who successively studied and reported on

1. the organization of the medical care of occupational diseases, Report 1963,
2. the organization of a National Institute of Occupational Health, Report 1965, and
3. occupational health services. Report 1968.

The report on occupational health services contains a study on the present situation in the occupational health field and this shows that full occupational health services according to the principles accepted by the Swedish Employers Confederation and the Federation of Labour Unions are to be found mainly in large industries and only to a very small extent in small industries.

Table 1

Occupational health services

Number and % places of employment with this type of services of various standards in a study of 1700 places of employment, with more than 100 employees, mainly industries.

Number of employees	Number of places of employment	Occupational health services to be found			
		A		B	
		Number	%	Number	%
100 - 200	628	25	3.9	3	0.5
201 - 500	598	82	13.7	12	2.0
501 - 1000	200	56	28.0	17	8.5
1001 -	133	105	78.9	6	4.5

A Occupational health services with physicians
 B Occupational health services with nurse and regular "contact" with a physician.
 From Committee report SOU 1968:44

The committee describes the functions of an occupational health service mainly along the lines of the LO-SAF agreement and tries to estimate the need of manpower to maintain a fully developed occupational health service serving the whole labour force of the country.

Sweden is a country of 8 million people and has now, in 1969, about 10000 doctors, and by 1980 will have an estimated 17000. The need for occupational health personnel in order to cover the whole working population would be 1300 physicians, 1300 safety and industrial hygiene engineers, 1300 assistant and industrial hygiene engineers and 2000 occupational health nurses.

In order to achieve this aim an extensive teaching programme will be developed.

So that a proper balance is maintained in relation to the need of manpower in other fields of public health and medical care, occupational health services must however be developed gradually and must take into consideration also the need of doctors and nurses for hospitals and for medical care and public health programmes. The committee also studied the implementation of the ILO recommendation nr 112/59 on occupational health services and proposed unanimously that occupational health services in Sweden should be developed on a voluntary basis according to the LO-SAF agreement and that no legislation for the moment should be introduced in this field.

The report of this committee is now being studied by the Ministry of Social Affairs. The National Institute of Occupational Health, at present the only institute for the basic training of occupational health personnel, has however already expanded its teaching programmes considerably. Annual Refresher courses for industrial physicians and safety engineers are given by the Swedish Employers Confederation. The Federation of Labour Unions hold courses in occupational health and ergonomics for safety workers.

As in most other countries occupational health services are to be found mainly in large industries. There are two main problems in developing occupational health services to cover the greater part of the working population of Sweden. One problem is to expand industrial health services to embrace not only large industries but small industries and to find suitable methods of organizing such services in a way that meets the special needs of small industries. The Swedish Employers Confederation has studied several industrial areas and stimulated the organization of several health centres for small industries. The National Institute of Occupational Health is planning an industrial hygiene survey of small industries and also a combined medical physiological, psychological study on these industries in order to have background information for a recommendation on occupational health services designed to meet the special problems of small industrial undertakings.

Experience has shown that the ideal health centre covers several industries with in all 1500-2500 employees, and staffed with an industrial physician, industrial nurses, physiotherapists, secretaries and a safety engineer. Model health centres are now to be found in Anderstorp and Eskilstuna and in all about 30 such health centres are now functioning. The former covers 60 undertakings with in all 1598 employees and the later 15 undertakings with in all 2478 employees.

Table 2

Health centres for small industries

County (in 20 of the total 28)	Number of health centres	Number of undertakings	Number of employees
Stockholm city	2	32	4 200
Uppsala	1	15	2 700
Södermanland	2	28	4 900
Östergötland	2	6	5 000
Jönköping	2	64	3 400
Kronoberg	2	15	3 600
Kalmar (south county)	3	22	5 800
Blekinge	2	7	4 400
Kristianstad	1	9	2 000
Malmöhus	1	9	2 100
Halland	4	26	6 800
Göteborg city	1	10	2 000
Göteborg and Bohus	1	6	1 400
Skaraborg	1	2	1 000
Värmland	2	15	3 700
Örebro	1	15	2 100
Västmanland	1	3	1 300
Kopparberg	1	22	2 000
Gävleborg	1	4	1 900
Västerbotten	1	6	2 300
Total	32	316	62 600

From Masreliez, Nils: Industrial Health Services for Small and Middle Sized Industries. Paper presented at ILO Congress on Occupational Safety and Health, Geneva July 1969.

It is considered very important to develop methods for studying the needs of individual industries for health services before such health centres are created. Considerable experience on such studies has now been gained. The National Institute of Occupational Health is evolving these methods and is trying to have a few health centres attached to the institute for use as field areas for the development of methods.

Another problem is to expand occupational health services from industry to other sectors of employment such as commerce, forestry, agriculture, transport. The different types of organization should also be studied, giving special attention to integration with general public health and medical care. It is planned to have as an experiment a health centre attached to a modern hospital, situated near an industrial area.

Research

Research has recently been promoted through the founding of the National Institute of Occupational Health in 1966, in order to carry out research, service and teaching. This institute consists of five departments (see plan of organization), and has now a staff of about 120 persons, of which 30 with university training. The research programme has been developed in close relation with governmental organizations such as the National Labour Market Board and the National Board of Industrial Safety as well as the organizations of employers (SAF), labour unions (LO) and salaried employees (TCO). A catalogue of research projects has now been published, and will be revised every 2-3 years.

The different departments conduct research on problems in their respective fields, developing new methods etc. It is most important that many interdisciplinary research projects involving several departments also are carried out. The problems with which this type of research is concerned will usually fall into four main groups:

1. Occupational hazards, where medical, epidemiological studies on incidence of disease, distribution by occupations etc. are combined with industrial hygiene engineering studies on exposure, for instance on silicosis, asbestosis, noise, vibration and aiming at preventive medical and technical measures.
2. Working methods or production processes, such as welding, painting or shift work may be studied jointly through medical, physiological, psychological, chemical and engineering methods.

3. Large groups of personnel may have common problems or difficulties in adjustment to work and broad studies are being organized on such problems as the aging worker, the rehabilitation of the unemployed worker etc.
4. A profession, occupation or branch may be made the subject of a broad study of the health problems of the whole occupational field, utilizing medical, physiological, psychological, sociological, engineering and chemical methods to study on one hand man at work, health, morbidity, working capacity etc. and on the other hand work, such as work load, ergonomics and occupational hazards. The groups selected for these studies should belong to professions where large groups are employed, where occupational hazards may be considerable or where rationalisation or mechanisation may introduce a rapid change of the working situation and consequently increase problems of adjustment. Such studies have been carried out in forestry and among stevedores, are currently being carried out in modern agriculture and have been planned for long distance truck-drivers.

In order to ensure an efficient coordination of occupational health research in the country the institute is organizing conferences for the exchange of experiences and the coordination of the planning of research and field studies. Such conferences have been held for instance on nitroglycol, dust measurement, silicosis, asbestosis, heat stress, vibration and the ergonomics of truckdrivers in forestry.

The institute is closely cooperating with the regional departments of occupational diseases at the regional hospitals, which pursue a considerable amount of research. According to a proposal by a governmental committee six such centres or departments will be developed in different parts of the country. At the moment such well-equipped centres are found in Stockholm, Örebro and Lund and in addition there is a small centre in Eskilstuna.

Teaching

The rapidly expanding occupational health services have caused a great demand for personnel trained in occupational health and the National Institute of Occupational Health recently had to expand its teaching programme considerably.

Research and teaching

The teaching programmes that are now developed for occupational health physicians, safety and industrial hygiene engineers and occupational nurses aim at diploma courses combining theoretical and practical training including field work, and lasting one academic year. At present the theoretical part of the training is being carried out. The organization of the practical training at the different departments of the institute and of field work at a few selected occupational health services will gradually be developed during the next few years.

A course in ergonomics for production and construction engineers, designers, architects etc. has been conducted, lasting one academic year and has met with great interest from industry.

Information

The responsibility of the institute is not only to carry out research and field studies but also to see that the results are distributed and applied. The institute has therefore organized its publications along three lines:

1. Information to other institutes, employers and unions, organizations, industries, industrial physicians, safety engineers, industrial nurses and the general public through News (AI-aktuellt) published every two months and containing summaries of the activities of the institute (in Swedish).
2. A series of Reports containing results from applied research and practical investigations, usually in Swedish but always with English summaries (AI-rapport).
3. Results from research are published in the institute's scientific journal, *Studia Laboris et Salutis*, as well as in the usual international scientific journals in English.
4. Information conferences and training courses on special subjects are organized.

Summary

The recent trend in occupational health in Sweden is the considerable development of occupational health services, based on a voluntary agreement between the employers' and unions' organisations, the expansion of health services to embrace not only large industries but small industries, the joint health centres for groups of industries and the expansion of industrial health services to other places of employment, such as forestry, agriculture, building industry and transport.

Research and teaching has been developed especially through the creation in 1966 of a National Institute of Occupational Health. Interdisciplinary research has been in the foreground with emphasis on applied research and the practical application of the results to work in the field. Teaching is being expanded by the institute in order to meet the increasing demand for personnel in the field of occupational health.

References

- Forssman, S.: Occupational Health in Sweden. A survey. WHO Inter-Regional Travelling Seminar on Occupational Health, 1962.
- Forssman, S.: Industriläkare i utveckling. Läkartidn. 1966, 63, 3179.
- Forssman, S.: Aktuella problem inom företagshälsovården i Sverige. Föredrag vid Dansk Industrimedisinsk Selskab möte den 3 november 1966.
- Forssman, S., Gerhardsson, G. & Masreliez, N.: Företagshälsovård. Publikationer från Svenska Arbetsgivareföreningen, nr 20, Stockholm 1966.
- Gerhardsson, G.: Occupational Health Services in Sweden. Nord. Hyg. Tidskr. 1967, Vol. XLVIII, 80-86.
- International Labour Office: Recommendation nr 112 on Occupational Health, Geneva 1959.
- Statens Offentliga Utredningar: Yrkesmedicinska sjukhusenheter, behov och organisation, SOU 1963:46.
- Statens Offentliga Utredningar: Institutet för arbetshygien och arbetsfysiologi, SOU 1965:24.
- Statens Offentliga Utredningar: Företagshälsovård, SOU 1968:44.
- Svenska Arbetsgivareföreningen och Landsorganisationen i Sverige: Rapport från SAF:s och LO:s arbetarskyddskommitté, Stockholm 1967.

NATIONAL INSTITUTE OF OCCUPATIONAL HEALTH

Plan of organization

The Ministry of Health and Social Affairs

Board

Director

Departments

Administration

Medical:

Section on Occupational Hygiene

Section on Toxicology

Section on Occupational Diseases

Section on Occupational Dermatology

Chemical:

Section for Development of Analytical Methods

Section for Service

Technical:

Section for General Problems

Section for Gases and Solvents

Section for Mineral Dusts and Metals

Section for Technique of Elimination of Hazards

Physiology:

Section for Work and Environmental Physiology

Section for Technical Physiology

Section for Clinical Physiology

Psychology and Sociology



ARBETSMEDICINSKA
INSTITUTET

Ö 6/69

Sven Forssman

EXPERIENCES FROM STARTING AN OCCUPATIONAL HEALTH
INSTITUTE

presented at the ILO International Occupational Safety and Health
Congress, Geneva, 30 June - 4 July 1969.

Arbetsmedicinska Institutet

1969

Postadress

Fack, 104 01 Stockholm 60

Gatuadress

Industrivägen 13, Solna

Telefon

08 - 23 69 00

Telegramadress

Occupationalhealth

health of persons
hygiene surveys
The Institute of
occupational health
in the
EXPERIENCES FROM STARTING AN OCCUPATIONAL HEALTH INSTITUTE

by

Professor Sven Forssman, M. D.
National Institute of Occupational Health
Stockholm, Sweden

Activities
The
from
Organization
Background

up by the
As in many other countries the setting up of occupational health institutes in Sweden was started gradually. 1938 a National Institute of Public Health was formed having three departments, namely general hygiene, nutrition and occupational hygiene. 1946 a Department of Occupational Diseases was organized at the University Hospital in Stockholm (Caroline Hospital) as well as at the Stockholm City Hospital (South Hospital). In 1952 the Swedish Employers' Confederation started a Council on Personnel Administration, thereby creating an organization to study human problems at work, especially the psychological and sociological aspects as well as to conducting field surveys and applied research. In 1955 the Swedish Employers' Confederation, the Council of Personnel Administration and the forestry industries started an Institute for Physiology of Work. There ensued a considerable need for the coordination of all these organizations, which were active in different sectors of occupational health. A similar situation can be found in many other countries (Forssman, 1967).

The Department of Health, Labour and Social Affairs appointed in 1964 a Committee to study this problem. The Committee proposed in its report the creation of a National Institute of Occupational Health, to which most of these organizations should be transferred or coordinated, and this proposal was accepted by the Parliament in 1966.

health services
of forestry
Aim

The purpose of the institute is to carry out research and surveys on problems of man at work, study the demand made upon man by different jobs, the influence of production methods, working equipment and environment upon human performance, study occupational diseases and other ill-effects on the

for recommendations for occupational health services. A preliminary report is under preparation.

A project leader was nominated for each of these schemes. Such large research projects usually cover about 1 1/2 years.

It was considered important that the responsibilities of the Institute should not only include research projects and the relevant scientific report but also distribution of information concerning its practical application on the "factory floor" including if necessary field experiments and training programmes.

Contacts and programme priorities

The Institute should adjust its programme on research, service and teaching to the present and estimated future needs of the commercial and industrial life of the country. Contacts were therefore established to follow the technical development in industry, forestry, agriculture, transport etc. from the health aspect as well as the development of the labour force, the situation on the labour market concerning un- or overemployment, mobility of occupational groups etc. These contacts had been established already through the organization of the Executive Board of the Institute, where the National Employment Service and the Workers Protection Board as well as the Federation of Labour Unions, the Confederation of Employers and the Organization of Salaried Employees are represented. Close contact was established with the different research councils and with the National Board on Health and Welfare. Regular discussions were organized with committees or working groups on occupational health and safety of the Labour Unions, of the Confederation of Employers and of their Joint Council of Workers' Protection. The information from these contacts formed a valuable background when priorities for the research programme were fixed.

Research

Using the information yielded by these contacts a long term research program was finally formulated in 1969 which will be revised every 2-3 years in order that it is continually adjusted to the need of the country. A catalogue on research projects has been developed. Research is carried out by each department on the development of methods or of special problems within their respective fields. It is relatively easy to organize an institute where each department is carrying out its own research independently. It is more important but much more difficult to have interdisciplinary research carried out covering the activities of two or more departments.

English
scientific

The Institute has divided these broad research projects into four major groups:

1. Occupational hazards, medical epidemiological studies are combined with industrial hygiene engineering surveys, for instance on silicosis, asbestosis, noise, vibration, with the aim of developing preventive medical and technical measures.
2. Special working methods or production processes, such as welding, painting, shift work may be studied jointly through medical, physiological, psychological, chemical and engineering methods.
3. Large groups of the working population may have common problems or difficulties in adjustment to work and broad studies are organized on such projects as the aging worker and the rehabilitation of the unemployed worker.
4. Occupational groups. A broad study of the health problems of the whole profession or occupation with combined medical, physiological, psychological, sociological, engineering and chemical methods to study the health and working capacity of man at work and on the other hand work load, ergonomics and occupational hazards. The groups selected for these studies belong to professions where occupational hazards may be considerable, where rationalisation or mechanisation may introduce a rapid change of the working situation, and where large groups of people are to be found. Such studies have been carried out in forestry, among stevedores, is currently being carried out in modern agriculture and are planned for long distance truck-drivers.

Information

It is extremely important that results of research and field studies are widely distributed through publications. They are organized along three lines:

1. Information to organizations of employers and unions, industries, institutes engineers, physicians, nurses, and the general public through a 4-page News bulletin (AI-aktuellt) every two months containing summaries of the institute's activities - in Swedish.
2. A series of Reports (AI-rapport) containing reports from applied research or practical field investigations, usually in Swedish, always with English summaries.
2. A scientific journal, Studia Laboris et Salutis, for scientific reports in English. Results of research are of course often published in the usual scientific journals.

Service

Service or investigations upon request from authorities, organizations, industries, hospitals will gradually be developed, now that research and training programmes have reached a certain stability. In order to gain practical experience and a field area for training and experiments in occupational health services and industrial hygiene surveys the occupational health services for groups of industries will be connected with the institute. This will enable the institute to develop methods for field work, try out results from laboratory research and apply them to the conditions on the factory floor and use the field area for field training.

Teaching

Teaching programmes have been developed mainly during the last year in order to expand the teaching of industrial physicians, industrial nurses, safety and industrial hygiene engineers as well as teaching in ergonomics of construction and production engineers. The teaching programmes will aim at one academic year with a combination of theoretical and practical teaching. The students are now given in all 4-8 weeks of theoretical training in the form of seminars, lectures etc., split up into periods of 1-2 weeks each, and with literature to study and field problems to solve in the periods in between. Field training at selected industrial health services, at the departments of the institute and at the occupational medical departments of the regional hospitals will be organized within the next few years.

Building

A permanent building for the institute is being planned in place of the provisional buildings located at five different places at present in use. In order to have an efficient coordination of the different departments of this institute it is essential to have all activities housed in one building. Of course a great deal of work will always be carried out in the field.

Literature

Forssman, Sven: 1967 Yant Award. Occupational Health Institutes: An International Survey. Amer. Ind. Hyg. Ass. J. 1967, 28, 197-203.

World Health Organization: Joint ILO/WHO Committee on Occupational Health, Third Report. WHO Techn. Report Series, No 135, Geneva, 1957.

NATIONAL INSTITUTE OF OCCUPATIONAL HEALTH

Plan of organization

Department of Social Affairs (including Health and Labour)

Board

Director

Departments

Administration

Medical:

Section on Occupational Hygiene

Section on Toxicology

Section on Occupational Diseases

Section on Occupational Dermatology

Chemical:

Section for Development of Analytical Methods

Section for Service

Technical:

Section for General Problems

Section for Gases and Solvents

Section for Mineral Dusts and Metals

Section for Technique of Elimination of Hazards

Physiology:

Section for Work and Environmental Physiology

Section for Technical Physiology

Section for Clinical Physiology

Psychology and Sociology