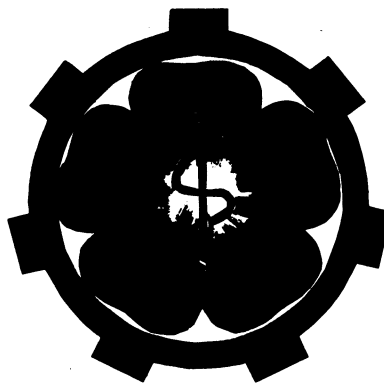
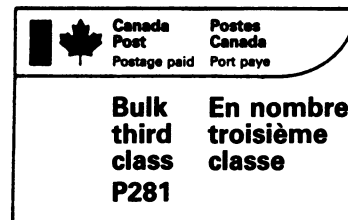


RETURN ADDRESS:

Editor, Alberta Occupational Medicine Newsletter
 Dept. of Community Health Sciences
 Faculty of Medicine
 University of Calgary
 3350 - Hospital Dr. N.W.
 Calgary, Alta., T2N 4N1 Canada



Vol. IV, No. 4

Winter, 1986

ALBERTA OCCUPATIONAL MEDICINE NEWSLETTER

EDITORIAL COMMENTS

The past several months have seen several changes in the Occupational Health scene in Alberta. As announced in the last issue, Alberta Workers' Health, Safety and Compensation has become part of the newly created larger department of Alberta Community and Occupational Health. Changes made since that occurrence have affected the structure and staffing of the Medical Services Branches in Alberta, with closure of the Calgary/Southern Alberta branch. The accompanying announcement from ACOH gives more information.

Many physicians and health care workers have used the Calgary office of the Medical Services Branch as a valuable resource in decisions on management or investigation of workers with occupationally related problems. Thus, its presence is bound to be missed. However, the Edmonton staff have indicated that they will be willing to receive calls from health professionals in the south half of the province, and, depending upon the request, provide the requested information or identify for the caller the local resources she or he could contact for further help. Their number, as listed, is 427-6724; for those out of the area, they can be reached toll free by using the RITE government line (297-6161 in Calgary; see local listings for access elsewhere in Alberta).

* * *

This issue of the Newsletter covers a range of topics, from global policy (Ron Dufresne and Mike Reesal's article on development and directions of Workers' Compensation in North America) to an account of an actual incident which raised practical issues of occupational health (Jeannette MacQuarrie's account of the impact of an active tuberculosis case on staff health in a rural hospital). Jean Parboosingh's article comments upon both policies and practicalities in her report of changes in recommendations for influenza vaccination of health care workers, and some of the obstacles to the achievement of the objectives.

Ergonomic principles, and their relationship to occupational disease, are critical in workplace design, and are often not well taught to health professionals. Thus, we often fail to explore the right questions when presented with a patient with a complaint related to workplace design. Two contributions deal either directly or indirectly with some of these principles. Ken Corbet and Mike Reesal provide an excellent description of one possible outcome, vibration-related syndromes, and through their discussion, point out how ergonomic principles in tool design may affect its incidence or course. Tee Guidotti and Shona Kelly provide us with information on a device specifically designed to assess workplace design, and offer suggestions on its use by those who are attempting to improve the workplace.

In addition to this "core content", there are several announcements and some commentaries scattered throughout the Newsletter which will be of interest to many readers. Should you desire to comment on any of the articles, make further enquiries about the announcements, or simply offer helpful suggestions for further articles, please drop us a line, or call the Editor at 220-4286. As always, we welcome your input!

Heather Bryant, M.D., Ph.D., FRCPC
 Editor

* * *

WORK AND WELL-BEING 1987 June 11-14, 1987, Edmonton, Alberta.

This conference plans to examine the changing workplace, and highlight emerging programs that promote workplace well-being. Further information can be obtained from:

Michael Henry
 Work and Well-Being 1987
 200, 12120 - 106 Avenue
 Edmonton, Alberta T5N 0Z2
 Phone: (403) 482-6096

* * *

CHANGE IN MEDICAL SERVICES BRANCH

The Occupational Health and Safety Division will be consolidating all operations of its Medical Services Branch at the Head Office in Edmonton (10709 Jasper Avenue, 4th Floor, Edmonton, Alberta T5J 3N3; telephone: 403/427-6724). The Regional Offices in Edmonton and Calgary will not have medical staff effective April 1, 1987.

The Medical Services Branch will focus on increasing the awareness of workers, employers and occupational health and safety professionals about the effects of occupational health hazards through the production of bulletins. It will also continue to produce guidelines and information documents on topics in occupational medicine and nursing. The medical components of occupational health and safety regulations will be reviewed to increase their utility, and Branch staff will continue to advise workers, employers and private sector occupational health professionals in this area. Additional activities will include special studies and investigations undertaken by the Division. The investigation and surveillance of potential occupational health problems by the private sector will continue to be emphasized, and where appropriate the Branch will play a promoting or co-ordinating role.

The number of occupational physicians and nurses in Alberta has grown, and there are now organizations such as the AMA Section of Occupational Medicine, Occupational Physicians Clubs in Calgary and Edmonton, and the Alberta Association of Occupational Health Nurses. There are also Occupational Health Programs at the Universities of Calgary and Alberta, the AFL Occupational Health Centre, and a number of private consultants to assist employers and workers in obtaining advice on specific problems and in developing and implementing worksite occupational health programs.

Prepared in the Department of Community Health Sciences, Faculty of Medicine, The University of Calgary
 through funding by Alberta Community and Occupational Health

LETTERS TO THE EDITOR

Dear Editor:

Re: Rubella Immunity and the Health Care Workplace

I would like to comment on this article by Margaret Russell which appeared in the Summer, 1986 issue of your newsletter. It is a thorough, well written review.

I would, however, like to clarify one point relating to rubella immunization requirements in Alberta which have changed slightly since Dr. Russell wrote her review. While the requirement that "infants with congenital rubella syndrome shall not be cared for by any woman of childbearing age unless the woman has been shown to be immune to rubella" remains in effect, there is now also a requirement for *all* health care workers (as well as day care workers) to be "immunized" against rubella if they have face to face contact with patients (or children)*. "Immunized" in this case refers to being rendered immune either by vaccination or natural infection. Compliance with this would require documentation of rubella vaccination or laboratory demonstration of rubella antibody.

In view of this addition to the regulations, the discussion of employment requirements at the end of Dr. Russell's review becomes academic because the law now requires that such employees demonstrate immunity and the employer would be in violation of the regulation to not require "immunization" as a condition of employment.

Yours truly,

J.R. Waters, M.D., F.R.C.P.(C)
Director, Communicable Disease Control
and Epidemiology
Alberta Social Services and Community Health
* "All staff of day care facilities and persons with face to face contact with patients in a health care facility shall ensure that they are immunized against Rubella." *Alberta Regulation 238/85. Schedule 4, Rubella, Section 5.*

Dr. Russell's comments:

I thank Dr. Waters for kindly drawing my attention to the change in the Alberta Communicable Diseases Regulations with respect to rubella. As he points out, this renders my discussion of employment requirements with respect to rubella academic.

However, the discussion of the legality of requiring immunizations as a condition of employment should still be useful if consideration is being given to a requirement for any other immunizations as a condition of employment.

M.L. Russell, M.D., C.C.F.P.

* * *

THE EFFECTS OF VIBRATING TOOLS ON THE HAND AND ARM

Dr. Ken Corbet, M.D., C.C.F.P.*
Dr. Michael R. Reesal, M.B.,
Ph.D., F.R.C.P.(C).**

INTRODUCTION

In 1862, when Maurice Raynaud presented his thesis on the relationship between a common condition of the hands known as 'local syncope' and the rarer occurrence of spontaneous gangrene of the digits, he mentioned its connection with occupation only to cast doubt on it:

'A certain number of patients had manual occupations such as washerwoman, chambermaid, burnisher, sculptor, etc. But as this circumstance was wanting in many other cases it appears to me that we cannot attach any importance to it'.

Digital vasospasm was not associated with a specific occupation until 1911 when Loriga, an Italian physician, described the phenomenon in operators of pneumatic tools. It was subsequently identified in a number of different jobs, most often in work involving some combination of cold exposure, the use of tools requiring a firm grip, or sudden jarring of the hands. The discovery of several medical conditions associated with peripheral vasospasm raised a long and lively debate on the relative importance of intrinsic and extrinsic factors in its etiology. Even in Britain, where occupational medicine enjoys a long and distinguished past, occupationally induced vasospastic disease was not recognized as a compensable illness until 1974.

Peripheral vasospastic symptoms associated with the operation of vibrating tools might be regarded as part of a larger complex called *vibration disease*. The entity encompasses the physical and psychological effects of both segmental and total body vibration.

For the purposes of this article, discussion will be limited to the musculoskeletal, circulatory, and neurologic effects of handheld vibrating tools (HHVT).

PATHOGENESIS

Musculoskeletal system:

Ergonomic studies suggest that the elasticity of the musculoskeletal system serves to absorb and attenuate the strains generated during ordinary use of the body musculature. Indeed, a degree of mechanical loading is necessary for the optimum health of bone and cartilage. However, since handheld tools operate at frequencies similar to the resonant frequency of the hand and forearm, the energy they transmit can result in a variety of tissue effects, including microfractures of the subchondral bone. Healing of these fractures reduces the shock-absorbing quality of the subchondral bone, and consequently may lead to progressive degeneration of the articular cartilage.

The radiologic appearances of such changes are similar to those seen in degenerative joint disease (osteoarthritis) and consists of narrowed joint spaces, cystic and/or sclerotic changes in

subchondral bone, and osteophytes. These changes in workers using HHVT are largely confined to the carpal joints, but are occasionally observed in the elbow and sternoclavicular joints. Though none of these changes are specific for vibration, the temporal aspects of their development and the selective anatomical distribution of degenerative joint disease suggest a causal relationship.

Circulatory system:

The vasospastic symptoms produced by HHVT are commonly referred to as 'vibration white finger'. Their pathogenesis is not completely understood, but at least three contributing mechanisms have been suggested:

- (1) a direct effect of vibration on vascular tone: vibration frequencies similar to those produced by HHVT have been shown to produce an immediate increase in arterial wall tension.
- (2) muscular hypertrophy of the arterial wall: studies using isolated vascular smooth muscle preparations have shown that gradual muscular hypertrophy occurs with repeated exposure to vibration. These hypertrophied vessels can demonstrate exaggerated vasospastic responses to stimuli such as cold and increased sympathetic tone.
- (3) a tamponade effect produced by skeletal muscle contraction: this effect on digital vessels is proportional to grip strength; the use of any heavy or unwieldy tool will reduce blood flow to the digits. HHVT can reduce blood flow even further by stimulating the muscle spindle receptors and causing additional reflex contraction of the muscles in the arms and hands.

Neurologic system:

Neurologic effects induced by HHVT have not been well documented by objective testing, even though symptoms are commonly recognized at the time of presentation. Standard electrophysiologic testing equipment lacks the sensitivity required for quantifying subtle alterations in digital nerve function.

Vibration appears to disturb proprioceptive sensation for a short time after exposure, and transient tingling and numbness are commonly noted. A reduction in fine touch sensation, temperature discrimination, and muscle strength of the hands and forearms has been attributed to the long term use of HHVT. Generalized symptoms of dizziness, incoordination, and fatigue may reflect the effects of transmitted vibration on the central nervous system.

TOOL ERGONOMICS

The ability to measure and interpret vibration energies of hand-held tools has emerged only over the last ten to fifteen years. Pneumatic and gasoline powered tools have received the greatest attention because of their impact or reciprocating designs. Electric tools produce fewer physiologic effects because they are better balanced mechanically and are usually restricted to light and medium-duty applications.

The energy delivered by a hand tool is related to its acceleration rate, which is a function of its *frequency* of oscillation and its *amplitude*

of displacement. Determining the acceleration rate of the various HHVT is important for two reasons. Firstly, because tissue effects vary considerably over the range of acceleration levels, different HHVT will produce different combinations of musculoskeletal, circulatory, and neurologic symptoms; affected workers will often present with a combination of symptoms that is characteristic for the type of tools used. Secondly, a good correlation has been observed between acceleration level and both latency (length of time in the occupation before the appearance of symptoms) and the rate of progression of the severity of symptoms.

Physical characteristics of some of the commonly used HHVT are presented in Table 1.

Table 1
Description of Typical Handheld Vibrating Tools

Tool	Weight (kg)	Mean Acceleration Level (decibels)
Chipping hammer	10 - 15	150
Rock drill	22 - 33	140
Chain saw	7 - 15	130
Brush saw	7 - 9	120

[*Condensed from Futatsuka et al. (1985)]

EPIDEMIOLOGY

Because workers move from one job to another and use a variety of tools both at work and at home, it is difficult to establish exposure estimates for epidemiologic studies. If American figures can be applied to Canadian industry, approximately 100,000 workers are estimated to be at risk for vibration-related symptoms.

Estimating the prevalence of vasospastic symptoms attributable to vibration is similarly difficult. Underreporting occurs because symptoms are initially mild and often overlooked. As well, because many of these jobs are relatively well paying, even bothersome symptoms are often denied for fear of job restriction. Some high risk occupations such as chainsaw operators may have prevalence rates in excess of 25 percent.

A recent survey of foundry and shipyard industries by the National Institute for Occupational Safety and Health (NIOSH) found no correlation of symptoms with smoking, alcohol intake, or age.

The redesigning of hand tools to include a variety of vibration reducing features offers the best means of minimizing the prevalence of vibration related symptoms; the experience of some Japanese and Swedish researchers suggest that modern tool design can not only significantly reduce morbidity, but may eliminate it altogether.

CLINICAL PRESENTATION AND MANAGEMENT

The appearance of vibration related symptoms is more often insidious than abrupt and may receive scant attention from both the worker and the physician. A typical presentation of vasospastic symptoms is summarized from the description by Taylor (1974):

"The early manifestations of vibration white

finger are trivial, and because there is no interference with work or social activities, generally pass unnoticed. Slight tingling or numbness of a single finger (often the middle digit) is noted first, with subsequent involvement of other fingers and more proximal portions of the digits. The ischemic phase is noted by blanching that lasts for 15 to 30 minutes, but in some cases may last as long as a few hours. The return of circulation is signalled by a 'flush' (reactive hyperemia) that progresses distally from the base of the fingers. Pain can occur with prolonged ischemia or with the return of circulation; repeated vibration exposure may ultimately lead to a dusky, cyanotic appearance of the finger pulps."

A grading scheme proposed by Taylor et al. as shown in Table 2 provides useful guidelines for evaluating the degree of impairment associated with vasospastic disease. This scheme has been widely accepted and where objective measures of impairment are not available, it provides a reasonable basis for the clinical assessment. Unfortunately, no comparable guides are available for the grading of neurologic or musculoskeletal effects.

Table 2
Stage Assessment of Raynaud's Phenomenon

Stage	Condition of Digits	Work and Social Interference
00	No tingling, numbness, or blanching of digits	No complaints
OT	Intermittent tingling	No interference with activities
ON	Intermittent numbness	No interference with activities
TN	Intermittent tingling and numbness	No interference with activities
01	Blanching of one or more fingertips with or without tingling and numbness	No interference with activities
02	Blanching of fingers beyond tips. Usually confined to winter	Slight interference with home and social activities. No interference at work
03	Extensive blanching of digits. Frequent episodes in summer as well as winter	Definite interference at work, at home, and with social activities. Restriction of hobbies
04	Extensive blanching. Most fingers. Frequent episodes in summer and winter	Occupational change to avoid further vibration exposure because of severity of signs and symptoms

NOTE: Complications are not used in this grading.

The examination of a worker who presents with suggestive signs and symptoms should begin with a comprehensive work history and general medical history. The worker should be asked about any associations he suspects between his symptoms and the various aspects of his job. Home, hobby, and part-time jobs frequently involve vibrating tools; these must be identified and an overall estimate of exposure obtained.

The history should also include:

- (1) the use of medications (specifically β -blockers, ergot derivatives, and known neurotoxic medications),
- (2) exposure to potentially neurotoxic chemicals or chemicals specifically associated with peripheral vasospasm (especially vinyl chloride),

- (3) any jobs requiring repetitive motions or awkward posture of the arms and shoulders,
- (4) symptoms suggestive of other diseases or conditions that may masquerade as vibration syndrome, including peripheral vascular disease, previous traumatic or frostbite injury, connective tissue disorders, cryoglobulinemia, hypothyroidism, diabetes, local entrapment neuropathies such as thoracic outlet and carpal tunnel syndromes, and others.

A screening examination of the skin, touch and vibration sensation, nail bed capillary filling, and peripheral pulses may succeed in identifying more advanced cases. Cold provocation testing is a specific but insensitive means of assessing severity.

Serologic investigation should be undertaken during the initial clinical assessment and could include a complete blood count, sedimentation rate, biochemical profile, urinalysis, anti-nuclear antibodies, and cryoglobulins.

If there is reason to suspect an underlying intrinsic disease, the worker should be referred to the appropriate clinical specialist for further evaluation. Arteriographic studies have demonstrated that some degree of narrowing is usually present in one or more of the digital arteries. However, angiography cannot be applied as a screening test or as a routine diagnostic procedure, and it may well be replaced by newer, less invasive methods such as digital plethysmography and infrared thermography. Recently developed vibration and temperature threshold testing offer the possibility of identifying early changes in the peripheral sensory nerves, but are not yet of proven merit.

Pharmacologic options in the treatment of vibration-related effects are few; calcium channel blockers are meeting with some success in the treatment of vasospastic symptoms, but their role remains unclear.

The reversibility of a worker's symptoms depends on the severity of symptoms at the time of cessation of tool use; successively fewer workers show complete resolution as the grade of vasospasm increases. Any recovery that does occur will be limited to a period of time roughly equivalent to the latency interval. It must be emphasized that *early detection* and *job modification or transfer* are the only available means of improving the prognosis.

RECOMMENDATIONS

In keeping with the general approach to any occupational condition, engineering and work practice changes should be applied prior to relying on a medical surveillance program. The need for manually operated vibrating tools should be reevaluated, and when they are deemed necessary they should be of a modern, low energy transmission design. All tools should be maintained according to manufacturers' specifications. The hands should be kept as warm and dry as possible. Gloves, though they do little to dampen vibration, nevertheless provide some thermal insulation. Although no studies have specifically dealt with the role of work scheduling, it would seem reasonable to include a few short workbreaks every hour in order to massage and warm the hands.

When hiring in the vibration prone occupations, it is important to detail the worker's history of previous exposure, and the presence of any symptoms suggestive of early vibration effects. The worker should receive information regarding HHVT-related effects, and their relatively high prevalence but good prognosis given early recognition.

CONCLUSION

Vasospastic disease of the hands is the best known of a number of effects that can be caused by the use of hand-held vibrating tools (HHVT). Knowledge of the specific tools used in a worker's occupation can allow some estimation of risk, latency period, rate of progression of symptoms, and the degree of reversibility. In the majority of cases, a history and clinical examination will provide the diagnosis. Some workers may require referral for the investigation of intrinsic diseases, or to provide a more quantitative assessment of impairment. *Prevention and early identification* are still the most effective means of reducing the prevalence of vibration effects.

*(References available upon request)

* Resident in Community Medicine, Department of Community Health Sciences, Faculty of Medicine, The University of Calgary
** Alberta Workers' Compensation Board

NEW GUIDELINES FROM ALBERTA COMMUNITY AND OCCUPATIONAL HEALTH

Five new additions to the excellent series of guidelines have been released since the last newsletter. These are:

19. Occupational Cancer
20. Occupational Health and Video Display Terminals (VDT's)
21. Medical Monitoring of Workers Exposed to Pentachlorophenol
22. Medical Monitoring of Workers Exposed to Ethylene Oxide
24. Medical Monitoring for Workers Exposed to Styrene

As usual, these Guidelines are concise, readable and practical. They can be obtained free of charge on request from:

Alberta Community and
Occupational Health
Education and Program
Development Branch
2nd Floor, 9321 - 48 Street
Edmonton, Alberta T6B 2R4

WCB AND OCCUPATIONAL HEALTH PROFESSIONALS: EXPECTATIONS

Ronald M. Dufresne, M.D., C.C.B.O.M.*
Michael R. Reesal, M.B., Ph.D., F.R.C.P.(C).**

While in earlier centuries we saw society trying to evaluate the various alternatives of dealing with those disabled through employment, 19th century Germany saw the birth of the first comprehensive industrial insurance. In its initial form, industrial insurance was a co-operative association. On the North American continent, the first legislation came at least 13 years after Germany adopted the first modern compensation system (1884).

The need to take action regarding the drama of work-related injuries was a major concern in North America. While Americans, for fear of unconstitutionality, more or less rejected the idea of compulsory monopoly of workers' compensation over the whole field of work-related injuries, Canadians opted for a system based on the doctrine of exclusive remedy by the workers' compensation system. The system chosen in North America was one in which the employer paid the entire cost, as opposed to the "Lassalle type of co-operative insurance" first supported by Bismark.

Among the major reasons for adopting workers' compensation legislation was elimination of negligence as an issue in determining liability for industrial accidents, reduction of the frequency of claims for compensation being settled in the law courts and, finally, the hope that imposing the costs of the insurance on the employer would prevent work injuries.

In fact, the workers' compensation system is issued from a "quid pro quo". In exchange for the right to tort actions, employees are to receive certain benefits without having to prove the employer is at fault. On the other hand, employers enjoy limited liability for occupational injury and disease. The system, which originally was meant to eliminate litigation, did not however close all avenues of contention. Despite, or because of, the wording of the definition of an "accident" under the workers' compensation system, the issue of what should be or what should not be compensable is still today the source of most contention.

The fathers of our present compensation system did not indicate in the definition that a condition for which compensation is granted must be caused by obvious and unique trauma at work. Instead, the definition was broader and simply indicated that compensation be granted for lesions arising out of work or in the course of employment. At first, and for many years, the understanding was that benefits should be paid only for disability directly caused by acute obvious traumatic injuries. Today, as a result of time and experience, the same original definition seems to support the interpretation that "accidents and diseases arising out of work or in the course of employment" means any lesions where employment played an active role in their development or progressions.

MODERN PROBLEMS

The modern vision of work-related injuries,

and the increased number of occupational injuries, has placed the workers' compensation system under tremendous pressure. Indeed, the current system has to decide which complicated illnesses and occupational stressors or exposures it must accept under the definition of what is compensable, and to what extent it is willing to recognize the effects of the lesion on the whole person rather than only on a specific injured part. At the same time, the increased pressure of rising cost can't be ignored.

In brief, the stress placed on the system is double: high quality of expertise and responsible cost management. No one should expect this pressure to be released by simply having the two other partners in the workers' compensation system—employers and workers—constantly blame "the system" for everything they feel is not to their immediate perceived advantage. The basic philosophy of adjudication, which to some non-initiated may appear too progressive, can hardly be changed in the context of the end of the 20th Century without risk of destroying the system, leading to a return to the situation the fathers of compensation wanted to correct. This topic could, in itself, be the subject of another paper, as could that of finance and cost control.

ACTUAL NEEDS

Among the needs arising out of the current stress situation, there are three which, in the context of the future of Occupational Health Services must be addressed. They are:

- (1) active interaction between the workers' compensation system and occupational health providers,
- (2) knowledgeable experts,
- (3) effective preventive programmes.

In summary, it is the need for effective occupational health services that we will address and we intend to do so through the channels of the three types of prevention recognized in public health.

SOLUTION: PRIMARY & SECONDARY PREVENTION

In Primary Prevention, the future must permit the development of appropriate responses to problems identified through reliable record keeping. The workers' compensation system is an "unexploited gold mine" containing priceless data which should be used by the occupational health providers as an essential first step in the development of cost/effective occupational health programmes. Presently, however, it is indeed an inadequate source of information as the data available is not compiled in a manner which can be effectively used by experts in the field of prevention. A precise coding system, meaningful to occupational health care providers, must be developed and the motivation to develop and use it must be brought to light.

Cost-effective preventive programmes should be initiated based on these statistics, as they very closely reflect the real disability created by work environment. These programmes, specific to the problems of each individual work environment, combined with general preven-

tive activities, will decrease the burden of work-related lesions.

Any long-term effective intervention programmes within the general terms of reference of "primary" and "secondary" prevention would be greatly enhanced if they were promoted and applied with a good knowledge of workers' compensation acts, policies and procedures. The serious occupational health provider should know what the compensation system considers to be compensable, before he or she starts a prevention programme. Proper investigation, early intervention and adequate monitoring of the workers' health and environment—not only for toxicological problems—should not be blindly relinquished to the Workers' Compensation Board or the State, as is too often the case. Occupational health providers must also understand the system of impairment and disability assessment used in the WCB and be prepared to intervene before the damage is permanently established.

The workers' compensation system was not designed to be a system to fight or to exploit. It was primarily a system intended to eliminate antagonism. Co-operation between WCB and occupational health professionals is an essential component of a future productive relationship and indeed may provide key elements essential to enhance expertise in solving the problems of occupational injuries. The input of knowledgeable occupational health experts is indeed needed, not only in prevention, but in disability management and motivation development, which are also part of the intricate world of WCB.

SOLUTION: TERTIARY PREVENTION

Rehabilitation, (more specifically "Vocational Rehabilitation"), is the area of the future in which we must all seriously start to invest. Rehabilitation is no longer the kind of luxury that is too expensive to consider. The cost of lack of rehabilitation is real and so high that it may eventually jeopardize the future of the whole system of compensation. Workers and employers should realize that lack of rehabilitation means prolonged total disability and very often degenerates to permanent total disability. Rehabilitation must be considered by the injured worker as a benefit of the same type as a disability pension. Too often we still see people who consider "rehabilitation" a loss of benefits. Once more, motivation and knowledge are essential to succeed. The workers' compensation system has already started to invest in this field but now desperately needs the help of everyone, as the challenge of rehabilitation may be the most difficult for workers' compensation to surmount. Occupational health providers must find and play their role in this endeavour, which may quite likely assume the qualities of a new trade-off essential to the continued health of the compensation system in the 21st Century.

CONCLUSION

Part of the future viability of the workers' compensation system, and to some extent the health of our industrialized society, definitely depends on a realistic investment in the future of prevention at the workplace. A long-

term, planned venture in occupational health services should yield major benefits to all partners of the compensation system. As we appear to be approaching a major set of difficulties in the field of compensation, society may have to choose between a plan for the future based on a realistic analysis of the present or a return to a dismal past, characterized by tremendous uncertainty. The choice is now ours!

Note: Revised for publication in Occupational Medicine Newsletter. Presented in original form at Conference on "Occupational Health Through the Year 2000", held at Calgary, Alberta on 20 November, 1986.

** Alberta Workers' Compensation Board and Clinical Assistant Professor, Department of Community Health Sciences, Faculty of Medicine, The University of Calgary*

*** Alberta Workers' Compensation Board*

* * *

PRODUCT EVALUATION: A KIT FOR CREATING THE ERGONOMICALLY SOUND WORK STATION

Tee L. Guidotti, M.D., M.P.H., C.C.B.O.M.*
Shona M. Kelly*

The office environment has changed with the introduction of word processing and computer terminals. The nature of work in the office often requires hours at the keyboard with limited mobility, leading to fatigue and musculoskeletal and eye strain. Controlling the factors causing this fatigue and strain, and thereby increasing productivity, requires a redesign of the work area on ergonomic principles. This is not always an easy task, however, for the untrained. We evaluated a kit that would allow individuals to adapt and redesign their work area and those of others without the need for expensive new furniture.

The "ergoscale"® comes in the form of a kit consisting of a multipurpose measuring pole assembly, a step-by-step guide to ergonomics in the office in flip-chart format, a step-by-step guide to solving lighting problems related to video display terminals (VDTs) in booklet format, and a tape measure (non-metric). It is all well packaged in a foam-cushioned carrying case. At \$349.00, it may appear to be quite expensive for the amount of hardware purchased, but as a system it provides a convenient solution to many aggravating ergonomic problems.

We obtained the "ergoscale"® from its manufacturer, Ergo Design Inc., 210 Sylvan Ave., Englewood Cliffs New Jersey 07632, (201) 894-1100 for evaluation. For two months, we used the device to set up our own computer stations and various office work areas. Secretaries, academics, and one research professional trained in ergonomics evaluated the system from their own points of view.

We found the "ergoscale"® to be a very handy system because it provides a straightforward, direct approach to optimal office design. Rather than telling one what is unsatisfactory about existing furniture and providing specifications for purchasing new, this system tells one how to adapt by adjusting standard office furniture and by using inexpensive accessories. Thus, from the manager's point of view, ergonomically sound work stations can be created at much less expense.

From the ergonomist's point of view, the "ergoscale"® measuring device is a simple, almost foolproof way of making otherwise complicated measurements. Since these measurements are essential to proper placement, they must be correct for the system to work. If the measurements are difficult to do correctly, one is likely to merely guess and run the risk of throwing everything off. The kit makes each user one's own ergonomist.

From the point of view of the user, the system allows the worker to customize the work station to personal preference, to adapt the workplace to the worker, rather than vice-versa. The manuals are written clearly in nontechnical language. Exercises to prevent muscle and eye fatigue are provided, although schedules for taking breaks are not mentioned.

We found three conspicuous omissions in the system. No mention is made of time on/time off cycles or varying the work pattern to avoid fatigue and monotony. No mention is made of work pacing; increasingly VDT users in data input functions are monitored for productivity on the basis of speed and pauses taken, leading to a reluctance to take breaks or to vary the pace of work. Both of these issues are important ergonomically as well as bearing on the quality of working life and should have been addressed. The third omission is consideration of other office equipment used in the same work area. My secretary brought to our attention that the system does not take into account her use of foot-pedals for dictation machines. Undoubtedly many users of VDTs are transcribing tapes, answering telephones, viewing microfiche cards or using other office machines at the same time. This will have a bearing on the efficacy of the system.

Despite these drawbacks, it is a good system and the price is not unreasonable for the system taken as a coherent whole, especially if it is used to fix a number of work areas. We recommend it for shared use to modify existing work stations, to set up new work stations, and to use in evaluating new office furniture or equipment before purchase. A sensible next step for the manufacturers might be an inexpensive line of some of the simple products that they recommend for adapting the work area, packaged as a similar kit.

** Occupational Health Program, Faculty of Medicine, The University of Alberta*

* * *

TUBERCULOSIS IN A RURAL AUXILIARY HOSPITAL

M. Jeanette MacQuarrie, M.D., D.P.H.*

In January 1985, Grade 12 students in two small, rural high schools were offered Mantoux tests for the purpose of completing application forms for entrance to post-secondary education institutions. Of the 65 students tested, two girls had positive reactions (over 10 mm). Both students had been negative three years previously when screened in Grade 9. Further contact tracing revealed no new reactors in their own families.

At about the same time another lady living in the area was diagnosed as having a pleural effusion. She was investigated in a small rural hospital and then transferred to the Misericordia Hospital. Her tuberculin test was 18 mm and she had previously been considered a negative reactor (8 mm in August 1984). She was considered non-infectious. All her family contacts were negative reactors.

The common denominator of all these positive reactors was employment at the Auxiliary Hospital within the past several months.

The focus of the investigation then turned to the local Auxiliary Hospital. The local physicians and hospital administrators were notified of the concern and Dr. Todo, Director of TB Services and Elaine Benjamin, Nurse Consultant, conducted an inservice at the hospital for all staff. Mantoux tests were started on all hospital staff and patients at the Auxiliary Hospital.

This 50 bed Auxiliary Hospital is attached to the active treatment General Hospital and patients are on occasion transferred between institutions. This also necessitated Mantoux testing of staff at the General Hospital.

METHOD OF INVESTIGATION

1. Auxiliary Hospital:

All patients were Mantoux tested as shown in Table 1. Negative reactors on the first test were two-stepped in about two weeks and those remaining negative were retested again in two months time. All patients found to be positive were X-rayed. An attempt was made to collect sputums on all positive reactors, but this proved difficult because of the degree of debilitation of many. Patients known to be previously positive were X-rayed only and sputums collected if possible.

All staff were Mantoux tested initially and those negative on the first test were retested in two months time. Known previously positive reactors and reactors to the current testing were all X-rayed. On further questioning it was discovered that several staff had BCG vaccination previously but the date of the vaccination and the result of subsequent Mantoux tests were not always known.

Of the total staff, 60.3 percent were positive reactors (18.8 percent were known previously positive or had a history of BCG). This was considered an extremely high reactor rate, especially in a low incidence area of the province.

The tuberculin conversion rate at the Auxil-

Table 1
Tuberculin Test Results

Tuberculin Tests	Patients		Staff & *Former Staff	
	Number	Percent	Number	Percent
Previous Known Reactors	6	12%	1	1%
First Mantoux 10mm	23	46%	38	56%
Two-step Mantoux 10 mm	7	14%	-	-
Three Month Mantoux 10 mm	1	2%	2	3%
Negative Reactors	12	24%	27	40%
Not Tested	1	2%	-	-
TOTALS	50	100%	68	100%
TOTAL POSITIVES	37	75.5%	41	60.3%

* Former staff may or may not have been followed by this Health Unit. They have been included in the data to more accurately complete the statistics.

ary Hospital (staff and patients) was impossible to calculate as many staff and patients had no record of their last tuberculin test and/or BCG. The only people on whom baseline information was known were seven students who had been tuberculin tested as part of the Grade 9 school survey and who are currently working at the Auxiliary. Of the seven students employed with known negative tests 2-3 years previously, three were now positive reactors.

2. General Hospital:

All staff at the General Hospital were Mantoux tested initially and negative reactors retested in two months. Positive reactors as well as previously positive reactors were X-rayed. All X-rays were negative. Of the total staff, 29.3 percent were positive reactors (12 percent of the total were previously positive or had a history of BCG). This was not considered an unusual percentage of positives and none of this staff had contact with the source case. Therefore, further follow-up at the General Hospital was considered unnecessary.

Patient Follow-up:

One patient, a 52 year old, brain damaged, severely debilitated man, was found direct smear positive sputum on the third specimen sent. He was immediately transferred to the Aberhart Hospital. He was started on INH, rifampin, pyrazinamide and pyridoxine. The culture on the sputum was also positive for tuberculosis; sensitivity showed a mycobacterium that was rifampin resistant. As a result, in May, 1985, the rifampin and pyrazinamide were discontinued and ethambutol added to the chemotherapy. This man was considered to be the source case.

Six months later, another man, age 98 years, was discovered to have a sputum positive on culture. His X-rays of February, 1985 and May, 1985 showed abnormalities in the right lung. He was transferred to the Aberhart Hospital. As his sputum was also found to be rifampin resistant, he was started on INH, pyridoxine and ethambutol.

Staff Follow-up:

The initial three staff or former staff who were found to be positive tuberculin reactors were immediately placed on chemoprophylaxis,

consisting of INH. The lady with pleural effusion was treated as an active tuberculosis but non-infectious. She was started on a nine month course of rifampin and ethambutol.

Two other staff or former staff had abnormalities on X-ray and were started on chemotherapy for one year; initially INH and rifampin. Because the source case had a rifampin resistant strain, all staff then had their drug regime changed by discontinuing rifampin and adding ethambutol.

Of the 41 positive reactors on staff, 24 were started on chemoprophylaxis; two were unable to tolerate INH and medication was discontinued; 10 staff refused chemoprophylaxis.

All staff on medication continue to be monitored for compliance and tolerance. Follow-up X-rays will be taken upon completion of chemoprophylaxis.

It is interesting to note that not only nursing and nursing attendant staff directly in contact with the source were converters, but also a number of auxiliary staff (housekeeping, laundry, arts and crafts, etc.) - 14 percent of total positives.

To complicate follow-up, it was discovered that children from a local elementary school visited the Auxiliary Hospital about once a week to entertain and work with the patients. Although none of the students worked directly with the source case, it was considered prudent to Mantoux test all these students in March and June, 1985. Of 60 students tested, one 13 year old girl was positive (15x15) in June. Her X-ray was negative as were TB tests on her entire family. She was placed on one year of INH chemoprophylaxis. It is undecided as to the source of her exposure. Her Mantoux on grade one entry (1978) was negative. About two years ago she spent two weeks visiting an Indian reserve in northern Manitoba, but was not in contact with tuberculosis at that time.

SUMMARY

The discovery of an active, infectious case of tuberculosis in a small auxiliary hospital, and the resultant identification of tuberculin converters, points out the importance of ongoing vigilance in TB control in the elderly population. Having baseline Mantoux tests and X-ray results is essential in differentiating new converters from those previously positive, in both staff and patients.

The assistance of TB Services in consultation, inservice and back-up was crucial in establishing the follow-up protocol and in facilitating collaboration and cooperation between the Auxiliary Hospital staff, the local doctors and the Health Unit.

SOURCE: Alberta East Central Health Unit.

NOTE: Thanks to Verna Reid, CHN and Joy Arntzen, CHN who coordinated and conducted the investigation, completed the statistics and wrote the report.

* Medical Officer of Health, Alberta East Central Health Unit No. 10

INFLUENZA VACCINATION RECOMMENDATIONS FOR HEALTH CARE WORKERS: ATTITUDES AND COMPLIANCE

E. Jean Parboosingh, M.D., M.Sc.*

Influenza is caused by influenza A and B viruses and occurs in Canada almost every year during the winter months. The incidence of disease varies from year to year. Historical documents suggest that human epidemics of influenza occurred as early as 1173 and convincing evidence is available for annual influenza activity since the late nineteenth century. The absence of annual activity prior to this may be a result of the absence of adequate records and the inadequacy of diagnosis. The seasonality of influenza activity is related to the direct influence of cold weather on virus survival and defence mechanisms of the respiratory tract, as well as to the behaviour of humans during the winter season, such as school attendance and close contact in poorly ventilated environments.

Influenza A viruses are classified into subtypes on the basis of two antigens: hemagglutinin (H) and neuraminidase (N). There are three subtypes of hemagglutinin (H1, H2, H3) and two subtypes of neuraminidase (N1, N2) among the influenza A viruses that cause human infections. Immunity to these antigens, particularly hemagglutinin, reduces the likelihood of infection and the severity of disease if infection does occur. However, a characteristic of the influenza virus, particularly the A virus, is that it is capable of antigenic variation. Minor changes in surface antigens, known as antigenic drift, occur at frequent intervals with major changes or antigenic shift occurring every 7 to 10 years. If there is sufficient antigenic variation within subtypes over time, infection or vaccination with one strain may not induce immunity to distantly related strains of the same subtype. Influenza B does not exhibit antigenic variation to the same degree.

Measures of the impact of influenza on the health of the population include measures of both mortality and morbidity. Infectious diseases have virtually disappeared from the top ten causes of death in developed countries. However, influenza and pneumonia was the sixth commonest cause of death for all ages in Canada in 1985 (Statistics Canada, 1986); 80 percent of these deaths occur in those 65 years of age and over and mortality increases with the presence of one or more underlying chronic disease. Influenza morbidity surveillance includes monitoring the rate of hospitalization for acute respiratory conditions, school and workplace absenteeism rates and the identification of circulating respiratory viruses by sentinel family practitioners. The Alberta chapter of the Viral Watch study of the College of Family Physicians is particularly active and reports of early and extensive viral activity often are generated from Southern Alberta as a result. In 1984-85, this group verified that the school absenteeism peaks were caused by influenza. Outbreaks in institutions for the elderly and handicapped also occur during epidemics. Investigations of influenza outbreaks in nursing

homes in the U.S. and Canada have demonstrated attack rates as high as 60 percent with case-fatality rates of 30 percent or more. Attack rates are often higher for unvaccinated residents.

RECOMMENDATIONS FOR VACCINE USE

Influenza vaccine has long been available and is the single most effective method of preventing or attenuating influenza. It is recommended for those at high risk of serious illness or death. Individuals at high risk include the following groups for whom annual influenza vaccination is recommended by the National Advisory Committee on Immunization:

1. Adults with:
 - (a) chronic cardiac or pulmonary disorders.
 - (b) other chronic conditions such as diabetes, cancer, immuno-deficiency or -suppression, renal disease and anemia.
2. Children with:
 - (a) recurrent or continuing pulmonary disorders.
 - (b) significant heart disease.
 - (c) cancer, immuno-deficiency or -suppression.
 - (d) sickle-cell disease and other hemoglobinopathies.
 - (e) long term acetylsalicylic acid therapy.
3. Residents of nursing homes and other chronic care facilities.
4. Persons over 65 years of age.
5. Health care personnel with extensive contact with the above high risk categories.
6. Household contacts of persons at risk.

Other persons who provide essential services should be offered the vaccine to minimise disruption of services during severe epidemics. The Alberta Department of Community and Occupational Health provides the vaccine free of charge to those in high-risk groups 1, 2, 3 & 4, but in 1986, the first year that the NACI recommendations included those in groups 5 & 6, the Department did not expand its program to cover health care workers or household contacts. Hospitals and individuals themselves can purchase the vaccine; in 1986 the cost was less than \$3.00 per dose.

The antigenic characteristics of currently circulating strains provide the basis for selecting the variants to be included in the vaccine. Hence, the vaccine formulation changes every year and usually contains one or more of the A variants plus a B antigen. The potency of present vaccines is such that nearly all vaccinated young adults develop hemmagglutination-inhibition antibody titres that are likely to be protective against infection by strains like those in the vaccine and often to related variants that emerge.

Recent reports on the efficacy of the vaccine in the elderly suggest that the vaccine is more effective in the non-institutionalised than the institutionalised and in reducing the severity of the illness rather than the incidence of infections in long term care institutions. Serological studies of the immune response of the elderly to influenza vaccine have suggested that the elderly have lower antibody levels following vaccination than younger recipients.

However, another phenomenon which should be considered is that of "herd immunity" and its role in determining the spread of the influenza virus within the institutional setting. Recent studies of nursing home outbreaks of influenza support the recommendation that institutions for the elderly and chronically ill should have as their goal the achievement of no less than 80 percent vaccination rates for their residents.

"Failure to achieve herd immunity among the residents and introduction of infection by non-residents into the institutions may account for some of the epidemics and sporadic cases that occur. Health care workers come into close contact with residents and can introduce infection into the institution or assist in its spread among the residents. Hence the recommendation is that health care workers should be vaccinated. The achievement of optimal levels of protection for the elderly and chronically ill residents of institutions by a high rate of vaccination among both *residents and staff* should be the goal of any vaccination program.

COMPLIANCE WITH RECOMMENDATIONS

Despite the recommendation of annual vaccination of high risk individuals as the most important method of reducing the impact of influenza, the use of influenza vaccine by high risk groups remains low, averaging 20 percent, with 55-60 percent of nursing home residents receiving the vaccine, as measured by the US immunization surveys carried out annually by the Centers for Disease Control. A study of elderly people registered at a community health clinic in Ontario revealed that 17 percent had received the vaccine in 1981; following the use of reminder letters, this increased to 43 percent in 1982. In Alberta in 1978, only 10.8 percent of the age group 65 years and older received the vaccine under the provincially sponsored program. In the 1985-86 flu season, only 27 percent of the residents of long term care institutions in a rural area of Alberta had received the vaccine.

Why is it difficult to achieve the necessary level of compliance with the recommendations? The risk of influenza may appear to be remote to the patient and the physician, but the risks for certain categories are high. The physicians must therefore be aware of the high risk groups, including staff of long term care institutions and other health care workers in contact with patients at high risk, to whom they should direct their attention. Compliance requires that the vaccine be available and acceptable to the recipient. Health care providers (including physicians and administrators) must be aware of the availability of the vaccine and must believe in its efficacy.

A recent survey of the attitudes and perceptions of nurses regarding the use and efficacy of influenza vaccine resulted in a poor response rate to the survey and revealed a low rate of vaccination in those surveyed, reflecting a general lack of concern about influenza. The fear of side effects persists in 15 percent of hospital personnel and is one cause for the low acceptance rate. Side effects are mainly of a minor nature, such as local induration and a sore arm, occurring in about 1/3 of recipients.

Guillain-Barre syndrome, the reporting of which increased in the National Influenza Immunization Program against swine flu, in the United States in 1976-77, has not been associated with the more recent influenza vaccines, despite close surveillance to detect any untoward effects.

Physicians and other health care workers must be convinced of the desirability of immunization for themselves and their high risk patients, but programs must also be organised to facilitate the opportunity for vaccination. As a result of the study of rural long term care facilities mentioned above, a program for the administration of the vaccine to residents in the lodges, by the staff of the health units involved, was successful in increasing the acceptance rate. A newly introduced staff influenza vaccination program in a number of long term care facilities in Calgary increased the level of vaccination from a possible low of 4 percent the previous year to between 50 and 60 percent.

A report of increased absenteeism (1.7 times the rate for the corresponding period of the subsequent nonepidemic year) during the 1980-81 epidemic of influenza A/Bangkok 1979 in a large hospital in Winnipeg showed excess sick-leave costs of almost \$25,000 during the peak of the epidemic. There was no policy of routine immunization for the staff at the time. The greatest rates of absenteeism were among nurses in the general medical and respiratory units with the next highest in the acute infection/isolation pediatric unit. This study suggested that selected nurses should be targeted to receive the vaccine. An excess of absenteeism in staff following an outbreak among patients in Toronto also led to the conclusion that hospital staff in acute and chronic care facilities can be better protected through influenza vaccination.

Attitudes and beliefs influence compliance with any immunization program. In the study of long term care facilities in rural Alberta in 1985, only 9.0 percent of the staff had received the vaccine. Older staff and those who believed that the risk of acquiring the infection in the workplace was high were significantly more likely to have received the vaccine. Yet only 18.1 percent of those who believed the risk high had been vaccinated. There was a significant difference across occupational groups; 22.5 percent of physicians were vaccinated, compared with 3.8 percent of the RN's, 2.8 percent of the RNA's and 16.4 percent of the other category, including housekeeping. When questioned on their beliefs with respect to the vaccine, 42.3 percent believed the vaccine was effective and only 24.2 percent believed the vaccine too risky. Thirty-eight per cent said they would accept the vaccine in future if offered it. In a survey of staff in a Veterans Administration Hospital in Illinois in 1985, 84 percent of the staff believed the vaccine protective, but 68 percent were unwilling to receive the vaccine.

Thus to achieve improvements in the rates of compliance with recommendations for prophylactic immunization against influenza it is necessary that complacency amongst health care workers be overcome. The staff program in the long term care facilities in Calgary which resulted in an increase from 4 percent in 1985 to 50 percent in 1986 of staff vaccinated included in-services to staff. These in-services gave information on mortality and morbidity in high risk groups and on vaccine efficacy and side effects; the protection given to the patients for whom they are caring by a high level of acceptance of the vaccine by both patients and staff was stressed. Those who attended the in-services were more likely to change their decision to accepting the vac-

cine than those who did not. Thus educational endeavours can have an effect on acceptance. This program was successful for two other reasons: the vaccine was administered at the workplace and at no cost to the recipients.

The literature on influenza vaccination in the workplace, other than relating to health care workers, is sparse. Absenteeism is known to be high during epidemics, but little is known of the rates of acceptance of vaccine and whether vaccination programs are effective in reducing morbidity or absenteeism in other occupational groups.

This article has reviewed the issue of influenza and influenza vaccination with specific reference to health care workers and suggested that improvements in compliance with recommendations for annual vaccination can be achieved. The absence of information on other occupational groups is noted and poses a challenge to occupational physicians and occupational health nurses to rectify the situation.

** Resident in Community Medicine, Department of Community Health Sciences, Faculty of Medicine, The University of Calgary*

* * *

UPCOMING CONFERENCES

First Conference on Education and Training in Occupational Health, May 4-6, 1987, McMaster University, Hamilton, Ontario.

Contact:

Mrs. P.M. Yake

Occupational Health Program

McMaster University

Health Sciences Centre, Room 3H50

Hamilton, Ont. L8N 3Z5

Phone: (416) 525-9140