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EDITOR'S COMMENTS

Each year, the Directors of the Occupational and Environmental Medicine Association of Canada (the national specialty association for occupational medicine) nominate speakers for the Mastromatteo Oration, given each year at the Annual Conference. Nominations are made on the basis of a sustained and significant contribution to occupational health in Canada. The Oration is named after Dr. Ernest Mastromatteo, one of the founding members of OEMAC, and a major contributor for more than three decades to the development of occupational medicine in Canada, the United States, and internationally.

In 1994, Dr. Edward Gibson presented an Oration titled "Trying to Explain the Unexplainable: A Conceptual Model for Low Back Disability". Dr. Gibson has considerable experience in Ontario with the assessment of musculoskeletal disability. He is well qualified to discuss the limitations of a strictly clinical approach to low back disability, and the lack of a coherent model that links biological, psychological, social, and temporal domains. His paper is produced in its entirety in this issue of the Newsletter; I would encourage readers to contact me by Fax (403) 270-7307 for a copy of the reference list.

On this same topic, clinical practice guidelines on "Acute Low Back Problems in Adults" were released early in 1995 by The Agency for Health Care Policy and Research of the U.S. Department of Health and Human Services. This guideline provides a thorough review of the health literature on initial clinical assessment, various treatment modalities, and special studies and diagnostic considerations. A patient information pamphlet has also been prepared. Copies can be ordered by writing to:

Agency for Health Care Policy
and Research
Publications Clearinghouse
P.O. Box 8547 Silver Spring, MD
20907, USA

For those of you versed in the Internet, most of the text is available through a server at Duke University:

gopher.mc.duke.edu
9/Duke Occupational and
Environmental Medicine /
clinical topics / Agency for
Health Care Policy and Research.

The Office of Continuing Medical Education at the University of Calgary is presently planning a 1-day course on low back pain and disability (late 1995 or early 1996). The morning sessions will provide a review and critique of the AHCPR Guideline, followed in the afternoon by sessions dealing with the physical and vocational rehabilitation of musculoskeletal injuries. Look for more details in future issues of the Newsletter.

Moving into the primary prevention of injuries, Dr. Tee Guidotti, University of Alberta, provides a report on the Fourth International Conference on Safe Communities, held in Fort McMurray in June of this year. His short article illustrates the possibilities of promoting workplace safety in the context of a community-based initiative. Keep an eye open for a future article from the Southern Occupational Health Resource Service describing a similar approach for introducing newly immigrated workers to occupational health and safety.

Kenneth Corbet, M.D., F.R.C.P.C.
Editor

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REPORT FROM THE FOURTH INTERNATIONAL CONFERENCE ON SAFE COMMUNITIES

Fort McMurray, Alberta 5-8 June 1995

Dr. Tee L. Guidotti, M.D., F.R.C.P.(C)., C.C.B.O.M.*

The fourth conference to be convened by the World Health Organization's Safe Community Network was held in Fort McMurray in June. The scientific program was strong and the social program nothing short of spectacular. However, the centre of attention was the community of Fort McMurray itself. The city's efforts at safety promotion

Prepared in the Department of Community Health Sciences, Faculty of Medicine
The University of Calgary, through funding by The Workers' Compensation Board - Alberta

served as a central focus for discussion and were honoured when the city was formally inducted into the Network.

This meeting placed greater emphasis than previous Safe Community conferences on occupational health and safety and on integrating occupational and community health and promotion. Fort McMurray now joins Motala, Sweden as a prototype for the integration of occupational and community health and safety promotion.

Vulnerable groups were different in emphasis in this meeting. Considerable emphasis was placed on native safety issues and indigenous populations, with somewhat less emphasis in this meeting on ethnic and age-specific groups, with the exception of child safety.

Injury epidemiology was given a tract of its own at the meeting, reflecting its emerging role as the "basic science" of "safe communities" movement. Injury epidemiology provides the tools for assessment, monitoring, and education of safe community interventions. The methodology and applications on injury epidemiology are becoming increasingly sophisticated within the safe community movement. They support the efforts at behavioural change that are the movement's chief tools.

These approaches to behavioural change have many common features. Health promotion, as reflected in the Ottawa Charter, now increasingly means "health and safety promotion". Community animation, as developed by Health Promotion Canada and the Healthy Cities movement, is breathing new life into the "bottom up" approach to community development. Social marketing provides a strategy for individual behavioural change on a large scale. Today, we are much more sophisticated about the utility and limitations of medica as a vehicle for these efforts. One wonders if communications theory could give us some useful lesson in using media more effectively.

The similarities and differences between the Healthy Cities and the Safe Communities movements are instructive. It is clear that despite their different approaches and emphases, the two movements have emerged on a "bottom up" strategy. They differ mostly in scope, expectations for institutional contributions, concepts about infrastructure, and accessibility to evaluation. It is probably too early to promote a merger between the two movements but further discussions and sharing of experiences are clearly in order.

Of course, it was also Fort McMurray's "day in the sun". As the first North American city inducted into the Safe Community Network (number 12), it has made a commitment to the future to build on the lessons of the recent past.

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TRYING TO EXPLAIN THE UNEXPLAINABLE: A CONCEPTUAL MODEL FOR LOW BACK DISABILITY

E.S. Gibson M.D., C.C.B.O.M.*

The societal costs of low back pain are acknowledged to be monumental. However, low back pain (LBP) is a normal experience of most of the population, it is low back disability (LBD) that is the problem.

Work in occupational health and safety has tended to be directed to the prevention and treatment of LBP. This is not entirely unreasonable, since to develop LBD one must begin with LBP. However the percentage of all cases resulting in chronic disablement is small, therefore much of the effort expended in prevention and treatment of LBP may be wasted. It is quite likely that the factors leading to chronicity are different from those leading to the initial pain, and indeed are likely to vary considerably between and within patients and with time.

There is a body of evidence accumulating which tends to support a multifactorial, variable intensity, time sensitive course of events leading to LBD.

A recent comprehensive literature review by Pulcins et al[1] identified only 8 cohort studies which included an inception cohort to identify prognostic factors for LBD. There was little agreement about the prognostic factors associated with LBD. The authors concluded that the results pointed to a lack of a broad conceptual framework in which to couch studies of prognosis and acute back pain.

Phillips et al[2] looked at the extent to which psychological reaction to injury would predict those at risk for chronic pain. Accurate predictions could be made at three months, but not at baseline.

Hogg-Johnson et al[3] examined 12,280 lost time back sprain or strain injuries compensated by the Ontario Workers' Compensation Board in 1991. They used an outcome variable of calendar time on benefits and a follow-up period of one year. Using a Cox proportional hazards model they found that the effects of age, and to some extent occupation and type of injury dampened over follow-up time. Their conclusion was that the factors which influence recovery differ over follow-up time and that prognostic models which incorporate a wide range of factors, some not yet determined at time of injury, are likely to do better than ones that do not.

A number of studies[4,5,6] have identified a history of LBP as a significant prognostic factor for further LBP. However there has been little evidence presented to explain this phenomenon.

INFLUENCE PRIOR LBP
TIME LOSS (MEAN DAYS)

HISTORY	ALL CASES	NO PRIOR LBP	LBP PRIOR 2 YEAR
NUMBER	262	182	80
FIRST	55.2	46.2	75.6
SECOND	86.4	57.6	124.0
THIRD	92.2	72.7	143.4

TABLE 1

INFLUENCE PRIOR LBP
RECURRENCES

262 TIME LOSS LBP (1 APR-30 SEP 1990) FOLLOWED FOR 18 MONTHS (DOFASCO)

RECURRENCE	NO LBP PRIOR 2 YRS	LBP PRIOR 2 YRS
NONE	136 (75%)	43 (54%)
ONE	25 (14%)	28 (35%)
TWO	19 (10%)	8 (10%)
THREE	2 (1%)	1 (1%)
OFF WORK AT END FOLLOW-UP	8 (4%)	19 (24%)

TABLE 2

In a retrospective study, a cohort of 262 consecutive steelworkers losing time because of compensable LBP within a 6 month period were each followed for 18 months to determine lost time and recurrence rate. Within the cohort 80 individuals had lost time because of LBP within the previous 2 years, 182 had not. The results, as shown in tables 1 and 2, indicate an interesting trend with regard to both recurrence and amount of time loss. There is an increase in amount of time lost with consecutive episodes and a statistically significant difference between those with LBP within the previous 2 years and those without. In addition, the recurrence rate for those with prior LBP is statistically significantly increased over those without.

This increased susceptibility might be explained by reinjury of incompletely healed tissue. However there are alternative hypotheses which have not been completely explored. This could be a "learned response" in reaction to many other effectors and their interactions, it could be what some authors describe as "fragility", it could be a manifestation of "labelling". Whatever the eventual explanation, reliance on a traditional biomedical model for management and research has been singularly unproductive.

The Need for a Conceptual Model:

We need to develop an appropriate conceptual model to allow us to identify and understand the factors which are important in the development of this apparent illness without a disease, low back disability.

We have been quite successful in identifying the biological parameters of LBP, have made some headway in identifying psychological factors, but very little in identifying sociological factors. It is likely that these other domains, psychological and sociological are equally important, and at certain stages of the natural history of LBP may be the most important factors leading to chronic disability.

Attempts to incorporate bio-psychosocial models into clinical management of LBP and musculoskeletal injuries in general have been relatively unsuccessful.

Over the past few years a number of authors have recognized the need for a different approach. Despite the earlier work of Meyer[7], and many others, who recognized that psychosocial factors influenced all illnesses, Engel[8] in 1977 wrote about the need for a new medical model. He stated "to provide a basis for understanding the determinants of disease and arriving at rational treatments and patterns of health care, a medical model must also take into account the patient, the social context in which he lives, and the complementary system devised by society to deal with the disruptive effects of illness". Further, he noted "since general systems theory holds that all levels of organization are linked to each other in a hierarchical relationship so that change in one affects change in the others, its adoption as a scientific approach should do much to mitigate the holistic-reductionist dichotomy and improve communication across scientific fields".

In 1986 and 1988 Turk and Rudy[9,10] described the basis of their multiaxial assessment of pain (MAP) model based on the integration of medical-physical, psychosocial and behavioural-functional data.

In 1987, Waddell[11] in response to the increasing concern about low back disability developed a clinical model for the treatment of LBP. He stated "only a new model and understanding of illness by physicians and patients alike makes real change possible". He used Loeser's[12] conceptual model of pain to construct an operational model for clinical practice incorporating the biopsychosocial concept. This concept emphasizes human illness rather than disease.

Peyrot in 1993[13] examined biogenic, psychogenic, and sociogenic models of adjustment to chronic LBP and their ability to differentiate patients with organic and non-organic cause for their pain. The biogenic and psychogenic models were not predictive, while the sociogenic model explained the greater psychological distress among the non-organic patients.

Tamm[14] analyzed 6 models of health and disease, religious, biomedical, psychosomatic, humanistic, existential and transpersonal. It was concluded that different groups in society look at health and illness from partly different models.

Finally, Deyo[15] has pointed out the need for a new clinical research paradigm in back research and it is hoped that such new paradigms will recognize the need for interactive research among the different disciplines.

These descriptive models have been helpful in forcing us to recognize the complicated interaction of factors affecting disability that are not directly related to the actual injury, its severity or medical management. However all the models are two dimensional in their physical construct. While making it very clear that much more than the biomedical model is necessary to explain the individual variability, they do not adequately represent the dynamics of the ongoing interaction of multiple factors over time.

It appears that there are three dominant "domains" within which we must look for factors that influence the course of an individual sustaining a musculoskeletal injury. These are the biological, psychological and sociological. The first is the most studied and in general best understood. The latter two are usually lumped as "psychosocial", but it is important, at least until we understand the interactions a little better, to look at them individually.

Unfortunately we have little understanding of the relative strengths and influence of these factors nor are we yet able to positively identify predictive factors that might be amenable to early intervention.

Biological Domain:

To develop low back disability an individual must first have an episode of LBP. There is sufficient evidence to suggest a strong association between the development of low back pain and certain occupations or work tasks. Further there is evidence that the basic structural disturbance of the tissues involved in acute low back strain should resolve without the sequel of chronic disability.

Psychological Domain:

The evidence is much less clear about psychological and sociological factors, although more recent research is

beginning to identify factors beyond the patient which may be important in the development of low back chronic disability.

The difficulty with much of the psychological research is that the studied populations are those with established chronic LBP. While they provide valuable insight into the behaviours and environmental factors that modify chronic pain, they do not provide help in defining the determinants for the transition of acute low back pain to chronic low back pain in the workplace.

Psychological research in the investigation of determinants of chronic low back pain behaviour seems to have two basic approaches, one is the effect of the environment (operant conditioning), the other an internalized effect involving pain perception or personality (hypochondriasis).

Hazard et al[16] studied 258 patients with LBD admitted to a functional restoration program. They found that disability exaggeration appeared to occur in a nearly normal distribution among the subjects. Factors contributing to disability exaggeration included fear of reinjury, overly protective spouses, physician warnings against painful activity, sick-role familiarity, anxiety, depression, and other personality features.

Waddell and Pilowsky[17] used the Illness Behaviour Questionnaire in two patient populations, 119 patients admitted to a regional Problem Back Clinic[18], and a prospective study of 113 patients undergoing primary disc surgery or chemonucleosis[19]. The most important dimension of the IBQ was the disease affirmation scale. Their interpretation of a high score on this scale was "the patient thinks that he has a serious physical illness which interferes with life a great deal, is associated with many troublesome physical symptoms and will not be amenable to reassurance by a doctor".

Turk and Rudy[20] have developed a classification system (Multiaxial Assessment of Pain(MAP)) for chronic pain patients based on physical, psychosocial, and behaviourial data. They were able to develop a taxonomy of pain patients based on the psychosocial and behaviourial data alone, outlining three distinct patterns that occur in homogeneous subgroups of chronic pain patients independent of medical diagnosis.

In a study of 200 chronic low back , 200 temperomandibular joint, and 100 headache patients from a University-based outpatient pain clinic they identified that the three patterns were distributed equally in each of the medical diagnostic groups. The results suggested that although the medical diagnoses were different, that in addition to appropriate medical intervention, specific psychosocial interventions tailored to the MAP classifications were indicated.

Talo[21] studied global functioning of rehabilitation patients, as determined by physical, psychological, and social factors. Multiple regression analysis showed that the psychological variables explained only 32% of the variance in follow-up functioning. It was felt that this was in agreement with the biopsychosocial view that psychological factors are only one class of events manifesting in illness, functioning and behaviour.

Sociological Domain:

There are a number of studies which indicate that sociological factors can influence the onset and the outcome of musculoskeletal pain.

In a large prospective study, Bigos[22] found that a response of "hardly ever" to the question " do you like your work" in a modified work "APGAR" questionnaire was the best predictor of a subsequent report of low back pain. In the same study the best predictor of time loss due to low back pain was an unsatisfactory work performance report in the previous 6 months.

Jamison and Virts[23] examined a random sample of 181 chronic pain patients one year after discharge from an out-patient pain program. The original population was made up of 233 patients who on admission to the program had described their family as always being supportive, and 275 who described family disharmony and limited support. The patients with non-supportive families tended to have liability and work-related injuries, relied on medication, reported having more pain sites and used more pain descriptors in describing their pain. They also tended to show more pain behaviours and more emotional distress. The group with strong support reported significantly less pain intensity, less reliance on pain medication and greater activity levels. They tended to be working and not to have gone elsewhere for treatment.

In a qualitative study of 52 women off work with repetitive strain injury, Reid[24] found that a major cause of distress was that the legitimacy of their claim was questioned. In addition there was the dilemma of seeking relief while at the same time being forced to be convincingly symptomatic to maintain their benefits. Reid quotes from Frankenberg "chronic disease, whether continual or...spasmodic, leads clearly to a different and perhaps more complicated way of being sick. It requires a different, longer lasting and more demanding cultural performance".

Tarasuk and Eakin[25,26] in a qualitative study of workers off work because of LBP identified "legitimacy" and perceived "vulnerability" as central features of the experience of work-related back injury.

Neimeyer[27] has developed a model to demonstrate the negative dynamics which can occur in the interaction of an injured worker with a provider of workers' compensation services. The resultant social labelling, stereotyping and observer bias is shown to result "in a self-fulfilling prophecy in which the expectancy- driven behaviours of the clinician or case manager can subtly direct the patient to behave in a manner consistent with the expectations".

Construction of a Conceptual or Explanatory Model:

One reason for our ineffective management of LBD has been our inability to answer a question; "what are the factors which act to convert an otherwise healthy individual with acute low back pain to one with a major handicap, yet not the majority of others?" This handicap is in reality a syndrome characterized by not only chronic pain and behavioural changes in an individual, but by behavioral and attitudinal changes in those associated with him/her. It involves family, treaters,

co-workers, supervisors, and insuring and compensating agencies.

A conceptual model must include domains involved in the transition of LBP to LBD, the biological, the psychological and the sociological. It assumes that all three interact, the interactions likely vary within and between individuals, the relative influence of each will vary, and that all influences and interactions will vary with time.

The interactions at a given time could be represented by a triangle, as in fig.1. Each apex would represent one of biomedical, psychological and sociological. The relative influence of each at that time would be represented by the height of the apex. The stronger the influence, the higher the apex. At any given time there would be an "equilibrium" state represented by the intersection of equidistant lines from the apices. This "equilibrium" state will represent the individual's functioning within his/her total environment. Since we really don't know the absolute influence of the three domains, one could propose that all three would be of about equal influence under "normal" circumstances, and the figure could be represented by an equilateral triangle.

A change in the influence of one of the domains, for instance an acute injury would greatly expand the influence of the biomedical axis, altering the configuration of the triangle, and would move the equilibrium point away from "normal".

In each domain there will be change over time. For example the domains "influence" over time could be represented by the natural history of a simple back strain as shown in fig.2. If the biomedical course was plotted as in the figure, there would be a sudden

CONCEPTUAL MODEL

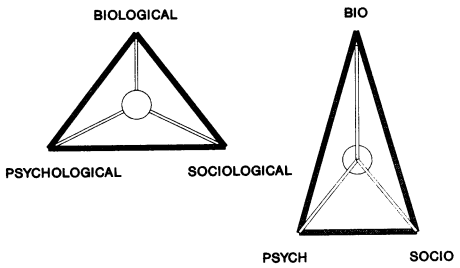

FIGURE 1

change from the baseline or "normal" state, followed by a period of about three weeks during which the deviation from the normal physiological and anatomical state would gradually lessen to normal or near normal dependant upon the severity of the injury and whether any permanent disruption has occurred.

The psychological influence might be somewhat altered by an enforced absence from work and some resultant anxiety. There likely would not be much deviation from baseline "normal" initially, then the anxiety level might rise somewhat as the injury might be painfully slow to respond and hence perceived to be more serious than first imagined. There might be a delayed return to baseline, even after return to work because of fear of reinjury.

The sociological course might be affected by an external influence such as the necessity to apply for workers' compensation. There would be no initial deviation as all the reporting mechanisms would be followed. However, after the first pay cheque is missed at 2 weeks and nothing has been heard from the Compensation Board, the influence of this domain could start to be of some significance. Again, the influence may last beyond the actual return to work if the claim has still not been accepted.

In all three cases, the baseline may be permanently "adjusted" to a different level, as indicated to the right of the graph. An indicator of this might be a recovery time prolonged beyond that expected. If the delay was not excessive, the reasons for delay might not be identified and addressed. In ensuing episodes this lack of awareness and resultant lack of remediation might lead to increasing length of disability and perhaps to eventual chronicity.

This effect could explain the findings from the study of steelworkers described previously.

This model can be represented in three dimensions. If the data from a muscle strain from fig.2 were plotted in three dimensions over time, it would appear similar to fig.3. The equilibrium points are altered by the relative influence of the three domains at any given time and thus will deviate from the "expected"

DOMAIN INFLUENCES

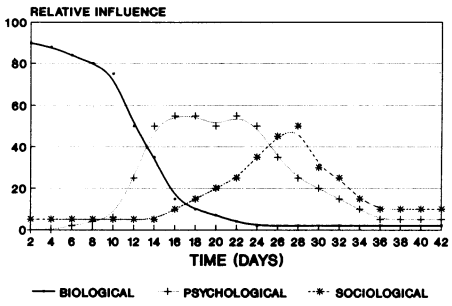

FIGURE 2

course on the vertical axis represented by the biomedical domain. The final "equilibrium" point in this case has also been shifted from the that expected if the individual had not had the experience.

So even in this modest case, it is possible for all domains to have an influence. Each has been affected independently by circumstances particular to each and by circumstances that can be independently assessed. The net effect on the individual, however, is the result of an interaction between all three. This effect may well not be predictable from an individual assessment of each domain. For example, if one attempted to look at the results from only the perspective of the biomedical model, that is a vertical "slice" of the biological domain taken along the course of the recovery from the injury, it is obvious that it would not be long before the patient was perceived as not behaving "normally".

Relying on the anticipated course of one domain, unless it is overwhelmingly influential, can result in inaccurate predictions.

An interesting observation relative to this model is that to understand the interaction within and between fields, it

MODEL AND TIME

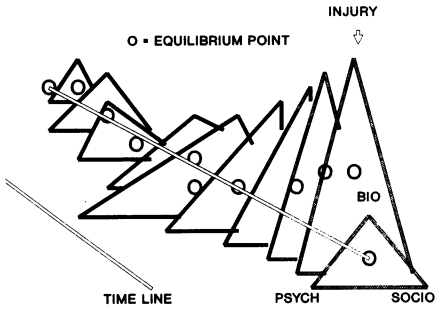

FIGURE 3

will be necessary to integrate three fields of research that have different traditions.

Gordon[28], in a paper outlining the research traditions available to family medicine, has summarized the essentials of these traditions.

The biological science tradition is reductionist, the study in great detail of the smallest and simplest systems, with the expectation that a complex phenomena such as a disease can then be explained by the aggregation of these simpler, but predictable mechanisms.

The psychological tradition is essentially the result of the work of R.A. Fisher. Statistical models and analyses, such as linear regression, were developed in order to assess the contribution of the many variables affecting the yield of a crop. The behavioral scientists soon recognized that they could use this agricultural approach to advantage. Measurement of yield could be replaced by measurement of constructs. Any number of potential influences could be hypothesized as affecting the outcomes and then measured and manipulated to isolate the components of behaviourally or socially important outcomes using regression analysis.

The sociological tradition, derived from the ethnographic methodology pioneered by cultural anthropologists, is one of disciplined, subjective observation of a group with which there is extended and intimate contact. The research involves extensive interviews, identification of shared assumptions and meanings, in order to provide unifying explanations for the dynamics of events and behaviours in the setting. There are two basic assumptions. First, that "scientific" objectivity is inappropriate when applied to the study of man. In other words, human behaviour cannot be understood without understanding the framework within which people interpret their thoughts, feelings, and activities. Second, that human behaviour is influenced by the physical setting within which it takes place and by the internalized notions of individuals about the kind of behaviour that is expected and allowed. This latter hypothesis implies that altering the "environment", as in an experiment, will result in atypical behaviour.

Conclusion:

Apart from helping to explain the frequent discrepancy between "expected" course and actual outcomes following a musculoskeletal injury, this model has a number of potential uses.

First it is of importance to occupational health because it reinforces the fact that scrupulous management of the pathophysiological consequences of injury is not sufficient to guarantee return to normality. Moreover, the occupational health practitioner is familiar with, and has access to the means to intervene with, the other domains. In particular there is the unique opportunity to directly influence both management and union to improve the social as well as the physical environment. There is some concern that the gradual shift of occupational health practice away from the workplace to centralized clinics may unwittingly decrease this potential effectiveness. It is essential that practitioners continue to recognize the importance of maintaining direct contact and access to the workplace. Not only to understand what is happening, but to be in a position to provide effective intervention and management.

Second, it underlines the importance of the interactions between these domains. It is likely that we have only a rudimentary understanding of the manner in which these interactions affect behaviour. Since there are likely multiple possible combinations and permutations, we need to identify a smaller number of the most influential factors in each domain in order to begin to test whether they are predictive and amenable to intervention.

Third, it identifies areas for research and for development of interactive methodology at the interface of three basically different research traditions. Indeed a few studies are beginning to appear in the literature attempting to address this issue[10,13,29].

(References available on request.)

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UPCOMING CONFERENCES

1st Annual Update in Occuptational Medicine, "Recent Advances in Repetitive Strain Injuries".

October 14, 1995

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International Commission, Occupational Health, World Health Organization, International Labour. International Symposium on Occuptational Health Services: Structure, Functions and Financing, Singapore

February 4-10, 1996

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February 24-27, 1996

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