NEW DEVELOPMENTS
IN
OCCUPATIONAL STRESS

Proceedings of the Conference on Occupational Stress
Held in Los Angeles 13 November 1978 Co-sponsored by
The Institute of Industrial Relations
Center for Management Research and Education
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Institute of Industrial Relations
University of California, Los Angeles
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ABSTRACT

This volume contains the proceedings of a conference held to
acquaint managers and health care professionals with new develop-
ments in the field of occupational stress. Approximately 250 in-
dividuals attended the one-day conference.

Psychological stress research performed by the National Institute
for Occupational Safety and Health (NIOSH) from 1971 to 1976 is re-
viewed first with an emphasis on defining high-risk work groups and
isolating specific sources of stress in the work environment which
may influence worker health. Current studies described in the next
two presentations include examination of the relationships between
coronary heart disease and machine-pacing with occupational stress,
followed by a discussion of the rise of worker compensation claims
based on cumulative injury, which includes stress-related diseases.

The remaining papers deal with issues bearing upon the establish-
ment of work-based programs to deal more effectively with occupa-
tional stress/strain.

The necessary steps to be taken by a consultant in setting up a
corporate stress awareness program are presented followed by the
description of an active, in-house employee assistance program
amenable to including stress management.

A socio-technical approach to dealing with stress in large organizations is described, as is a union-management collaborative program on occupational health. Finally, specific topics which merit attention are outlined in the concluding remarks.

CONTENTS

INTRODUCTION

The rising incidence of stress-related disorders has generated con-
siderable research interest in occupational stress and in efforts
aimed at alleviating such disorders. The National Institute for
Occupational Safety and Health (NIOSH) has taken a leading role
in examining the relationship between job stress and worker health
and has sponsored meetings and conferences to bring up-to-date re-
search findings to public attention in a timely fashion. This con-
ference represents a product of that activity.

Attempts are being made to define stressors--those elements in the
work environment which generate distress in the workers. Psycho-
social factors are emerging as important sources of stress which can
influence worker health and well-being. The complex interaction be-
tween work and life stress and the effects of personality traits on
stress reactions are a few of the diverse areas being investigated.
Factors which serve to "buffer" the individual against stress (e.g.,
biofeedback, relaxation) are also being investigated.

While stress-management or stress-reduction programs are being im-
plemented at an ever increasing rate, there exists a gulf between
the professional/practitioner and the scientist/researcher. This
is due in part to a lack of "cross-talk" between these groups that
hinders the translation of research findings into applied therapies
and programs.

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In order to help bridge the gap between research and application, the Institute of Industrial Relations, UCLA, conducted this conference on November 13, 1978 with the co-sponsorship of NIOSH. The conference provided a forum for researchers and practitioners to interact and present respective viewpoints. The presentations were recorded and are presented in this volume, some as they were transcribed and others as formal papers received f om the authors after the conference. It is hoped that these proceedings will promote greater awareness and understanding of occupational stress and the methods being developed to deal with it.

A REVIEW OF THE PSYCHOLOGICAL STRESS RESEARCH
CARRIED OUT BY NIOSH, 1971 to 1976

Michael J. Smith, Ph.D.
Michael J. Colligan, Ph.D.
Joseph J. Hurrell, Jr., M.S.*

INTRODUCTION

From its inception, NIOSH has carried out a concerted research
effort to examine the role of behavioral or psychological factors
in the occurrence of occupational injuries and illnesses. One
major component of this program dealt with the health consequences
(both physical and mental) of occupational stress. This research
has taken two major thrusts. The first has been broad-based sur-
veys seeking to define specific groups of workers at greatest
risk of suffering from high levels of job stress and strain and the
job demands that produce stress problems. The second thrust has
been more focused, concentrating on select high stress occupations
and specific stress-producing work conditions to characterize
their potential health consequences.

Both the general and focal studies have utilized health record eval-
uation as well as questionnaire and interview techniques to define
stress problems. Because of their in-depth nature, the focal stud-
ies have delved much deeper into specific stress-producing work

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conditions and aspects of worker health than the more general in-
formation studies. The intent of this paper is to highlight NIOSH
research exemplifying these two approaches.

GENERAL STUDIES

The first NIOSH research dealing with identifying high stress-risk
individuals and stressful job elements was a cooperative effort
with the Institute for Social Research at the University of Michi-
gan performed in 1972.

The study was co-sponsored by the U.S. Department of Labor, Employ-
ment Standards Administration. Approximately 1,500 American fam-
ilies, whose employed members represented a national probability
sample, were surveyed utilizing a structured interview procedure.
Many aspects of the individual's working life were evaluated from
satisfaction with pay level, to amount of sick leave used per year,
to relations with supervisors. Included in the survey were items
concerning job stress and employee safety and health. There were
twelve different occupational groups studied, covering a range of
white and blue collar jobs.

The results indicated that the following outcomes were related to
job stress level: job satisfaction, life satisfaction, motivation
to work, intention to leave job, absenteeism, overall physical
health, self-esteem, depressed mood, and escapist drinking. One
stressor, non-participation, appeared to be of special significance,
correlating highest among all of the stressors with eight strain

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measures. Responses to the job stress and strain questions varied
considerably across occupations. Professional and technical work-
ers and managers scored highest in perceived job satisfaction but
also showed high levels of depressed mood. Machine operators scored
lowest for job satisfaction, low in perceived health, but the best
of any group on the mental health measures. Laborers showed the
second worst job satisfaction level, but perceived their health as
good and scored well on mental health measures. Overall, white col-
lar workers showed much greater job satisfaction than blue collar
workers although showing slightly higher depressed mood and slight-
ly poorer perceived health.

A second major study, dealing with defining high risk occupations
and evaluating the impact of particular stressors, was also con-
ducted for NIOSH by the Institute for Social Research at the Uni-
versity of Michigan. Entitled "Job Demands and Worker Health,"
this project went further than the previous one in that it exam-
ined 23 occupational groups and conducted a more expansive examin-
ation of job stressors and their role in producing job stress and
strain. Over 2,000 workers were surveyed via questionnaire. As
with the previous study, the results indicated strong occupational
differences in stress/strain levels. Specific stressors such as
low utilization of abilities, lack of participation, low work com-
plexity, responsibility for persons, and role ambiguity were high
for assembly line workers, fork-lift drivers, and machine operators;
but very low for professors, family physicians and other profession-
als. Machine-paced assembly-line workers scored high on boredom
and dissatisfaction with workload. The most satisfied occupational

groups were family physicians, professors, and white collar super-
visors. Overall, assemblers and relief workers on machine-paced
assembly lines had the highest level of stress/strain.

The most significant stressors reported by the study participants
were difficulties with job complexity (too little for blue collar,
too much for professional), utilization of abilities (underutiliza-
tion for blue collar, overutilization for professionals), and re-
sponsibility for persons, which was most troublesome for first lev-
el supervisors and air traffic controllers. In addition to these,
blue collar workers complained of job dissatisfaction, boredom, and
dissatisfaction with workload.

The third and final study in this program area was a records eval-
uation of over 22,000 cases of stress-related health disorders in
130 occupations in the state of Tennessee. This study is described
in detail in the proceedings of last year's UCLA stress conference,
and therefore I will only summarize the findings. The results eval-
uating the health disorders case data indicated that 40 of the 130
occupations had a stress-related disease prevalence significantly
higher than expected. Of these 40 occupations, 12 had very high
prevalence rates. These were laborers (general and construction),
secretaries, inspectors (assembly-line), clinical laboratory tech-
nicians, office managers, managers/administrators, foremen, wait-
resses/waiters, machine operatives, mine machine operatives, farm
owners, and house painters. There were 77 occupations that showed
expected stress disease prevalence and 13 occupations that showed

significantly lower than expected stress disease prevalence. The
13 lower-than-expected occupations included sewers, checkers/exam-
iners, stockhandlers, freight handlers, craftsmen, maids, farm
laborers, heavy equipment operators, child care workers, packers/
wrappers, college professors, personnel/labor relations workers,
and auctioneers/hucksters.

The three studies just described have made important contributions
to the study of occupational stress. First, they are significant
because they represent the only unified effort by a research group
to compare stress/strain levels over a wide range of occupations.
Second, they have been instrumental in defining, verifying, and
elaborating critical workplace factors related to stress such as
machine pacing, lack of control, poor supervisory relations, and
lack of social support. Finally, they have identified many high
risk occupational groups suffering from job-related stress and
strain worthy of in-depth evaluation.

FOCAL EVALUATIONS OF STRESS PRODUCING CONDITIONS

As already noted, the second major thrust that has been taken by
the NIOSH stress program has been to examine in detail particular
high stress occupations or significant job stressors. In this re-
gard, specific occupations, such as police and coal miners, have
been examined, as have individual stressors such as shiftwork and
machine pacing.

Job Specific Stress Problems

The first high risk group to be evaluated by NIOSH was policemen.
This study was initiated in 1972 and examined a sample of police
officers and administrators on the Cincinnati, Ohio police force.
In this study 100 police officers and 20 administrators from this
approximately 1,100-person police force were given in-depth inter-
views about their work conditions and health problems. Interviews
of police officers were conducted in the officer's police car while
on duty. If an emergency came up the interview stopped until the
officer was free to continue. Each interview (without interrup-
tions) took about 45 minutes. A semi-structured interview format
was used in which open-ended questions were asked. The officer an-
swered these questions; then based on the responses, in-depth fol-
low-up questions were asked.

Results of the police officers' interviews indicated that the most
significant stressors were adverse court interactions, negative
public reactions, and lack of appropriate equipment. These types
of stressors were more significant and more often emphasized than
were direct life-threatening situations. Taken as a whole, the of-
ficers believed that their professionalism in law enforcement mat-
ters was at stake.

Police administrators were interviewed in their offices at district
or department headquarters. The interview was similar to that of
the officer except that administrative burdens were given more em-
phasis. The results indicated that the most significant problem

for police administrators was the "man-in-the-middle" phenomenon produced by conflicting demands from superiors, subordinates, and the community. This problem was reported as having a number of negative effects on the administrator's family and home life.

Based on the results of these first police evaluations, a major study was initiated, in cooperation with the Police Foundation and the International Conference of Police Associations, to define stress problems in a nationally representative sample of police officers and administrators. This study surveyed over 2,200 police officers from 29 separate departments spread across the country, utilizing a stress questionnaire that examined 40 stressors as well as possible health outcomes. The data are still being analyzed and therefore what is presented here is only preliminary. The preliminary results for just the police officers indicate that boredom, role conflict, and job future ambiguity were found to correlate highly with health complaints and self-reported physical health status. Furthermore, police officers were found to have a divorce rate which was more than twice the national average. More complete results from this study will be available in a report which is nearing completion.

A second group of workers which we have examined is coal miners. Stress problems for coal miners were evaluated as an adjunct to a larger study aimed at examining factors which motivated the use of safe procedures and wearing of personal protective equipment by coal miners. Approximately 486 coal miners from 29 mines distri-

buted across the 9 major coal producing states were surveyed using a questionnaire. In addition, family members of a sample of the survey respondents were interviewed. The results were compared with the findings for blue collar workers in the earlier study of "Job Demands and Worker Health." It was found that miners in general fared better than other blue collar occupations in various measures of job stress. They reported more participation, more utilization of skills, a less variable workload, and greater equity in wages. However, miners did show higher levels of mental strain (anxiety, depression, irritation) than the other blue collar occupations.

High Risk Stressors

A major area of our stress program deals with evaluations of high-risk job stressors--those conditions that have the greatest potential for producing job stress and adverse health consequences. This has developed mainly from our earlier described work in identifying high risk work groups. The purpose of this research effort is to evaluate the significance, in terms of worker health, of general stressors that affect large numbers of workers. To date we have examined two such stressors--shiftwork and machine pacing. Dr. Murphy will present an in-depth look at our current results dealing with machine pacing in a separate paper.

In a recent NIOSH-sponsored study conducted by Stanford Research Institute (SRI), it was determined that approximately one out of every four employees works other than a regular day (morning to evening) work shift. The type of shift worked varies considerably in

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terms of starting and ending times, and there are also variations
in fixed and rotating schedules. However, the majority of shift-
workers fall into the fixed afternoon, fixed night, or rotating
(morning, night, afternoon) categories. NIOSH in conjunction with
SRI carried out an evaluation of the health and safety effects of
the aforementioned shift schedules in two work groups--nurses and
food processors.

This study combined a questionnaire survey with a health and safe-
ty records evaluation of over 1,200 nurses and 1,200 food pro-
cessors distributed across the country. The questionnaire survey
examined worker perceptions of job conditions and stress factors
as well as specific shift matters related to life styles, family
problems, coping patterns.and health complaints. The health and
safety records evaluation examined dispensary logs, OSHA 100 logs,
and personnel records to compile health and safety information.

The results of the study indicated that the nurses and food pro-
cessors working rotating shifts had significantly more dispensary
visits and recordable accidents (almost twice as many) than did
those workers on fixed shifts. Workers on day shifts had the least
health and safety problems, followed by afternoon and evening fixed
shift workers.

In terms of job stress and strain, the rotating shift workers showed
a significantly higher incidence of the following problems than did
fixed shift workers:

--Digestive trouble

--Chest pains

--Wheezing

--Nervousness

--Inadequate sleep patterns

--Colds

--Fatigue

--Leg and foot cramps

--Less satsifactory domestic and social life

--Alcohol consumption

--Use of stimulants

--Use of sleep-enhancing medications

The results of the study support the view that there is a tendency for shiftwork (in particular rotating shiftwork) to have a deleterious effect on the physical and psychological well-being of a significant number of shift workers. These effects include disturbance of sleep patterns, digestion problems, mood disorders, and negative impact on personal, social, and domestic activities. The effects become more severe with departures from the conventional daytime work schedule.

HEALTH PROBLEMS OF PSYCHOGENIC ORIGIN

The final research area I plan to address deals with our in-depth examinations of psychogenic illness related to job stress. There are two studies in this area. One examines the relationship between specific job stressors and coronary heart disease. Dr. Chad-

wick will be giving a detailed description of this research in a
separate paper. The second study deals with evaluations of mass
psychogenic illness (assembly line hysteria) in industry. Since
1974, we have participated in evaluating eight plants where such
outbreaks have occurred. These outbreaks are typified by a number
of workers becoming simultaneously ill, displaying symptoms such as
dizziness, weakness, difficulty breathing, vomiting, fainting, etc.
These symptoms are indicative of toxic poisoning and produce a great
deal of apprehension in the workers affected, as well as their un-
affected coworkers. When such incidents occur, the Occupational
Safety and Health Administration (OSHA) and/or NIOSH will be noti-
fied. NIOSH gets involved when a request for assistance comes from
OSHA, the employer, or the union (or employee representative).

The first action that NIOSH takes is to determine if a toxic agent
is present that could have produced the outbreak. If no such agent
is identified, then a biomedical evaluation team is asked to evalu-
ate the working conditions and the employees to determine if the out-
break could have had a psychogenic component. These evaluations en-
tail an examination of medical records and employee symptoms, em-
ployee psychological status, job stressors, life stressors and home
problems, and sociometric interaction.

The results of the biomedical evaluations from the first five plants
examined revealed the following:

    --In general, mass psychogenic illness occurs in predominately
    female workforces and affects primarily women.

    --Those persons affected are experiencing high levels of job

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stress. Worker complaints center around work pace, poor su-
pervisory relations, lack of social support, boredom, role
ambiguity, and poor physical work environment (noisy, poor
lighting).

--Problems of work interfering with family responsibilities
were a major difficulty for the women affected. For instance,
overtime was often required at the time the outbreak occurred.
Working women complained that such overtime took away from
the little time they had to fulfill their housewife responsi-
bilities.

--The outbreak is usually triggered by a physical stimulus,
for example, an odor.

These results are far from complete. We will have to evaluate many

more of these outbreaks in order to get reliable, generalizable

trends. Future efforts in this area will include not only the eval-

uations of more such outbreaks, but also the development of inter-

vention strategies to deal with such outbreaks when they occur.

CONCLUSION

The intent of this report has been to summarize the work of NIOSH

in examining occupational stress from 1971 through 1976. As you can

see, there have been two major areas of concern--one aimed at de-

fining high risk groups and select job stressors; another aimed at

keying in on the particular stress problems encountered by specif-

ic high risk groups. The former endeavor encompassed the major work

done by NIOSH for the first four years of the stress program and has

established an excellent base upon which to build the latter work.

Current emphasis is on examining particular stressors that impact

across a wide variety of work groups, and in defining critical ele-

ments responsible for worker ill health. Such studies will form the

basis of developing methods and programs for eliminating or reducing worker stress.

In addition to the studies described above, NIOSH has sponsored a number of conferences, some of an international nature, which bring together experts on various aspects of job stress to present state-of-the-art information as it is being developed. As you know, there is always a considerable lag between the time a research study is completed and when the results reach the literature. Even then it may be years before the results of such research become common public knowledge and are applied. The purpose of the NIOSH conferences has been to bring pertinent current stress knowledge to public view in a timely fashion so that new developments can be utilized as soon as possible. NIOSH sponsored conferences have included:

1. General Stress Conference - Cornell Medical Center 1972

2. Conference on Shiftwork Health Effects - NIOSH 1975

3. Conference on Job Stress and the Police Officer - NIOSH 1975

4. Conference on Reducing Occupational Stress - Cornell Center 1977

5. Conference on Occupational Stress - UCLA 1977

6. The current conference (New Developments in Occupational Stress - UCLA 1978)

I have given very brief overviews of a number of our completed studies. I would like you to keep in mind that there are a great number of important aspects of the findings from each study that I could not cover here. Reports on almost all of the studies covered are available from NIOSH, and I urge you to write to obtain copies.

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MACHINE PACING AND OCCUPATIONAL STRESS

Lawrence R. Murphy, Ph.D., and Joseph J. Hurrell, Jr., M.S.*

This paper addresses two questions:

1. Are machine-paced job operations inherently stressful
    to the worker?

2. Is the stress arising from machine-paced work sufficient-
    ly great to place workers at a greater risk for health
    disorders?

Past research cited in the literature and current projects being
conducted or supported by the National Institute for Occupational
Safety and Health (NIOSH) that bear on answers to these questions
are reviewed here.

At the outset, it is important to note that the majority of stu-
dies concerned with aspects of machine-paced tasks have been pri-
marily directed to performance and work capacity considerations.
In this regard, measures of interest have included production out-
put, error rates and indices of energy expenditure such as oxygen
consumption rate (Wyatt and Langdon, 1938; Conrad, 1954; Corlett
and Mahadeva, 1970; Salvendy and Piltsis, 1971). Fewer investiga-
tions have been made into the psychological problems or health con-
sequences connected with forced paced-work routines. In fact, a-
side from a recent Swedish study on machine pacing and health,

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there exists no systematic investigation of such problems. The
following excerpt from this Swedish study describes the ration-
ale for viewing machine-paced work as stressful with potential
health consequences:

> The social psychological approach is based on the
> assumption that challenge and pride in work are
> fundamental ego-needs, and that any serioıs threat
> to these needs will endanger the individual's total
> wellbeing. Critical factors are those which circum-
> scribe the individual's ability to control his own
> work and assess his work role in relation to a mean-
> ingful whole, as well as factors which limit his op-
> portunities for cooperation and fellowship with oth-
> ers. Among specific job characteristics which have
> been identified as particularly threatening, some
> are associated with underload, others with overload.

> Examples of the former category are mechanically con-
> trolled work pace, standardized motion patterns, con-
> stant repetition of short-cycle operations, and lack
> of opportunities for social interaction in the course
> of work. Examples of the latter include piece-rate
> rush and high demands on superficial attention. It
> should be noted that these characteristics of under-
> and overload tend to occur in the same work situation.
> For example, workers engaged in repetitive, machine-
> paced tasks may be required to make skilled judgements

at short intervals. Such a combination of monotony
and pressure, typical of work on the assembly line,
exposes the worker to a heavy total load. (Franken-
hauser and Gardell 1976, p. 36)

WHAT IS MACHINE PACING?

At the first glance, the concept of machine pacing seems straight-
forward. It is a work condition in which the speed or pace of
the operation and the work output are controlled to some extent
by a source other than the operator. This differs from self-
paced operations where the output, rate, and speed of the task be-
ing performed are under the continuous control of the operator.
In reality, there exists a continuum between the extremes of oper-
ator control along which specific work operations may fall.

Conrad (1954) was perhaps the first to call attention to the im-
portant fact that there are different types of pacing. He identi-
fied two types, which he called "rigid systems" and "systems with
margins," respectively. Dudley (1962) describes the distinction
between these two types of pacing as follows:

In an extreme case, the operative may be rigidly
paced by a machine, in that the time allowed to per-
form the operation is equal to the time required for
its completion and every article or component must
be dealt with. In other cases, a few misses may be
allowed, a few faults tolerated, or a little waiting

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time introduced. Alternatively, the work itself
may be allowed to accumulate at the work station
to permit some degree of flexibility on the part
of the operative.

Murrell (1963) described two slightly different types of pacing
which he referred to as Type 1 and Type 2 pacing. In Type 1 pac-
ing there is a time period in which some operation must be carried
out; little or no work is performed by the operative while the
machine is indexing or processing the part. This type typically
occurs in situations where workers perform tasks which support
machine functioning, e.g., feeding machines, removing processed
parts.

In Type 2 pacing, work is performed during the period that the ma-
chine indexes and must be completed at the time that the machine
is ready to be fed, i.e., work is performed in synchrony with the
machine cycles. This type occurs when operatives must remove a
part from a belt, process it and return it to the belt before the
next part passes out of reach.

From the above discussion, it should be obvious that numerous va-
rieties of pacing exist, and that different paced systems may re-
quire different amounts of cognitive and motor activity from the
worker. Unfortunately, many of the studies concerned with the ef-
fects of pacing fail to document adequately the specific character-
istics of the system being examined.

The material reviewed in this paper seeks to clarify relationships between different machine-paced job demands, emergent stress in workers engaged in such tasks, and the potentiality for stress-related health disorders. By way of organization, relevant studies are grouped under two main subject headings, namely, field or work-site studies and laboratory research. For each subject area the previous work reported in the literature is summarized as a prelude for describing current or planned efforts by NIOSH to obtain definitive information on the problem.

In addition to the references cited in the text, a selective bibliography is provided at the end of the paper for the interested reader. Portions of this paper were based upon a literature review of job stress in machine-paced work conducted by Canyon Research Group (1977) under contract with NIOSH.

FIELD STUDIES OF MACHINE PACING

Early field studies reported a variety of negative psychological reactions in workers involved in machine-paced jobs. These reactions included expressions of high job dissatisfaction (Wyatt and Marriott 1951), "tension" (Kretch and Crutchfield 1948), feelings of anonymity (Walker and Guest 1952), and under-utilization of abilities (Kornhauser 1965). Other studies have reported more frequent health complaints among workers in machine-paced tasks such as muscle cramps and spasms, nervous disorders (Komoike and Horiguchi 1971), and a range of psychosomatic problems including peptic ulcers, heart attacks, and strokes (Frankenhauser and Gardell 1976;

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Kritsikis, Heinemann, and Eitner 1968).

In a recent comprehensive study, Frankenhauser and Gardell (1976) studied machine- and self-paced workers in Swedish sawmill operations using questionnaires, health examinations, and clinical laboratory tests. The authors found more feelings of monotony, general mental strain, and exhaustion at the end of the work day, as well as frequent sick leave requests and greater morbidity, among workers in machine-paced jobs than those in self-paced jobs. Medical examinations revealed a higher incidence of psychosomatic, cardiovascular, and stress disorders in workers involved in the machine-paced tasks as compared with those in non-paced jobs. Results of biomedical tests indicated elevated adrenaline secretion in those workers involved in paced job operations and a similar, though non-significant, trend for nonadrenaline release.

Frankenhauser and Gardell (1976) related the biomedical findings to both self-reported feelings of "well-being" and measures of repetitiousness of the job. Specifically, low adrenaline release was associated with more positive statements of well-being and less repetitiousness of the job. Feelings of exhaustion at the end of the shift and the inability of machine-paced workers to relax soon after work were related to increased adrenaline secretion. The authors concluded that lack of control over workplace was an important contributing factor, producing increased "wear and tear" among workers engaged in machine-paced jobs.

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In research conducted for NIOSH by the University of Michigan, workers in twenty-three occupations were surveyed via questionnaire for levels of job stress and strain and health status (Caplan et al. 1975). The twenty-three occupations included both blue and white collar jobs. Machine-paced assembly line workers (and their relief men) reported the highest levels of job stress and strain relative to all occupations studied. Significant sources of stress and strain evident in the questionnaire responses of these workers were:

1. Underutilization of abilities--feelings that one's talents and skills were not being used to their fullest on the job.

2. Decreased participation in decision making--having little or no input to the decision making process which affects how a job is performed.

3. More frequent feelings of boredom and dissatisfaction with the amount of work to be done.

4. More frequent feelings of anxiety and general irritability.

5. More frequent health complaints.

While these field studies suggest possible adverse psychological and health effects in workers engaged in machine-paced jobs, conclusions of this nature will require more definitive data. Indeed, the above mentioned studies did not acknowledge or control for other factors in the work environment which may also have contributed to the indicated problems. Also, some of the results are

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based solely upon self-report indications of job stress and health
status, which could be open to bias.

Current NIOSH Field Studies

NIOSH is engaged in two projects aimed at verifying, as well as
obtaining a more complete picture of, stress/strain effects and
health difficulties connected with machine-paced work. One project
deals with operators of multiple position letter sorting machines
(MPLSM's) in the U.S. Postal Service, and the second one with U.S.
Department of Agriculture (USDA) poultry inspectors.

MPLSM Operator Studies

In the MPLSM job the operator typically is seated at a console
with a twelve-digit keyboard and a display window. Letters are
conveyed to the workstation and appear in the display window for
approximately one second. The operator must scan the envelope
address and then type three or four digits of the zip code which
assigns the letter to the appropriate bin for local delivery. (Of-
ten the task can be more complex. What is presented here repre-
sents a simplified description of the task.) The operation is ma-
chine-paced at a rate which varies with local post offices, but
is generally set at about 55-60 letters per minute. Operators
typically work on this task for 45 minutes in a given hour and
spend the remaining 15 minutes performing other duties.

Three different approaches are being used by NIOSH in examining
job stress problems in MPLSM operators. These are: (1) a human

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factors evaluation, (2) a cross-sectional questionnaire survey, and (3) a longitudinal study.

Human factors evaluation--Using human factors experts, an evaluation will be made of the man-machine-environment interrelationships seen in MPLSM job operations. Operational and design features found incompatible or particularly stressing on human performance skills will be targeted in this effort. Plans call for the human factors design study to include site visits to fifteen selected MPLSM facilities. A checklist will be developed of factors to be examined during these observations which will include job demands, keyboard design, informational displays, motion pattern analysis, man-machine interface compatibility, and psychosocial considerations. Detailed analysis of job demands will include physical demands on the operator (musculature requirements, work-rest cycles, work posture), cognitive demands (attention requirements and information processing load), and work environment factors (noise levels, temperature variations, lighting requirements, and workspace adequacy).

As already mentioned, the human factors evaluation will identify problems in the MPLSM operation due to inadequate interface between the worker, the machine, and the work environment. Such problems will become further elaborated in the two other phases of this project which concentrate on worker reactions to the demands of MPLSM work.

Cross-sectional questionnaire--A second part of the MPLSM project
will be a questionnaire assessment of job stress/strain and work
conditions in six-thousand MPLSM operators and six-thousand con-
trol workers in fifty postal service facilities nationwide. The
study sample will be stratified by major regions of the country as
well as by facility size. The questionnaire is made up of differ-
ent sections which assess job stress as produced by amount of work-
load, workpace, control over workpace, supervisor relations, and
physical characteristics of the work environment. Questions are
also included dealing with psychological and medical health status,
Type A personality tendency, and measures of life stress. Re-
sponses of MPLSM operators and control workers will be compared to
gauge the added stress and related effects expected from the machine-
paced jobs.

The results of the questionnaire survey will define potential
sources of job stress in these employees and highlight important
stress points in their work situation. The large number of employ-
ees to be surveyed and the use of a stratified sample of facilities
make the results representative of all MPLSM operators across the
country.

Longitudinal study--The third part of this NIOSH project consists
of a prospective, longitudinal study of MPLSM operators. It is be-
ing undertaken at a midwestern postal facility by the School for
Workers, University of Wisconsin, in cooperation with the American
Postal Workers Union and NIOSH. A group of about fifty postal em-
ployees with little or no experience on the MPLSM, but who have

been accepted for MPLSM training, are to be followed in this study for a period of four years. Prior to beginning full-time work on the MPLSM, each of these employees completes a questionnaire on job stress/strain and gives blood and urine samples for biochemical analysis and stress level determination. Levels of blood cholesterol, triglycerides, uric acid, protein, and other chemicals as well as urine catecholamines, will be assayed. These data will be used as a base line against which to compare measures taken at regular intervals over the four-year period after the employees become MPLSM operators. The cycles of questionnaire and biochemical results over the four-year period will make it possible to determine both acute and long-term stress reactions generated by the MPLSM job.

The three field studies of MPLSM operators will together provide a broader perspective on the health consequences of this work operation. The results of these investigations complement one another and will alternately verify and strengthen obtained findings. By researching this machine-paced task with three methodologies, definitive conclusions will be possible.

USDA Poultry Inspectors Study

The second project underway at NIOSH concerning machine-pacing consists of a questionnaire survey of job stress/strain in the U.S. Department of Agriculture (USDA) poultry inspectors. At the request of the USDA, NIOSH has designed an evaluation of working conditions for poultry inspectors in such operations. The poultry

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inspection process is a machine-paced operation which requires
both visual and manual examination of each bird to assure that it
is free from disease. The birds are hung by the legs from shackles
on an overhead conveyor system. Inspectors must recognize as many
as fifteen disease states, discolorations, or malformations and
make one of the following decisions for each bird: (1) pass the
bird as disease-free, (2) instruct the "trimmer" to trim off iso-
lated diseased parts or save only certain acceptable portions of
the bird, (3) place the bird on the "hang back" rack if unsure of
a decision and allow the inspector-in-charge to examine the bird
in more detail later, or (4) condemn the bird as totally unaccept-
able.

The study will consist of a questionnaire survey of poultry in-
spectors stratified by five major geographic regions. Like the
one used for Postal Service employees, the questionnaire is de-
signed to assess levels of job stress and strain, health disorders,
and a wide range of work environment factors peculiar to the poul-
try inspection operation. There are approximately 2,000 poultry
inspectors nationwide and 240 inspection facilities. Questionnaires
will be bulk-mailed to the inspector-in-charge at 121 plants for
distribution to inspectors in selected plants. Approximately 1,500
inspectors will receive questionnaires which represents about three-
fourths of the population under study.

The results of this project will indicate whether this work group
reports similar stress/strain and health problems as has been found

in other machine-paced work groups (Caplan et al. 1975, Franken-hauser and Gardell 1976). Moreover, the study complements the NIOSH-MPLSM research since, while both jobs are forced-paced, they differ significantly in terms of workpace, work cycle, and the cognitive versus motor demands of the task.

Overall, the significance of the NIOSH field studies reviewed above lies in their contribution to a data base on the stress and health effects of machine pacing. Such studies will also suggest specific job stressors worthy of more intensive examination in laboratory situations.

LABORATORY STUDIES OF MACHINE PACING

In the context of studying stress in machine-paced tasks, the laboratory setting permits accurate manipulation of variables of interest (e.g., workpace, decision latitude, social interaction) and objective quantification of concomitant psychophysiological reactions to such manipulations. Psychophysiological reactions such as elevations in heart rate, blood pressure, and muscle tension have been shown to be sensitive to fluctuations in perceived psychological stress (Geldrich 1953, Obrist 1968) and are precursors of stress-related disorders.

There are four studies published in the literature which have studied aspects of a forced paced task and assessed physiological reactions. Ettema and Zielhuis (1971) reported elevations in heart rate, blood pressure, and breathing rate with a decrease in

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sinus arrhythmia (i.e., heart rate variability) as performance re-
quirements on a simple binary task increased from low to high lev-
els. The authors did not evaluate comparative reactions in paced
versus unpaced subject groups. Amaria (1974) found higher heart
rates under three conditions of paced work as compared to heart rate
when subjects worked at their freely chosen pace. Johansson and
Lindstrom (1975) reported that subject-controlled performance rate
on a complex reaction test was judged more favorably and was asso-
ciated with lower heart rates than a workpace controlled by the ex-
perimenter. In contrast, Manenica (1977), using a simulated assem-
bly task, found greater sinus arrhythmia among subjects who paced
themselves and concluded that unpaced work was more demanding and
imposed a higher load upon the subject than forced paced work.

These laboratory studies have not produced consistent results re-
garding psychophysiological reactions to machine-paced work. On
the other hand, only one study (Manenica 1977) attempted to simu-
late an actual work task; the others used performance situations
which bore no resemblance to a work situation. This represents an
important methodological issue since it affects the subjects' at-
titude toward the task and motivation to perform. Other limita-
tions in the design of these studies include the use of very short
test sessions, the absence of motivational factors (e.g., incen-
tives) which are typical in actual work settings, and the lack of
attempt to consider social support or other workplace factors which
can buffer apparent stress.

In retrospect, the laboratory research on this problem to date has not considered the range of factors that deserve highlighting for their real or alleged contribution to stress and strain and stress reduction in machine-paced work regimens.

NIOSH Laboratory Research

Recognizing the need for more meaningful laboratory research on machine pacing and its effects on physiological function, NIOSH has designed laboratory research with the following features:

1. computer simulation of a punch press operation on video display screens

2. subjects "work" at the task for 8 hours per day (with rest breaks in the morning and afternoon and a lunch break) for a full 5-day work week as is typical in an industrial situation

3. manipulation of aspects of machine pacing including speed of workpace, degree of control over pace, task complexity, work incentives, and social interactions.

4. performance measures of error rates and total work out-put

5. continuous noninvasive monitoring of heart rate, blood pressure, muscle tension, and respiration rate

6. periodic assessment of subject's attitude toward manip-ulations

7. periodic assessment of fluctuations in psychological mood states

Psychophysiological reactions to aspects of machine-paced work will be assessed to determine the relative impact of each on worker stress. The results will represent a significant contribution to the literature in terms of the detail of the task analysis and the precision, sensitivity, and comprehensive nature of the measurement tools employed.

SUMMARY

As you can see, NIOSH has placed a great deal of time and energy into the study of the stress/strain effects of machine-paced work operations. This was justified in view of the paucity of research findings in the literature, the scattered implications of serious health consequences of forced paced work routines, and the relevance of such research to large groups of workers engaged in such operations.

The output of the NIOSH studies, both in the field and in the laboratory, will provide a solid data base in this neglected area of occupational health research and ascertain in a more definitive way the prevalence of stress/strain effects of machine-paced work operations and the impact of such effects on worker health status.

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PSYCHOLOGICAL JOB STRESS AND CORONARY HEART DISEASE--
A CURRENT NIOSH PROJECT

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I am going to discuss a current NIOSH project being carried out at Stanford Research Institute (SRI) that is investigating the relationship between psychological job stress and one aspect of physical health, namely coronary heart disease (CHD).

Coronary heart disease is a major disease in the general population. It is a major factor in lost productivity and workers' compensation in the industrial setting. It is one of the top contributors to the cumulative injury problem and disability in industry.

As Dr. Murphy pointed out, we are in a very early stage in stress research and so a lot of general areas have to be looked at. As we continue to go along, we have to begin to look at specific issues more closely. We then find that there are many kinds of stress problems, not just one, and there are many complications. Thus, this talk is going to be somewhat technical, but I hope that it will illuminate the problem in a new and useful way. At this time I am only going to discuss the results that we have from our base line examination, that is, from one cross-sectional data collection on our study population.

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There is one phase I will be using, conjectures and refutations, which comes from the name of the book by that title, Conjectures and Refutations, the Growth of Scientific Knowledge, by Carl Hubber. Hubber is a noted philosopher in the field of science. The point he is trying to make is that we need a lot of conjectures to carry science forward. Since most conjectures turn out to be wrong, we need a lot of refutations. Where we can, we seek replications, conjectures that actually hold up. We have to be willing to be somewhat skeptical and see many of our conjectures go by the board when they come to the repeated test. This theme will reoccur in my discussion.

Our study is a longitudinal study of stress and strain, that is, of stressors and heart disease risk factors (see Figure 1). We are not dealing with a very large population but we have heart attack events and deaths enough to count. So we have to look at the step before that, namely, CHD risk factors. What is the effect of psychological stress on the work environment social climate? Does it result in physiological strain, which constitutes cardiovascular or coronary heart disease risk factors? At the same time, individuals are subject to life stresses. They have home environments that are affecting them. I am calling that more of a compounding factor, rather than a main factor. The reason will become clear as we go on.

Actual heart disease status in this case is also a compounding factor as we do not have enough data on it. We don't have a longitudinal set of CHD events. So if someone, for instance, has had a heart attack, that is a compounding factor in the sense that it

FIGURE 1

PROBLEM DEFINITION
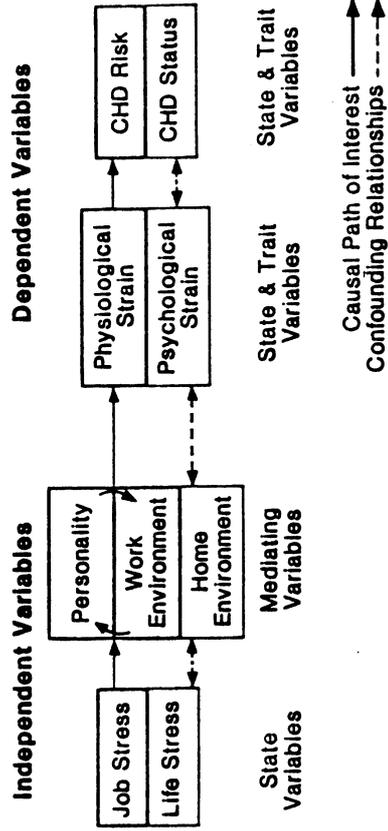
Block Diagram of Job Stress & CHD Process

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will affect his job psychology, or attitudes toward the job. So
in this study we actually excluded individuals who had what is known
as definite clinical heart disease.

Now, when you get into the area of coronary heart disease and health
in general, or you have to prove something medical, you run into a
number of difficult conceptual barriers. One is what I call the
"dense underbrush of findings." There are so many close findings
or statements of possible effects, which are still mostly conjec-
tures, that they clutter up the landscape and make it very hard to
see what is really going on. There is what is known as "ecological
masking" of diverse trends. For instance, if you have one person
who views overload as distressful and another person in the same
population who views underload as distressful, it substantially com-
plicates your ability to find out things. There is the phenomenon
that is known as "assortive mating." It means that we have many
situations where an individual will gravitate to an environment that
fits him and hence tends to cancel out the effect of the environ-
ment. In this study we see a substantial amount of this.

Since you have a lot of this accommodation coping and assortive
mating, it becomes very hard to say what is a stressor for a given
individual, and for that reason you are considerably dependent on
self-reports. There are a few examples where you can get away from
this, but in so many cases it has been found extremely difficult,
if not impossible, to get objective measures of stress and objec-
tive measures of work load that will predict. So you are very de-
pendent on self-reports. You will find that people will self-re-

port stress. Stress is real because so many people report it, along with the psychological distress which quite often accompanies that stress. But it is very difficult to definitively trace out the cause and effect. I think in most cases the process is circular. Stress will cause distress, or psychological distress and mental health problems. Mental health problems in turn will often exaggerate or accentuate the pressure of a given situation, and cause more stress on a given individual. It is very hard to get away from this circularity.

I want to quickly review some of the background: what we know today, or perhaps what we don't know, and some of the difficulties in some of the areas of relating psychological stress to medical health. CHD is the particular example we are concerned with. There is way too much literature to look at so I will very quickly review some reviews that have been written in recent years. All of these are concerned with the relationship of psychological factors to medical health.

Dr. Weiner, who is a distinguished researcher in the field of psychosomatic medicine, has recently reviewed the last twenty years of progress in psychosomatic medicine in his book, Psychobiology and Human Disease. He chose what he thought were the six most important diseases in terms of the classic definition of this field. These were the diseases that people in the field have put the greatest emphasis on and felt were the strongest examples of psychosomatic diseases. This book is over 600 pages and contains

more than 3,000 references. I have not yet found a single state-
ment in the book that would say psychological factor x is defin-
itely related to health factor y in a quantative degree z. I
think this is indicative of some of the real difficulties in this
field. My impression is that the statements made by Dr. Weiner
in 1977 are substantially less positive than the statements made
in this same field twenty years ago. I do believe, however, that
there are many results of real significance in this area. I think
that they are just very hard to find.

Coming over to a review of psychological factors in relation to
coronary heart disease specifically, Dr. David Jenkins, who has
spent more than a decade in this field, has written a number of
reviews. I think that his most recent review is "Evidence for
Psychologic Risk Factors in CHD" in the New England Journal of
Medicine (1976). As far as I am able to determine, it is only for
coronary-prone behavior, the Type A-Type B behavior phenomenon,
that he makes unequivocal assertions of existence of an effect.
The effects can actually be quantified, showing a roughly 2:1
rate of occurrence of heart attacks among Type A versus Type B in-
dividuals.

So what we see in the literature is a very common failure to rep-
licate results. Well, this shouldn't be too bothersome. This is
typical of science as far as I am concerned. However, it would be
wrong to assume that every conjecture that we ever had would be
replicated. Therein would lie the greatest danger. So we see
something that is common throughout science, namely, that there

are hundreds of papers, many conjectures, but very frequent occur-
rences of failure in replicating an effect in a laboratory using
its own measures. More frequently, there is a failure, or lack of
attempt, to replicate across laboratories. In some cases replica-
tion is attempted using different measures which are not standard-
ized. I think it is of the essence to recognize this situation
and attempt to replicate important results as they are recorded.
Then if we can't replicate them, we refute them. I believe that
there should be a sunset law on conjectures. If conjectures are
around for three or five years, they should be refuted. Or, at
some point, the evidence itself will refute them.

The relationship between stress and distress has been replicated
repeatedly. There is no question of the existence of the phenom-
ena, namely, that individuals self-report job stress by a number
of definitions. These will then correlate with self-reports of
psychological distress on a number of parameters, which here are
called strain indicators (see Table 1). So here is a set in
which you see quite strong correlations between stress and dis-
tress. This is a recurring phenomenon.

Table 1. Mean z-scores on strain indicators in relation to
          job stress.

Strain indicator	Overall low	Job Medium	Stress High	F-ratio
Depressed mood	-.29	-.04	.43	64.62*
Self-esteem	.32	-.01	-.41	63.58*
Life satisfaction	.29	.01	-.40	57.58*
Job satisfaction	.49	.09	-.78	246.51*
Motivation to work	.28	.06	-.46	69.24*
Intention to leave job	-.22	-.07	.39	47.01*

*p less than .001
Source: Margolis, Kroes, & Quinn, 1974

To carry this further, we find that life stress, specifically as measured by the Holmes and Rahe Life Event Scales, correlates with psychological distress, specifically, as measured by the Symptom Check List. Both of these devices are standard, well-known measures. Work pressure correlates with psychological distress. In our data and in data drawn from several other studies, psychological distress and life stress both correlated with angina, that is, chest pain. Presumably heart-related problems and neuroticism, which contains elements of mental health and distress, correlated with angina. If we are willing to jump to conclusions, we can say that this apparently solves the problem. We have stress, causing psychological distress, causing heart disease, which is followed by angina. Unfortunately, this paradigm does not survive closer examination.

Here is a study, and there are a number of these like it, giving us essentially the same results. People report chest pain. If it is at a sufficient level, their physician concludes that it is serious and needs confirmation. They go through a catheter lab procedure and contrast angiography, which allows their coronary arteries to be examined for stenosis or occlusion. It then turns out that some of these people have relatively normal arteries; not necessarily perfect, but with what would be called insignificant disease. Most have significant disease. It turns out that if you come to that examination with a higher degree of life stress, as defined by the Holmes and Rahe scale, with a higher degree of psychological distress, as defined by the symptom distress list of the exact measures that we were just talking about, it is more

likely that your arteries might be normal.

Now it seems we have solved the problem the other way around. It appears that stress and distress are protective of your arteries. But we certainly do not really believe that. But what we have to believe is that there is a substantial amount of circularity there and that, in fact, distress may cause someone to report more chest pain than he otherwise would. Other factors that cause him to be stressed or to report distress may cause him to report more chest pain than he would otherwise. This is a highly fallible measure in the study of job stress and coronary heart disease.

Take another facet of the problem. We have already talked about the fact that the only thing that we really can believe concerning behavior and psychogenic phenomena in relation to coronary heart disease is coronary-prone behavior. Let us consider then the cases where individuals have been interviewed and rated Type A versus Type B and then have had coronary angiograms performed. In three such separate and independent studies, Type A's had more than twice the rate of significant coronary arteries disease than Type B's, with Type A's coming to this procedure in substantially higher numbers. In 3,000 men, followed for 8 1/2 years in the Western Collaborative Group study of Dr. Friedman and Dr. Rosenman, Type A's had twice the CHD event rates as Type B's. But we also find that although Type A's may be under more stress, they do not re- port either more or less life stress, job stress, or psychologi- cal distress than B's. So the job stress-psychological distress

paradigm is important, represents a phenomenon in itself, and is where most of the action in the thinking in the job stress world is now focused. But it really has to be treated as a separate problem. It does not appear to be strongly connected into the coronary heart disease and stress loop. So if we were to write a book on the subject, we could call it "The A's Die Quietly," because they do die. It may be that they have more stress. We cannot get it out of them on self-report.

Let us look at another paradoxical result. This is a study that actually is quite parallel to our study in some ways. It is not concentrated on coronary heart disease or even on medical health, but it is a stress-strain study of a working group over a period of time. It is a three-year study of a very interesting group, namely, air traffic controllers. This undoubtedly is the best study of job stress and strain that has ever been done. The study has been completed and is just now being reported by Robert Rose and his associates.

In this group of air traffic controllers, the hypertension rates are remarkably high, at least double that which you would expect. Interestingly, the Type B's and particularly those Type B's that also had less life events, had the highest incidence of hypertension. The other most notable finding was the very high degree of impulse control problems on the mental health side. Thirty percent of these individuals were hypertensive, and 30 percent showed appreciable impulse control problems over the three-year period of this study. It was surprising that the B's, who reported less

life events, were the ones who had the high blood pressure. The ones who had the impulse control problems were the A's who also reported more events. The last is not surprising as our data show consistently that Type A's are more impulsive than B's, and I believe that an air traffic controller job is one where it is helpful to be impulsive. To illustrate the level and the nature and the complexity of the conjectures you may have to make to explain these kinds of facts, here's a hypothesis. You could say that since B's are not as impulsive as A's, the B's are not impulsive enough for the job. Therefore, performing at work puts more stress on them and their blood pressure goes up. The A's are more impulsive; therefore, they do the job better. Their blood pressure doesn't go up, but they have impulse control problems on the side because probably the group as a whole is more than normally impulsive. So that would explain two of these three findings, and it is certainly that level of hypothesis you are going to need before you can ever explain these kinds of findings.

Now why did the Type A's have more minor illness? That could hypothetically relate to the AB measure used in this case which was the Jenkins Activity Scale(JAS). The JAS is a self-report questionnaire, which is not the same thing as the interview which is the official definition of A & B. It turns out the JAS has some components that tend to pick up life stress, work stress, and psychological distress, which almost always tends to pick up minor illness with it.

Our own study population is a white collar, professional population of approximately 400 lower level managers, supervisors, and those managers just above them. They were all salaried, male employees at a large aerospace corporation. In the study population we also have identified different categories of managers to see what the differences might be among these groups on several variables. The four groupings are finance and accounting, product assurance, new business, and a comparison group that was a cross section. The study proceeded by giving all 400 study subjects a large number of tests at the start (base line), and then repeated the examination on 220 of those individuals at five intervals. As those repeat examinations went forward, there was a continuing weekly reporting of work load and job stress by the 220 individuals. Below are listed the measurements used in the study.

PSYCHOSOCIAL AND GENERAL HISTORY VARIABLES

Type A/B Interview
Jenkins Activity Scale
Type A/B Scale - Thurstone
Type A/B Scale - Vickers
Type A/B Scale - Framingham
Eysenck Personality Inventory
Gough Adjective Checklist
Addiction Proneness Scale
    (from MacAndrew et al.)

Work Environment Scale
Family Environment Scale
Life Events - Holmes and Rahe
Symptom Distress Checklist
Job stress, satisfaction,
   and support measures
Smoking, alcohol, caffeine
   consumption rates
Physical exercise rate

plus Weekly Workload Reports

PHYSIOLOGICAL VARIABLES

Cardiovascular variables:
   Pulse rate
   Blood pressure
   Resting ECG (read by computer for prognostic indications)
   Cold pressor test response

CHD and other health findings by self-report, including:
   Family history of heart disease
   Own history of heart disease
   Symptoms of dyspnea
   Symptoms of angina
   Symptoms of claudication
   High blood pressure

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Physiological strain variables:
Uric acid
Blood glucose
Dopamine-beta-hydroxylase
Total cholesterol
HDL cholesterol
LDL cholesterol
Triglycerides

You will notice that in addition to a total cholesterol measure, we also used measur₍s of HDL and LDL cholesterols because we have discovered that one cholesterol, namely, the high density protein fraction is protective, whereas most of the other cholesterols increase the risk of heart attacks. It is very important to make this distiniction.

We used the company we did because it was a large aerospace company which was involved in high pressure work. We chose groups that seemed to be under greater pressure than the company as a whole. So a conjecture would be that these groups should therefore be at higher than ordinary CHD risk rates. We then compared the z scores of the study population as a whole against the best national norms that we could find to see by how many standard deviations our population is different from what is typical in the United States. We found that our 400 subjects were slightly better off on most CHD risk factors, including total CHD risk. So we are not able to show that they were at special risk for CHD even though we had gone to a lot of trouble to find high risk people.

Again, there were no significant differences among our groups. The new business group which we thought was under the highest stress

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was slightly better off in terms of CHD risk factors than the other groups. On the other hand, the groups were substantially different on personality variables and on work environment variables. There was clear evidence of assortive mating on those variables. For instance, we could separate the finance and the new business groups on the basis of the variables with only about a 20 percent error. But on the CHD variables we couldn't separate them at all. We had succeeded in finding groups that were substantially different in their personalities and their work environment, but not on their CHD variables.

Let's take another dimension, namely the Type A-Type B personality dimension, which we know to be very important. We had both A's and B's, which we could distinctly separate into groups. But they were not appreciably different on CHD risk factors, psychological distress, work pressur or life events. They were sharply different on conventional personality variables, as well as being different on the AB variables. Among other notable things that distinguished A's from B's were responses on the Gough Adjective Checklist. A's assert less self-control than B's, and A's also assert that they are in an environment with less control than B's. Both of these are highly significant findings.

There are a number of measures of the AB dimension, this dimension being the most important thing we know of in the CHD problem. The interview is the basic measure. This was developed by Drs. Rosenman and Friedman. An interviewer talks to someone for 15 minutes,

asks some standard questions, and then decides if the person is
A or B. To try to simplify this procedure, a lot of people have
attempted to put together self-report questionnaires, the most
well-known of which is the Jenkin's Activity Scale, the JAS. None
of these self-report questionnaires correlates to a major degree
with the interview. The JAS is 15-20 percent as effective as the
interview. The Jenkins and other AB scales do not correlate high-
ly with the interview, but they do correlate with other things in
the job stress field, such as work stress and alcoholism. There-
fore, it is not practical at the present time to use any self-re-
port as a proxy for the AB interview.

There are a couple of other scales that we have found to be extreme-
ly interesting, and may be very useful in this field. One scale,
addiction proneness, predicts a tendency to substance abuse, such
as alcohol, addictive smoking, and heroin. Another scale, which
is standard, is one of impulsiveness. Impulsiveness is a compon-
ent in measuring AB and addiction proneness, and it seems to be
quite important in itself. It was a very important factor among
the air traffic controllers. It may be important in other jobs in-
volving a hectic, stressful situation where fast decisions are
needed.

We had a number of work environment variables that were being used
for the first time in this context. There were ten scales which,
when boiled down by factor analysis, reduced to three factors.
There was a set which together made up a global work factor which

indicated whether a person felt good about his work or not. Then
there were two separate factors, job pressure and work control.
These are important dimensions of the work environment which are
going to be useful in the future.

We found that several of the AB self-report scales correlated with
other things. We could explain some of the difference between
them and the interview by their relationships to stress, anxiety,
and alcoholism. Dr. Glass, who has been researcher in the field
of AB and has mainly used the JAS, makes the assertion that the al-
coholic is a work-a-holic who doesn't become a work-a-holic; or
that alcoholism and workaholism are two branches of the same phen-
omenon. This is only true if the JAS is used as the measure. When
the interview is used as the measure, this is not true.

When we try to shed some light on our results, and seeing that
Type AB factors do relate to heart attacks but do not correlate
too well with CHD risk factors, we try to turn it around and look
at the risk factors themselves. The more conventional risk fac-
tors show all the usual correlations among themselves and to car-
diovascular status, and they show almost nothing else. With quite
a number of unconventional CHD risk factors, we do see some in-
teresting phenomena. It is questionable whether the relationships
are at a sufficient level to explain the amount of heart disease
associated with Type A behavior, at least in looking only at base
line data. It is another story when we start to look at repeat
data. We see HDL cholesterol, which is actually a cholesterol that

is good for you, being one of the strongest favorable factors. It
and triglycerides tend to work in opposite directions. HDL chol-
esterol is an important variable to study in the future because it
correlates with almost everything good and the levels of trigli-
cerides correlate with everything bad. We even see correlations
of HDL with angina and dyspnea and these relationships are almost
certainly real. It is hard to see where the psychological circu-
larity could enter the picture.

I would just mention that we have new correlations of factors which
are protective to CHD status. A higher level of HDL correlates
with better CHD status. It also happens to correlate with levels
of alcohol consumption, which is consistent with some fairly re-
cent findings which show that alcohol consumption is protective of
your coronary arteries. We believe the mechanism to be the rais-
ing of the HDL level.

Let us look at job stress and CHD as a process. We see that in
the CHD problem, the stress-distress paradigm is a somewhat sep-
arate phenomena, which is mainly compounding. We see that the re-
lationship of the Type A personality to coronary heart disease is
real, and very likely neurogenic. At the present time we do not
have a definite understanding of the mechanism as yet. So we can
say at this point, A's die quietly. It is clear that to find the
mechanism we are going to have to look at second order things: the
person, environmental fit; and nonlinear interactions of several things,
such as impulsiveness, one year in a job situation, and what re-
quires this impulsiveness. We are going to have to look at the

changes in repeat examinations. Cross-sectional studies won't do because of the tremendous amount of coping that has taken place before you get to there and has wiped out so much of the differences that you are looking for.

That is where we stand today. I hope that these results have illuminated one side of the problem. Perhaps next year we can come back and give you some more information on this subject.

DIMENSIONS OF CUMULATIVE INJURY

Alan Tebb*

My purpose today is to report to you the results of a two-year re-
search effort to define and quantify the impact of the cumulative
injury (CI) phenomenon upon the California workers' compensation
system. Data for the exhibits are drawn from a review of cumula-
tive injury claims of California employees. The results may or may
not have application to other states. We think they do, however,
and the differences are only of degree, not substance.

As a corollary to this caveat, I suspect some of you with interests
in other states may be content to look upon cumulative injury as a
peculiarly California phenomenon. Please don't take any comfort in
that supposition. The fact is cumulative injury is not peculiar to
California. The seeds are present in the statutory and decisional
laws of many states--Florida, Illinois, Kentucky, Michigan, Virgin-
ia, Connecticut, New York, to name just a few. California is dif-
ferent only because of the assignment of a particular label to de-
scribe the phenomenon, and the frequency and severity of the mani-
festation of that phenomenon.

Let me begin with a definition: Cumulative injury is a judge-made
doctrine that recognizes that a series of micro-traumas over time

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can produce disability and, if so, then that condition is compensable under California law. The classic example is the boilermaker who develops a hearing loss after a working lifetime in noisy job environments. Unlike the more common traumatic injury, there is no single identifiable incident; instead, prolonged repeated exposure led to a partial loss of hearing. More typical today are back injuries attributable to lifting and bending over a period of years. And now California employees, in ever increasing numbers, are asserting cumulative injury claims for heart ailments, vascular conditions, mental stress and strain, even neuroses.

The lawyers tell us there's nothing new about cumulative injury, in California or elsewhere. The concept has been recognized for at least fifty years in this state. What is new is that the concept has broadened, and the frequency of such claims threatens to rival fast food franchises as a growth industry.

In 1974, less than 1 percent of disabling work injuries in California were cumulative injuries. Three years later, in 1977, the incidence had risen to 2 1/2 percent, and this year to 3 percent of all disabling injuries. Admittedly, those figures are still a minor part of the total of disabling injuries, although a threefold increase in five years suggests exponential growth. Moreover, the numbers take on an added dimension when costs are considered.

In 1976, just two years ago, cumulative injury claims in California cost insured employers $137 million, almost every eighth compensation claims dollar. Last year's cost is estimated at $166

million and, if the results of the Institute's latest study are
an indication, incurred cumulative injury losses will exceed $200
million in 1978. By the end of the decade cumulative injury losses
will pass the $300 million mark--without any change in benefit lev-
els.

These figures, their impact on the business community, and the rap-
id escalation in the frequency of cumulative injury claims led to
a massive research effort by the workers' compensation insurance in-
dustry. It began in September of 1976 when the California Workers'
Compensation Institute (CWCI) was commissioned to define, on an in-
dustrywide basis, the extent and scope of cumulative injury in Cal-
ifornia, a subject about which much was surmised but little was
known. Today we have some of the answers.

The study itself involved a detailed review of all cumulative in-
jury claims resolved or reported during January and February of 1977.
And then, because the 1977 results only provided a picture at a par-
ticular point in time, the same measurements were taken during the
first two months of this year. Although reporting was simplified
this year, the two studies are virtually identical in size, scope,
and methodology. The dimensions of these undertakings can be
judged by some numbers:

   --Forty insurers writing about 90 percent of statewide prem-
      iums participated in the studies.

   --Over 200 people were involved in the study design and the
      development of format, programming and verification procedures.

--Three times that many people were involved in the compil-
   ation of data at 185 branch and division offices of cooper-
   ating insurers.

--The data base for each study ultimately included over one
   million pieces of information.

--The compilation, analysis and interpretation of these data
   bases required, conservatively, ten thousand manhours for
   each study.

Let's take a look at some of the results. The data in Table 1 are
outside the scope of the CWCI studies. They show the growth of
cumulative injury claims during the most recent three-year period,
according to statistics compiled by the Workers' Compensation Ap-
peals Board, the state adjudicatory agency. You'll note a 20-25
percent annual growth rate.

Table 1. Frequency of cumulative injury

Fiscal year	Number of cumulative injury applications	Increase over prior year
1975	8,974	----
1976	10,971	21.1%
1977	13,393	23.2%

The Appeals Board figures are compiled on a different basis and
for a different purpose. We think the true growth is understated.

Based on input to the 1977 Institute study, the number of cumulative injury claims filed during calendar year 1977 is estimated at 16,200. The 1978 calendar year total will exceed 19,900, up 30 percent from last year. And when you look at the increase in the number of employees filing cumulative injury claims--recognizing that some employees file more than one claim--the increase is in the neighborhood of 40 percent annually. And that's a pretty expensive neighborhood.

Table 2. Age at injury as a percent of total cases

Age	0/0 All disabling injuries	Percent cumulative injuries 1977	1978
36 years or less	57.4	18.0	18.2
37-51 years	27.1	34.2	32.5
52-60 years	11.7	30.6	29.8
61-65 years	3.0	13.5	14.6
Over 65 years	0.8	3.7	4.8
Median age in years	33.4	51.2	50.7

We found workers affected by cumulative injuries are significantly older than other injured employees, with a median age of 51 years compared to 33 years. (See Table 2.) Nearly half are 52 years or older--although accounting for only about 15 percent of the injured workforce.

Table 3. Age at injury as a percent of dollar loss

Age	Percent of dollar loss 1977	1978
36 years or less	7.7	12.5
37-51 years	37.0	33.6
52-60 years	37.0	34.2
61-65 years	13.6	15.1
Over 65 years	4.7	4.6

Table 3 shows the loss patterns for both 1977 and 1978, which underscore the older worker aspect of cumulative injury--in part reflecting the accumulation of infirmities over a lifetime, both working and non-working, and the prospect of retirement.

Last year we found one in 11 workers already was retired before claiming compensation for cumulative injury. In order to test the assumption that some claims may originate with preparation for retirement, we made a different measurement this year.

Table 4. Employment status at disposition

Status	Percent of cases	Percent of total loss
Employed, employable	50.3	30.8
Disabled	27.2	37.8
Retired	18.5	24.4
Deceased	4.0	7.0

Rather than look at the worker's employment status at the time of filing, we felt a better indicator would be employment status at the time the claim was resolved. Looking at Table 4, you'll note that about 25 percent of the cumulative injury claim payments are made to retired workers. We believe this supports the thesis that a significant number of cumulative injury claims are a pension supplement and not to compensate for the employee's reduced ability to compete in the labor market--a labor market of which he is no longer a part.

The retirement relationship also is borne out in the allocation of cumulative injury benefit dollars (Table 5). The cost of medical

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Table 5.   Distribution of the benefit dollar

Percentage of total incurred

	Medical	Temporary disability	Permanent disability
All injuries	39.0	22.1	38.9
Cumulative-1977	18.8	7.9	73.3
Cumulative-1978	19.0	5.9	75.1

treatment is less than half of that necessary in other work injuries. Wage-loss benefits are only a third of what they are in other compensation cases, in many instances because the disability isn't severe enough to prevent working. Instead, most of the dollars are expended for permanent disability--again, intended to compensate for the employee's reduced ability to compete in the open labor market--even though the employee may be retired or about to retire.

Table 6.   Nature of principal injury as percent of total cases

Injury	% of all Disabling injuries	% of cumulative injuries 1977	1978
Back	24.9	37.7	34.3
Heart/vascular	7.4	21.1	22.7
Hearing loss	0.2	15.7	13.2
Extremities	54.1	11.5	14.4
Neurosis	n.a	7.2	5.9
Pulmonary	0.6	1.0	1.9
All other	12.6	5.8	7.6

Back injuries are the most common cumulative injury, followed by heart and vascular conditions with incidences far greater than those affecting the injured workforce generally (Table 6).

Table 7. Nature of principal injury as percent of dollar loss

Injury	1977	1978
Back	32.7	26.9
Heart/vascular	40.8	39.9
Hearing loss	6.6	10.2
Extremities	7.3	4.4
Neurosis	7.0	7.1
Pulmonary	1.0	4.3
All other	4.6	7.2

The ranking of back and heart injuries is reversed when dollars are taken into account. These two most common conditions--both closely associated with the aging process--account for more than two-thirds of all cumulative injury claim payments (Table 7).

Table 8. Loss distribution by industry group as percent of total cases

Industry	1977	1978
Agriculture	2.3	2.8
Mining/petroleum	1.4	1.7
Food and tobacco	3.4	4.0
Textiles	0.9	1.5
Rubber/plastics	5.1	3.1
Wood products	2.8	2.1
Metalworking	11.0	13.3
Construction	17.9	22.0
Trucking	3.1	3.7
Utilities/service	6.4	6.0
Wholesale/retail	9.6	10.4
Clerical & professional	7.0	9.9
Municipal government	18.2	16.3
Miscellaneous	0.9	1.6
Unclassified	10.0	1.6

More than two-thirds of cumulative injury claims occur in five broad industry groups: state and local government; construction; metalworking; wholesale and retail trade; and clerical and profes-sional (Table 8).

Table 9. Loss distribution by industry group as percent
          of total dollar loss

	All disabling injuries	Cumulative injuries 1977	Cumulative injuries 1978
Agriculture	6.3	1.4	3.1
Mining, petroleum	1.6	0.9	0.8
Food & tobacco	4.1	1.8	2.5
Textiles	1.5	0.6	1.8
Rubber/plastics	4.8	2.2	1.0
Wood products	2.2	1.8	1.8
Metalworking	14.2	5.1	8.0
Construction	14.4	7.2	6.1
Trucking	5.0	1.1	3.1
Utilities/service	9.7	5.1	7.2
Wholesale/retail	13.5	7.2	6.5
Clerical & professional	8.9	8.0	16.6
Municipal government	11.4	54.3	39.7
Miscellaneous	2.7	0.2	0.3
Unclassified	----	3.4	1.5

These same categories account for more than three-quarters of the
incurred cumulative injury loss (Table 9). Admittedly, these dis-
tributions are heavily weighted by the statutory presumptions of
compensability for heart trouble and certain other conditions of
public safety employees. However, when Municipal losses are ex-
cluded and the tables restructured, the pattern of cumulative in-
jury losses parallel the loss pattern for other injuries. The point
is the cumulative injury phenomenon is pervasive, common to all oc-
cupations. No industry is unaffected. Any differences, again, are
more of degree than substance.

Litigation is a fact of life in cumulative injuries. Virtually all
such cases are litigated. And almost without exception, the filing
of an Application for Adjudication (California's equivalent of a
request for hearing signalling a dispute) is the employer's or in-
surer's first notice of injury.

The average incurred loss per cumulative injury claim is about
$8,600, nearly five times the value of other disabling claims. How-
ever, employees may file more than one CI claim--cumulative injury
to the heart, cumulative injury to the back, a hearing loss, etc.--
and when these claims are consolidated, the average recovery per
claimant is somewhat more, about $9,100.

Table 10. Average litigation expense per case

Litigation expense	1977	1978	Percent change
Attorney fees-employee	$ 780	$ 843	+ 8.1
-employer	401	478	+ 19.2
Medical-Legal-employee	357	446	+ 24.9
-employer	272	274	+ 0.7
Other -employee	52	37	- 28.9
-employer	88	124	+ 40.9
Totals	$1,950	$2,202	+ 13.9

In California the employee's attorney's fee is paid out of the pro-
ceeds, so the claimant's take-home was $8,400 last year, $8,200
this year. Table 10 shows the direct costs involved in delivering
$8,000-plus in benefits--a litigation overhead of 23-27 percent.
Collectively, these costs are more than was paid physicians to
treat the effects of cumulative injuries.

Table 11. Time-lag between date application filed and
           date of appeals board disposition

Time-lag	Percent of total cases	
	1977	1978
12 months or less	40.3	36.3
13-24 months	37.4	41.9
25-36 months	13.8	14.2
More than 3 years	8.7	7.6

Yet another litigation cost, difficult to measure but nonetheless

real, is the built-in delay. The reality is that it takes time,

lots of it, to untangle liability and apportion costs. Although a

significant number of cases are resolved within a year, 22 percent

of the cases are still pending two or more years after filing

(Table 11).

Table 12. Time-lag between date application filed and date
           of appeals board disposition

| | Percent of dollar loss | |
Time-lag	1977	1978
12 months or less	31.7	32.3
13-24 months	40.5	41.7
25-36 months	17.1	14.6
More than 3 years	10.7	11.4

And these cases, the tough cases, represent more than a fourth of

the incurred dollars (Table 12). This hardly seems the expeditious,

inexpensive and unencumbered justice guaranteed by the California

constitution.

Table 13. Disposition of litigated cases as
           percent of all dispositions

Case	Compromise & release	Findings & awards	Dismissal	Take Nothing
All applications	49.6	36.5	11.1	2.8
Cumulative injuries				
1977	67.5	17.5	11.6	3.3
1978	70.8	16.2	11.2	1.8

Two-thirds or more of all cumulative injury cases are resolved by

Compromise & Release Agreement, a rate one-third higher than in

other litigated claims in California (Table 13). We think this is
attributable to the nature of cumulative injury claims: defense is
difficult, liability is splintered, and the delays push both par-
ties to compromise.

    Table 14. Geographic distribution of cumulative injury
               litigation as a percent of total cases

    Area   1977   1978

    Greater Los Angeles   63.1   63.5
    San Diego, Imperial   2.0   3.2
    Central Valley   3.1   10.9
    North Central Valley   10.0   2.2
    Bay Area, North Coast   14.3   15.2
    San Jose, Salinas Valley   7.4   5.0

Cumulative injury and the litigation it engenders has a distinct
geographic bias. Although the Los Angeles Basin accounts for less
than half of all disabling injuries, it generates two-thirds of
the cumulative injury litigation (Table 14).

    Table 15. Geographic distribution of cumulative injury
               litigation as a percent of dollar loss

    Area   1977   1978

    Greater Los Angeles   74.2   71.3
    San Diego, Imperial   1.5   2.0
    Central Valley   2.3   10.2
    North Central Valley   7.0   2.2
    Bay Area, North Coast   9.0   10.1
    San Jose, Salinas Valley   6.0   4.2

As indicated in Table 15, Greater Los Angeles also accounts for
the bulk of the incurred loss.

The final series of tables illustrate the "long tail" of cumulative injuries and support the need for amendatory legislation, which became effective January 1978, and reallocated the liability for cumulative injury claims.

Table 16. Duration of cumulative injury exposure with last employer as a percent of total cases

Period	1977	1978
Less than 1 year	25.6	24.7
1-5 years	25.3	25.4
More than 5 years	49.1	49.9

Prior to the enactment of AB 155 in 1977, liability for cumulative injuries was apportioned among employers (and their insurers) during the most recent five-year period of exposure. But there was a major exception: if the employee worked for the same employer more than five years, then the cost of the case was spread among all insurers during the entire period of exposed employment. In some instances, this period extended to twenty or thirty years. About half the cases in 1977 and 1978 extended beyond the five-year period (Table 16).

Table 17. Duration of cumulative injury exposure with last employer as a percent of dollar loss

Period	1977	1978
Less than 1 year	17.0	19.1
1-5 years	18.7	19.9
More than 5 years	64.3	61.0

These longer duration cases accounted for 60 percent or more of the incurred cost (Table 17). What this means--or meant, prior to the

enactment of the allocation legislation last year--is multiple rep-
resentation of employers and insurers at multiple hearings, inordin-
ate delays, and gross inefficiency. For example, the typical cumu-
lative injury case involved 2.7 defendant employers and 3.3 defend-
ant carriers.

Table 18. Time-lag between policy inception and date
           cumulative injury claim incurred as a percent
           of total cases

Period	1977	1978
Less than 1 year	25.3	27.1
12-24 months	14.8	14.3
25-36 months	11.4	10.7
More than 3 years	48.5	47.9

The cost accounting problems of insurers are charted in Table 18.
Only one in four cases are reported during the term of the employ-
er's current policy. And nearly half aren't established for three
or more years--after policy expiration, after payment of dividends,
and after the experience ratings have been computed. Ultimately,
of course, the new legislation will bring costs more into line with
premiums.

Let me conclude by citing the conclusion reached in last year's re-
port of the Institute. I apologize to those of you who have read it,
but the words clearly define what the insurance industry believes
to be the issue.

    The central problem presented by the cumulative injury
    phenomenon concerns the objectives of workers' compen-
    sation. If workers' compensation is a rehabilitation

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system expected to provide prompt, quality medical care,
adequate income replacement and employment restoration
services in the event of job injury or illness, that is
one thing--and the record over the past 60-plus years
proves the system has the ability to meet these purposes
effectively and efficiently. On the other hand, if the
system is expected to provide these same services not
only for job-incurred disability but also for systemic
disorders, the aging process and myriad other conditions
that can affect the human organism--then that's a vastly
different system dictating a massive upheaval of human
and economic resources.

AN INDUSTRIAL STRESS AWARENESS PROGRAM
Carlo Weber*

Setting up a stress awareness, stress reduction, or stress manage-
ment program in any organization is an art, rather than a science.
As art, it deals with the individual, the individual organization,
the individual in the organization, and the individual biases and
idiosyncracies of the consultant who is designing the program. It
is an art in the sense that there are no specific and scientific
answers. It is an art in the sense that it is to some degree pro-
jective; one finds what one wants in the program. And finally, it
is an art in the sense that it requires of both the consultant, and
the organization with whom he or she is working, a recurring series
of strategic decisions made as the project goes along. In a sense,
one flies by the seat of one's pants.

As consultants in the field of work stress, we are totally aware
of the ambiguity of the concept. We know that even in the best of
studies, such as the Friedman and Rosenman Western Collaborative
Institute Studies and the Holmes and Rahe Life Crisis Events Scale,
there is little in the way of conclusive evidence from validating
studies. We realize also that the science is essentially explor-
atory. But we do not really enjoy the luxury of waiting upon sci-
ence. Questions are being asked now; the demand is now.

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partment and Consultant, Medical Department, Union Oil Company

The concept of stress is also embarassingly popular. One can hardly go into a book store without finding at least a dozen titles on how to manage stress in all parts of one's life, with a great variety of tips on what to do. Some of these are applicable; some are not. Some are helpful; some may be positively harmful. There is no doubt, therefore, that the demand for some stress awareness program, (and I am using "program" in a very loose sense) among all organizational systems is intense. And the demand cannot wait for experimental designs to be perfected, nor intervening variables to be controlled in such a way that we could have definitive conclusions about what to do about stress in job situations. In one sense, this stands as an example of the chasm that has always existed between the academic and clinical worlds in our fields of psychology and psychiatry. The academic psychologist is searching for answers scientifically. He must be indefinite in his statements. But the clinical psychologist cannot wait. There is a patient in front of him now, be it an organization or an individual, and some steps must be taken. This is by no means a criticism of the caution that science must exercise in pursuing accurate conclusions. But the lag between scientific development and organizational demand exists, and organizational activity must somehow be designed to bring together the academic and the practical as much as possible. If anything has characterized the flavor of our efforts at Union Oil Company, it is that we are trying as best we can to bring together what we do know about stress scientifically with what we do know about the person in the organization. I see the consultant then as a strategist, who works at different levels, and employs a variety of strategies or stratagems in order to ef-

fect a wedding between his own objectives and the objectives of the organization.

The popularity of the concept of stress serves as both an advantage and a disadvantage for the above-mentioned task. In some instances it is helpful. We are all aware of the dramatic shift in the pattern of disease in the twentieth century from the communicable diseases, that were until this era the major lethal elements of society, to the so-called degenerative or stress-related diseases. The statistics are really quite undeniable. There were some million or so deaths from coronary heart disease in the United States last year, and estimates of 20 million Americans who suffer from some form of essential hypertension. With that dramatic change, we in the health professions have got to respond, not with models borrowed from the communicable disease or public health model, which essentially is what we have done, but with models from the stress-related diseases. The popularity of dealing with stress is also due to the fact that organizations are not unaware of the rapid increase in the number of disability claims based on cumulative trauma or cumulative stress, nor of the difficulty in establishing that the job situation did not aggravate stress-related disorders.

Consultants have always faced the problem of how to approach an organization. Any organization tends to resist when informed that the consultant is to assist with management problems. Approaching organizations by indicating that there are psychological problems among the employees also invites immediate and decisive denial. But the concept of stress is acceptable. It is innocuous to manage-

ment. Every organization is willing to acknowledge that there is stress among employees, because the organization is a highly entreprenurial,competitive business, after all, and there ought to be stress. This provides the consultant an entreé that he would not have had before, and the opportunity to do many of the things that he otherwise might not have been allowed to do.

The disadvantage of the popularity of the stress rubric is that confusion about it continues to abound. So, as an approach to a consultation in this area, stress, or the management of stress within the company, offers a curiously happy invitation to work with the company. But it is a mixed blessing.

The general stages one observes in initiating this kind of consultation are no different from those that occur in any kind of organizational consultation. First of all there has to be entreé; someone has got to extend an invitiation. I am not selling stress management programs to organizations. I would, in some instances, discreetly and delicately identify something of a problem within the organization, about which I might have something to say; but the invitation must be extended by the organization itself. And the problem of stress-related disorders provides a rather convenient entreé to a great number of organizations.

Second, there is the creation of some kind of harmony between the objectives of the organization, the objectives of the unit within the organization which has extended the invitation, and the objectives of the consultant. These objectives may differ. The organi-

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zation is interested in either its service or its product. The in-
dividual or unit that invites the consultant into the company may
have a totally different objective, which has to be defined. The
consultant's objective turns about the potential of reducing the in-
cidence of mental illness or stress-related disease among the em-
ployees in the company, or stated positively, of enhancing the qual-
ity of human life within the organizational structure. Now, those
objectives are never quite the same, nor would I suggest they need
be. A certain tension of objectives is probably good for the ongo-
ing process of consultation. But at least the objectives should not
be incompatible.

Third, once the objectives have been candidly discussed, and some
agreement reached as to where the parties stand in this relation-
ship, sanctions must be established. Who wants the program, and
why? Management may want the program for a variety of reasons. The
capacity to announce the existence of a stress reduction or stress
management program may enhance the organization's public image. In
some instances, the program could then be a paper program, rather
than a real one. We all know cases in which there were considerable
discrepancies between what was asked in the original invitation and
what the real agenda for the relationship proved to be. If the con-
sultant allows himself to get into a situation in which objectives
are not harmonious, it could indeed be difficult for him.

The fourth step is to establish one's credibility within the com-
pany. We have in many instances been able to identify the curious
role of the consultant as a dilettante who comes in, drops his

pearls of wisdom over a period of time, and leaves the scene. He also leaves a dilemma to be resolved after him. As an example, we had a lot of consultants at the Los Angeles Unified School District at one time. The consultants, being in most instances skilled psychiatrists or psychologists, were able to identify for the teachers, who were the consultees, what "Johnny's problems" were, and what the teacher needed to do in order to relate to "Johnny's problems." Usually it meant that, among other things, the teacher had to spend much more of her time relating to Johnny. The question of what to do with the rest of the forty children in the classroom during that time was not the consultant's problem, and consequently he left that to the teacher. There is too much danger of the consultant being that kind of dilletante. To avoid that, the consultant must be willing to get his or her hands dirty, to get some work done, to establish some credibility within the organization, to be able to put his or her expertise on the line, and to show whether or not the thing that he is proposing really does work.

Finally, no program can work without a built-in evaluation. Once the process has started, without going through the niceties of experimental design (because obviously we cannot control variables in a program of this sort), at least some kind of heuristic evaluation methodology should be involved. A six-month follow-up would serve.

All of the above steps are essential in the art of establishing any awareness program in an organization. As an example, we can examine briefly the program that we are doing in consultation with the Medical Department of Union Oil Company. This is not a report,

because we have been working with the Company only since January of this year (1978). Therefore, I can only outline what we have done, and defer to a later time discussion of any further prospects or conclusions.

The invitation from Union Oil Company was extended several years ago by the Corporate Medical Department. We spent a year discussing what our objectives were. There were three sets. The obvious objectives that the company has are profit and product and that is clear. The objectives that the Medical Department had were both clinical and educational. It took a year to work out those objectives to some sort of harmonious arrangement between the organization, the Medical Department, and myself. In order then to establish myself within the department, I had to provide clinical services. As referrals came, either from physicians within the Medical Department or from supervisors, we dealt with each case. Some had to be referred out, because the department is not established to provide ongoing medical assistance to any employee. However, largely because a goodly number of referrals seemed to involve Type A personalities, there was the possibility of setting up preliminary stress management programs on an individual basis. These included a follow-up over a period of four to six months to determine (a) whether the individuals were following the suggestions made; and (b) whether or not there had been any change in organizational behavior or in the alleviation of symptoms.

As credibility was gradually established, we began a series of presentations. These presentations were arranged through the Medical

Department with various managerial groups. The groups included management, marketing representatives, the research division, workers in refineries, etc. The first thing that was obvious was that the presentation could not be the same for these groups. No matter what you have to say, you have to tailor it to the particular group involved. Our presentations, for the most part, followed a similar outline, with a bias in the direction of the scientific aspect. We spent a good deal of time defining stress as clearly as we could. That necessitated some kind of review of the functioning of the autonomic nervous system and the endocrine system, however casually that was presented. We did this because, given the popularity of the concept of stress, it seemed to us absolutely essential that whoever was going through our program understand why he or she was doing what he or she was doing. An indiscriminate application of stress-hnadling tips was not appropriate, because what is stressful for one person is not stressful for another. The perception of stressors varies from one individual to another. So, the program had to be geared to the individual.

Now, this quasi-scientific approach generally meets with some reluctance. We have given many workshops, not only at Union Oil Company, but elsewhere, on stress management and stress reduction. The evaluations are always the same. The part that everybody wants to hear about is "what to do about stress." There is a great deal of impatience with that portion of the program in which we attempt to present what we know scientifically about it. People want to get down to the solution of their individual problems. But too hasty an inclination to respond to that impatience leaves one, I think, in

many awkward situations. So, our presentations remained scientific.
We were saying what stress was, and making distinctions which we felt
were important in terms of ultimate practical application. We feel
that this patience is paying off, and the long-range effects of
this solid base will exceed the benefits from a gadfly program. We
distinguished between stress, as intra-organic, and stressors, which
are extra-organic. We said to management and employees of the com-
pany that stress is within them, being essentially the wear and
tear on their systems. Stress, we insisted, is not one's mother-
in-law or kids; it is not one's job, the employer, or the supervis-
or. Stress is what happens in us as a function of how we perceive
those people and events. The practical reason for this explanation,
apart from its scientific accuracy, is that if stress is intraor-
ganic, we can then conclude that everyone has some limited control
over it. The responsibility for what one does in the face of a
perceived stressful situation is within. We have limited control
over our perception of stressful events, and limited control over
how our bodies respond to them.

We felt that this aspect was particularly important in any kind of
program because one of the psychological correlates that has been
found to accompany the experiences of stress consistently is the
sense of powerlessness. It is the sense of being trapped, of having
no options, of not being able to do anything about the situation.
What we are trying to communicate is that if, indeed, stress is in-
traorganic, one is not powerless. There are options, or at least
the perception of some options. The idea of options gets into some

interesting stress-coping theories. The options, for example, need
not be real. The feeling of being able to do better somewhere else,
whether that feeling is accurately founded or not, reduces the ex-
perience of stress. There are further corollaries or consequences
from a distorted perception of what one's options may be, but that
is another problem. With respect to the stress cycle, the sense
that one has options, that one is powerful, whether that sense is
true or not, is functional.

Further corollaries to this approach include the idea that stress
is obviously essential. There is no stressless life; and thus the
distinction that Selye makes between distress and stress. Some
stress is essential for the stimulation of intraorganic systems af-
fected. Stress-related disease is not the function of the inten-
sity or frequency of stressors, but rather the failure of the or-
ganism to restore itself to equilibrium, or in Walter Cannon's
phrase, homeostasis, after the stress has been experienced. Every-
one experiences stress. The stress-related diseases, I think it
can be said with reasonable accuracy, are a function of the fail-
ure of the body to get back to equilibrium after the blood pres-
sure is up, after the heartbeat has increased, after the blood has
been circulated from the abdomen to the brain and elsewhere, after
sugar has been extracted for the muscles and so on. The body nor-
mally restores its own equilibrium. The failure to restore, either
because of the continued perception of stress as unending, or be-
cause of malfunctioning of the parasympathetic nervous system or
the adrenal cortex, is associated with stress-related disease.

Thus we presented to the people in these programs a stress cycle in
which there were three major points of intervention. The first are
the stressors. Identification of the stressors requires a very
careful discernment of what the stressors really are. The Holmes
and Rahe studies suggest that the stressors in one's personal and
social life probably exceed the stressors of one's occupational
life. Yet, in many instances, it is very easy to identify occupa-
tional stressors as the culprits in cases of stress-related disease.
One must also be aware of the fact that the areas of stressors are
not water-tight. Personal stressors can be brought to the job, and
vice versa. So, identifying the actual stressors in an individual's
work, social, or life history has to be done with great care. One
can waste a lot of time eliminating those events which are reported
to be the stressors, but which may actually not be. I think Dr.
Chadwick's paper suggested the importance of taking care with self-
reports. I have looked in recent years at many MMPI profiles for
employees in large organizations, and apart from the fact that the
clinical scales are characteristically benign, there is one other
factor that I don't think has been reported very often, namely,
that the validity scales strongly suggest that employees do not re-
port what is wrong, and are trying to look as good as possible on
the test, even to the extent that the clinical scales are rendered
very difficult, if not impossible, to interpret. That phenomenon
is undoubtedly present as well for the individual self-reporting
stress. The first stage in the management of stress, therefore, is
an accurate and candid identification of what the stressors really
are, and that doesn't come across immediately on the basis of what
the manager or the employee reports. There has to be a much more

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careful and honest analysis.

The second point of intervention is obviously the area of perception. What is this individual's personality style? Is he a Type A, or more classically, is he likely to be a migraine, GI, cardiovascular, or respiratory responder? There is a great deal of literature on kinds of personality profiles which seem to be correlated to those physiological responses. We look first then at personality, and then in light of that, at the manner in which the individual perceives his job, his work life, his family, his social and physical environment, etc.

The third point of intervention involves the utilization of those techniques which are directed to the restoration of homeostasis once stress has been experienced. These include relaxation exercises, breaks, physical fitness programs, yoga, transcendental meditation, biofeedback, and others.

Our program, then, first attempts to get into the organization in a suitable and harmonious way and develop credibility within the organization. Through the use of various presentations, we attempt to provide management and employees with a model to cope with the stress that they experience. We emphasize identifying the stressors and also identifying the kind of perceptions that this type of individual has of himself in his environment. Finally we utilize, to the extent that our resources allow us, the various techniques which we now know for facilitating the restoration of bodily equilibrium.

At this point I would say we are not far into this procedure. We do not have a complete program worked out. It is much too early to be able to identify outcomes. This stage of the program within Union Oil Company seems to be successful; follow-ups on those who have filtered through the Medical Department on the basis of some stress-related disorder or some stress-related, performance-impeding problem are generally positive to date. At the end of the first six-month follow-up, there has been an amelioration in the conditions of all but two or three of the twenty-five employees with whom we had had contact. Again, I want to reiterate that this is not yet a full-fledged program. It is an approach; and it is presented only in terms of the strategies employed in introducing a stress-awareness program to the corporation.

AN ACTIVE EMPLOYEE ASSISTANCE PROGRAM

Jack Guest, MPH*

I would like to use the concept of mind set, and I would like to
change your mind set once again from the theoretical to the practi-
cal. As a consultant, my job is out in the field dealing with day-
to-day problems as they arise. My guess is that a lot of you have
the same problem. You are out in the field, on the job, meeting var-
ious kinds of problems that may be a result of stress. We do not
have a stress reduction program at Hughes as yet, although I think
that an extension of our Employee Counseling Program might very well
be the logical next step. What I hope to cover today is why we have
a counseling program at Hughes, the steps involved in that program,
and how I work with supervisors to help them solve problems that are
perhaps the result of stress. Then, I would also like to talk a lit-
tle about some of the results that we have had, because I think they
are very impressive. I think they have been impressive to our man-
agement.

First, I would like to clarify "Hughes." We are not part of the reg-
ular Hughes empire, or Summa Corporation; we are part of Hughes Med-
ical Foundation. We are large. We have 42,000 employees, one-third
of whom are hourly, two-thirds of whom are salaried. We have 15,000
employees with one or more advanced degrees. We are a high technol-
ogy organization; we build satellites, radar systems, and missile

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systems, among other electronic products.

Why do we have a program at Hughes? We want to identify problems
that our employees bring to the work setting and assist them in
solving those problems. There are two reasons we do this. One is
increased productivity on the part of our work force. The second
one is that we have valuable employees. When we say that our em-
ployees are our business, we mean it, and therefore we want to re-
tain them. Consequently, rather than fire employees that have prob-
lems, we would like to help them deal with those problems. I would
add that there probably are some companies around that don't have
that philosophy. I don't believe that employee assistance programs
or employee counseling programs can work unless you have top manage-
ment support and unless you are able to do the kinds of creative
things that Hughes allows us to do with our employees.

Let's move on to the steps involved in our program. They are iden-
tification, confrontation, referral out, and follow-up. Let us look
at each one of these in a little more depth. We have to know we have
a problem, so there has to be some way to identify that problem. At
Hughes we are very conservative in the way we identify problems. We
only do it in two ways. The first is self-referral. The employee
knows he or she has a problem, knows about Employee Counseling, and
comes to us for help. My guess is that many of the stress-related
problems that we work with come to us as self-referrals. The second
is a supervisor referral. Two-thirds of our people come as super-
visor referrals. The performance of the employee has deteriorated
and the supervisor is concerned. He follows the usual supervisory

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procedures, which do not work. Performance continues to deterio-
rate, and Employee Counseling is called in. I mentioned that we
are conservative; we are conservative for a reason. We want to be
absolutely sure that we have a problem. We do not want to deal with
personality differences between the employee and the supervisor. Our
Employee Relations people deal with those problems. We want to know
that something external is causing the deteriorated job performance.
We check this out with documentation. I would like to walk through
the kinds of things we ask our supervisors to document. Obviously,
attendance is one. Attendance tends to be a better indicator at the
bottom level of the company than it does at the top. At the bottom
we have a much greater control on our employees. At the top, paper-
work may not get filed. You might open up a file that looks clean
but probably isn't so clean. When you get into upper level manage-
ment, we look for some other kinds of things like reliability. We
do a lot of team work, projects where we will have three engineers
working on a program. They are supposed to come together on Novem-
ber 15, each one with a piece of the project. They clip the pieces
together, and it works. Well, if November 15 rolls around and they
only have two pieces, that means a delay in whatever it is that we
want to get on the road. So, we look at reliability in this instance.

Production is another area; but sometimes it is difficult to get a
handle on production. At our production facilities, it is fairly
easy. If somebody is supposed to produce fifty widgets, and they
are only producing twenty-five, we have a production problem. But,
we have some other kinds of plants, such as the one out at Malibu
which is a kind of think tank. Our people out there think. Now,

I have been up here for five or ten minutes, and I have been look-
ing over this audience very closely. It is very difficult to tell
whether or not you are thinking. In any event, we have to get a
handle on performance one way or another. We will work with super-
vision to see what kind of objectives they have for an employee and
whether the individual is fulfilling those objectives.

Interpersonal relations is another area that we look at. Maybe we
had an employee who used to get along with everybody in the depart-
ment and suddenly he is edgy and having arguments. Things like that
indicate that something very well may be wrong.

Then, of course, there is sick leave. Sick leave is one of the bet-
ter indicators. We have twelve days of annual sick leave plus what
is called extended sick leave. You show me somebody who has used
all twelve days of sick leave, and somebody who may have used some
extended sick leave, and I will show you somebody with problems.
Now, it might be a very legitimate problem, such as a chronic ill-
ness that requires the employee to be off that amount of time. But
in any event, we ought to know why that employee has to be off
twelve days per year.

Let's move on to the next step, confrontation. Confrontation is
the most difficult step in our program. It is tough for a supervis-
or to call an employee in and say "I am dissatisfied with these five
.specific things. You have to take corrective action, you have to
improve." We have quite a stable company. All kinds of interrela-
tionships are present. The supervisor may have been the best man

at this employee's wedding. So it is a very, very difficult step.

While confrontation is difficult, you have to develop a philosophy that enables you to confront. Mine is basically very simple. Every human being has a right to know exactly where he stands. If he is doing something wrong, he has a right to know what he is doing wrong. He has a right to know what you are going to do to him if he does not take corrective action. If you think about it in this way, it makes confrontation much easier. Also, when you realize that this is the method we use to motivate employees to get the help that they desperately need, then it becomes even more meaningful.

Now we also use discipline in our confrontation. We follow our labor contract. We follow it to the letter of the law with our hourly employees. We also discipline our salaried people in much the same manner. We use an oral warning, a written reprimand, disciplinary leave without pay, and discharge. You may ask, "You are dealing with illnesses and problems, and you are going to punish people for having those problems." That is not our intent. Our intent is to establish credibility. People with many of these problems, including alcoholism, have been threatened by others including their supervisor. "Next time you are not able to perform, I am going to do this, or I am going to do that." We don't threaten people. Promises, yes; threats, no. What we do during the oral step is to say, "Hey, if you don't take corrective action, if your performance doesn't come up, we are going to give you a written reprimand." Most alcoholics will think, "They won't do that. They have been

warning me for a long time and they will warn me again." Then, of course, performance doesn't go up, and what can we do? We give him that written reprimand. We don't say in the reprimand that he is an alcoholic, we deal with what's wrong with his performance. He thinks to himself, "My goodness, if they have given me that, they will give me a disciplinary leave without pay. That is the next step." Then we do it. While in most cases people come into Employee Counseling with their problems during the initial step, we will go all the way, if need be.

Let's move on to referral out. We are fortunate in Southern California in that we have about 1,300 agencies that deal with problems that we uncover at Hughes, and we are able to refer out to those agencies. I don't like to refer employees any place I haven't been myself. So I visit agencies. I like to get to know the staff, find out what the programs are all about, and then go from there.

The last step is follow-up. Mental illness, drug abuse, and alcoholism are chronic problems. These are problems where people may indeed have a relapse. So follow-up is absolutely necessary. We follow up in three major ways. First of all we follow up with the agency to which we have referred to make sure we made an appropriate referral and to make sure that some plan of recovery has been laid out. Next is the employee. We are looking for a change in that employee, and if we do not get it, we may need to try some other facility or some other resource.

Then, of course, we follow up with supervision. Here our goal is increased productivity and there have been a few occasions where we have dealt with the individual problem and performance did not go up. We need to know from the supervisor if performance begins to go down again. We want to know now so we can get involved right away.

Let's move on to some of the results. Fifty-five percent of our case-load is alcoholism. That may be astonishing to you, but I can say that at Standard Oil and some other companies that have programs it runs about the same. We get 70 percent recovery results. I used to run an alcoholism treatment clinic in Northern California. I don't think that our recovery results were any better than 20 per-cent. Why do we get 70 percent in industry? Very simple. In Con-tra Costra County I was getting social welfare referrals and proba-tion referrals. They were late stage alcoholics, by and large. In industry, early and middle stage alcoholics are being identified. They still have their families. They still have a lot to work with, and recovery rates go up. Eighty-four percent of our caseload are employees. Sixteen percent are family members. We are very much interested in family members. The family member with a problem can have an impact on the employee's ability to do his job, and we want to help that employee if we can. The average age is forty-five. If you go to any school of business management, they will tell you that people at forty-five are right in the middle of their most pro-ductive years. Those are people we don't want to lose.

When you combine that with the next statistic, it becomes even more significant. The average length of service at Hughes Aircraft was

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eight years, as of the time I did this survey. Because we deal with problem employees and 55 percent of our caseload is alcoholism, the average length of service in our caseload should be something less than eight years. It turns out to be twelve years. If you look at these two facts, forty-five years of age, with twelve years of service, we are reaching long-service employees who are theoretically in their most productive years. These are people we really cannot afford to lose.

When the program was first started, a survey was completed. A great deal of data was available. Finance looked it over and made an estimate that every alcoholic on the payroll was costing Hughes Aircraft $4,000 per year. At that time we estimated 6 percent of the work force were alcoholics. With a population of 28,000 employees at the time, we were losing $7.2 million due to that one problem, not to mention all of the other kinds of problems that we talked about today. If you accept our recovery rates, the job we have been able to do with that one problem alone, we are saving the company $1.2 million annually. Perhaps even more significant for those of you in labor relations, we have recommended hundreds of disciplinary actions, including about one-hundred discharges. We have never had a grievance filed by any of our labor unions on any recommendation that we have made. Why? Because labor and Employee Counseling have the same goals as does management. We want to retain that employee. We don't have an adversary relationship. But, more importantly, we documented. We have touched all the bases, we have been fair, and we have treated everybody exactly the same. If someone were to file a grievance, there is no way he could win.

I have mentioned that we have discharged almost one-hundred people.
We have discharged blacks, Chicanos, women, and men over forty.
You know that those are all protected classes. They could all file
a charge against the company. We have never had a charge filed
against Hughes Aircraft on any discharge we have recommended. Why?
Again, the documentation and the fact that we have been firm and
fair and treated everyone alike are the reasons.

One of the more interesting things about our program is that in the
beginning one of our senior scientists said, "Well, I don't know
whether we should have a program like this at Hughes. You know we
have a lot of bright people here, and probably if we have a program,
it should be for 'those people'." He meant the hourly employees,
because the Ph.D.'s and the people with Master's degrees are much
too bright to have problems like mental illness and alcoholism.
We suspected that he was wrong, and so we have collected some data.
It indicates that if you break down our 42,000 employees by class-
ification, and you do the same thing with 2,200 cases we have
worked with, you find that we have as many problems as a percent-
age of the total in the top of our organization as we have at the
bottom. That should be no surprise since we are dealing with hu-
man beings and they are all subject to the same kinds of problems.

I think everyone wins with our kind of program. The employee is
the biggest winner. He has the most to gain. He still has his
job, his family, and is still a productive member of society. Su-
pervision also benefits. Also we have been able to solve a prob-
lem that the supervisor by himself was not equipped to solve. We

have increased productivity in his department and saved the company
$1.2 million annually in the process.

I would like to carry this one step further to the community. If
all corporations, large and small, had programs like this one, and
eventually moved into some stress prevention programs, what would
we find? At Hughes we have seven hundred families where the em-
ployee is still with us, still working, still supporting his family.
Without a program, eventually he would have been unemployable.
When he is unemployable, the male breadwinner usually has to leave
and the family goes on welfare. Alcoholism accounts for one very
big chunk of our welfare budget, and we all know how large that bud-
get is. Then the alcoholic may well wind up on skid row, and what
do we do there? We arrest him, book him, jail him, let him out,
arrest him, book him, jail him. That is a very expensive process.
Then, of course, when the alcoholic really gets bad, what do we do?
We send him over to County-USC Hospital. I don't know what the
latest figures are, but it probably costs about $240 a day. Who
pays it? Well, you and I pay it. So I maintain that if companies,
large and small, would work together or buy the social services
available in the community, we could have a tremendous impact on
some of our most serious social problems.

STRESS AND CONDITIONS OF WORK--A SOCIO-TECHNICAL APPROACH
TO LARGE ORGANIZATIONS
Joel Fadem*

I would like to begin by presenting in greater detail some of the
findings from a study touched upon earlier, the "Air Traffic Con-
troller Health Change Study" conducted by Dr. R.M. Rose and asso-
ciates of Boston University Medical School. The findings were re-
ported June 1978, and I think some of the conclusions are most ger-
mane to the approach my colleagues and I at UCLA are taking to a
project with the Federal Aviation Administration (FAA) which I shall
soon describe. Some of the Boston study's findings are indeed re-
markable, but first let me give you a rough idea of what that inves-
tigation entailed.

The study lasted three years, and covered 416 air traffic control-
lers from small and large facilities in the New England and New York
areas. Of the 416 subjects who were in the study from the start,
388 remained to the finish--an acceptable retention rate. The prin-
cipal goal of the study was to determine the nature and extent of
health changes in air traffic controllers and by what characteris-
tics these changes might be predicted. There was an extensive ar-
ray of data collection in this study. It was calculated that over
2,500 man days of observation took place, including data collection
in the various facilities over 5-6 hour periods at a rate of every

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20 minutes. In total, there were approximately 40,000 individual

observations made while controllers were actually working.

The data were quite extensive--medical, psychiatric, psychologi-

cal, and physiological--and ran the gamut of research techniques

available to the study team. The Rose study is the most comprehen-

sive piece of work in this area that the FAA has ever conducted,

and probably one of the most impressive studies of stress and the

environmental conditions contributing to it that has been under-

taken.

From all the data, the Boston team was able to diagnose old and new

cases of hypertension, along with occurrences of major illnesses,

such as peptic ulcer and diabetes. The vast bulk of the physical

health changes related to short term respiratory illness and acci-

dents, which were associated with occupational disability in moder-

ate degrees. The major clusters of predictor or risk variables in-

cluded stable personality characteristics in order to determine

whether or not particular traits raised one's risk of developing

some kind of physical or psychological disability. The Boston team

was particularly interested in the controllers' attitudes and per-

spectives about their work; in other words, their feelings about

their ability to cope with the diverse demands of their work, both

on and off the job. The team was concerned with controllers' feel-

ings about the human cost of working in this occupation: its inter-

ference with the rest of their lives, their feelings and investment

in their work, their concerns about burn-out, their ability to

bounce back after periods of being away from the scopes, anxiety, etc.

The major category of predictors related to responses to the work itself--actual responses during the act of controlling air traffic. While the men were on the job, the Boston team measured their blood pressure, endocrine responses and various types of arousal levels. Workloads were also very carefully recorded. The Rose team was able to then compare controllers with respect as to their work load, as well as their subjective responses to work, changes in overt behavior, blood pressure, hormone levels, and so forth.

There were basically three clusters of findings. The first was that the largest single chronic illness condition among air traffic controllers was hypertension. This came as no surprise to the research team. Findings in this study paralleled previous reports which documented the increased incidence of hypertension in controllers as compared with other individuals. Using a very rigorous definition of hypertension, the team found that about 32 percent of the men entering the study already had borderline or definite hypertension. In addition, 9 percent (36 controllers) developed these conditions over the course of the study. The Boston team concluded that there was an increased risk of hypertension among the air traffic controller volume population. They did not say that air traffic controlling actually caused hypertension. They were very careful about making that distinction, although there is clearly a strong association involved. They recommended that an appropriate conclusion might be that air traffic controlling represents a risk factor interacting with other risk factors, because there may be a variety of biological and perhaps genetic causes of predisposition towards hypertension. Clearly, in this occupation, it was a key

chronic illness.

It is also important to note that hypertension had no relation to
performance. People who had hypertension were neither better nor
worse in terms of how they did their job, in terms of how they
coped with their workload, or in terms of how they were rewarded
or punished. There was no relationship between performance and in-
cidence of hypertension.

The second major category of health change related to the annual
rate of mild or moderate illness. This primarily consisted of res-
piratory illnesses and the average number of acute health change
episodes per controller over that period was 2 1/2 per year. There
were wide variations within groups, but that was the average. These
illness episodes were primarily accounted for by upper respiratory
infections and more moderate injuries due to nonspecific viral dis-
orders, and acute gastro-intestinal syndromes. Although the occur-
ence of these mild or moderate illnesses did not present a signif-
icant risk for future mortality, the team concluded, they were as-
sociated with significant numbers of days of restricted activity
and they could, indeed, be expected to be an increasing source of
absenteeism in the future.

Although they couldn't be as precise in their assessment of psycho-
logical health, the team used the state of the art methods of diag-
nosing psychological and psychiatric health changes. They tried to
contrast those who did and those who did not develop various types
of psychological and psychiatric illnesses over the course of the

study. Over half of the men in the study had at least one psych-

iatric problem, as defined by the team's criteria. Most of these

problems did not receive professional treatment.

The controllers who developed psychiatric problems were signifi-

cantly lower in satisfaction with their work and in their ability to

discharge tensions following work. They also had an increased ten-

dency to cope with job stress by drinking after work, and showed low-

er amounts of coping in activities such as physical exercise.

Thus, in many ways, the measured outcomes in terms of psychological

and psychiatric health change were very similar to those of people

who experienced mild or moderate illness. This prompted the re-

searchers to ask whether they were really looking at the same peo-

ple. Was this the same group of people who became physically sick?

Was there, essentially, one sick group and one healthy group? The

answer was negative. In fact, there were three separate clusters

of people, overlapping to some degree but essentially distinct.

Therefore, the men who developed hypertension were no more likely

than others to have mild or moderate illness and no more likely than

others to have psychiatric problems. The following quotation from

the Boston team's tentative conclusions is illuminating in this re-

gard:

    This finding supports the specificity hypothesis in psycho-
    somatic medicine which emphasizes that different individ-
    uals will develop different problems despite the fact that
    they may be exposed to similar difficulties or similar prob-
    lems in their psychosocial environment. For psychiatric ill-
    ness and mild to moderate illness, several common themes
    clearly emerge. The work environment seems to be impli-
    cated in the risk for developing health change more than
    the work activity itself. Men who developed more mild or

moderate illness or who developed psychiatric prob-
lems did neither more nor less work when observed
during the field studies. They spent neither more
nor less time on position nor did they control more
or fewer planes. It was also noted that they were
not considered less competent by their peers, al-
though they may have been less frequently chosen as
amicable or less likely to be nominated as an ideal
team member. Because of these findings, one may not
conclude that individuals who develop more mild or
moderate illness such as flu or psychiatric problems
were poorer controllers or did less work...One is led
to the conclusion that these individuals are more at
odds with their work environment. They are often
highly invested in being controllers although they
find themselves less able to discharge tensions as-
sociated with their work. Hence they find that func-
tioning as controllers is associated with an increased
cost in terms of their personal lives and psychological
health. This finding of "it's not so much what they
are doing as the context in which they are doing it"
holds definite implications for changes that might
be considered in the work environment to reduce the
risk for future morbidity.

I should also mention that the particular population of controllers

which was studied had a lower rate of disqualification than the com-

parison group. Therefore, these findings were probably on the con-

servative side.

The Boston team assessed the predictors of burn-out, as they had de-

fined it, and found that those individuals who later developed burn-

out scored significantly higher on a number of positive factors ear-

ly in the study. These individuals had more vigor and friendliness,

less anxiety, and reported a higher tension discharge rate. They

also coped less by drinking. In other words, they did not start out

as dissatisfied or as having anxiety. Rather, they were committed

and, from their own estimation as well as that of their peers, they

were functioning as well or better than others. It is notable that

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there were no differences in workload between the group that exper-
ienced burn-out and the larger group which did not. The burn-out
group did not have physical health deterioration per se, though it
is quite possible that if this study continued, some kind of phys-
iological deterioration could develop as a result.

Another quotation from the Boston study can serve as a summary of
this remarkable research:

> Our findings are in many ways different from our expec-
> tations, especially with regard to the predictors of
> psychiatric illness and mild to moderate physical health
> problems....These findings suggest that it was not so
> much what they were doing but the context in which they
> were doing it and the attitudes and feelings they had
> about their situation that influenced their risk for
> health change...We had expected that the workload itself
> during field studies would have stronger predictive power
> than it turned out to have. The consistency of these
> results, which might be summarized as the alienation con-
> trollers experience from their work environment, suggests
> that changes should be made in this environment and in
> the way it is experienced. We believe that dissatisfac-
> tion with FAA management policies are a significant prob-
> lem and represent part of the negative set associated
> with an increased risk for health change. We also be-
> lieve that some of the divisiveness that the controllers
> experience may in part derive from union-management inter-
> actions. Thus...some of the alienation and divisiveness
> controllers often experience may be an unexpected and un-
> wanted side effect of the adversary relationship between
> union and management....Our interpretation is that this
> is not solely a matter of working hours or of pay, but
> that there is a need to improve the communication between
> management and individual controllers and to attempt to
> limit the adversary nature of their relationship. It is
> our view that this could be accomplished by a cooperative
> effort between the FAA and union management, and that in-
> dividual controllers would significantly benefit from
> such a reduction of controversy in their work environment.

The predictors of hypertension were distinct and, in fact, the Bos-
ton team's recommended ways for overcoming hypertension were differ-
ent than those preferred to deal with the environmental issue. The

people in the hypertensive group did not feel alienated toward their work. This suggested that there may be more individually-based, as distinct from organizational, remedies for reducing hypertension or for coping with it within acceptable levels. However, with respect to the other mental and physical health problems studied, the Boston team was recommending a hard look at the work environment in its broadest sense. This serves as an appropriate backdrop for the project I now wish to describe.

The Rose study began in 1975 and was completed in June 1978. We at UCLA knew that the study was going on, although we hadn't kept in touch with it. We were, in a sense, pleasantly surprised to see that the recommendations from that study called for a broader frame of reference to address wider organizational conditions, as distinct from narrower approaches to the work itself and particular individual differences. The origins of the project I am going to describe were interrelated. They all converged in late 1975. In the Federal Aviation Administration, a high degree of technical progress, complexity and sophistication has developed within the air traffic control part of the national air system. High level managers in FAA were becoming concerned that present attempts to deal with these changes in terms of the human factor were not satisfactory, and that technological solutions to work problems were not always providing the most desirable results. Given plans for further automation, there was an increasing awareness of the national air system's vulnerability, and its crucial dependence on people. One FAA manager characterized this as the contrast between hardware versus "skinware." The word "skinware" became one of the rallying calls in

this project for those concerned with mitigating the social impacts of technology.

A younger work force was emerging in the FAA, and there were issues which had to be raised in connection with the work force of the future--what kind of people would the FAA wish to have, given the new technological environment? What kind of generation gap existed in the agency between those who grew up in it, so to speak, who worked the old manual system before the days of advanced radar, and the young people who entered with automation as their first work experience in the FAA?

A great deal of anxiety is expressed by younger air traffic controllers who operate the present highly-automated system. In short, they fear system failures. Many of these individuals lack the capability to revert to the old tried and tested "manual" ways. So, while the scopes are humming and the displays are up and everything is right, there remains a latent fear that the system may go down. And when the displays suddenly disappear, controllers don't know when they will come back. Meanwhile, they, the controllers, must act. This requires the development of a reliable mode of crisis intervention to cope with temporary system failures. Therefore, the automation problem is very emotion-laden as well as being a technical issue.

There were vexing problems in the area of labor-management relations which reflected the tougher climate existing in the public sector. Some of FAA's upper-level managers were favorable to the idea of ex-

ploring areas of common ground between the agency and the unions
in an attempt to jointly solve problems outside the bargaining
arena. Also, from a management viewpoint, they wished to move the
agency more toward an anticipatory posture, rather than a reactive
one. This would require an improved capability for continuous long-
term planning, especially in connection with emerging issues among
the agency's diverse work force.

Subsequently in 1976, top level management in Air Traffic and Air-
ways Facilities sectors of FAA convened a task force to consider
how to proceed with tackling some of these issues. They served as
a steering group for two subgroups or task forces, consisting to-
tally of line managers, journeymen controllers, and technicians,
covering a range from GS-8 through GS-15. The task forces had ten
people each. One task force was called the Technology Group, the
other became known as the Quality of Work Life Group. Both were
composed of representatives from the three FAA unions. The over-
all purpose of these two groups was to learn and experiment with new
tools--new approaches and concepts--which would help them diagnose
FAA problems in organizational terms, both with respect to the agen-
cy as a whole and, more immediately, within local operating facili-
ties. In doing so, it was hoped that the groups would be in a bet-
ter position to generate options for changing the agency organiza-
tionally for the purpose of improving effectiveness, as well as the
quality of working life of its employees. These potential options
included not only technical ones, but social ones as well. Among
the key factors underpinning them was employee participation from
the bottom ranks upwards of the FAA.

In terms of the dynamics of this project, I shall just say that an extensive training program was designed for the two sub-task forces by our group at UCLA. The training is based on an appreciation of organizations in systems terms. Through this approach, interdependencies between organizational units can be traced in a systemic way, and not merely in terms of symptoms. New linkages can then be formed to 1) improve the service mission, e.g., actually getting the work done, delivering services to the aviation public; and 2) provide more effective social mechanisms through which to undertake work. As part of this, important outcomes also included the reduction of "hidden costs" such as occupational stress and illness, job dissatisfaction and destructive forms of conflict.

A guiding principle of the training program and its application was that processes of change had to be congruent with the actual content of change recommendations. That is, the UCLA group acted in the role of trainers, not outside experts with solutions. Members of the task forces knew their own business. We could provide them with concepts which might help them assess, change and evaluate results at a number of demonstration sites. At these sites, the task forces went through the analytic exercise of conceptually taking apart the technical and social systems of air-traffic control rooms and airways facilities stations. A key part of their data collection involved extensive participation of employees at those facilities. This was an attempt to really get down to the nuts and bolts of the relationship between activities undertaken to get work done, and the social processes and support functions which bind air-traffic control technology--both hardware and procedures--together.

The Technology Group was charged with looking at new technology, as well as existing systems. Let me just give you one brief example of the type of issue they addressed. In the highly automated environment toward which everyone in the FAA is well convinced the national air system is evolving, it is vital that controllers have the capability to revert to more manual methods when the automated system fails. Nevertheless, air traffic control will progress toward more machine control over decisions. You may wish to question this, but that is the logic which currently is the driving force in FAA planning. With greater machine control over decisions, the air traffic controller will be relegated to a monitoring role. There is a good deal of research which confirms that man is not a good monitor. Among other things, he may fill in information gaps displayed based on several psychological factors, his mind may wander from boredom, etc. Yet at the same time, there remains the need for crisis intervention and decision making based on a deep understanding of the new system. Therefore, they are in a dilemma. The controller on the one hand will be cast into the role of monitor, and on the other he will have to respond quickly and intelligently to random crises. The net effect, as far as the Technology Group could see, is that the next generation of automation will accentuate the very problems which now beset them--boredom, frustration, peaks of very intense activity and periods of low activity, fears of system unreliability, etc. They concluded that the FAA was driven by a technological force which has enabled it to succeed in their service mission, but the agency has not been nearly as successful in its mission with respect to human resources--"skinware."

The FAA has reached the point where newly-available technology, though usable, may not be practicable to implement because of its adverse effects on employees. With this in mind, the Technology Group developed and recommended a framework for screening new technology through a human impact "filter." That is, quality of work life considerations are one of the key filters in the technology assessment process. Although human factors engineering and ergonomics are a part of this, the assessment is much broader. During the past two years, the Technology Task Force tested this assessment process with existing technology through retrospective analyses. They are now actually testing out this process on a new major air traffic control technology destined for use, and there is a good chance for modification based on quality of work life considerations.

The second task force, the Quality of Work Life Group, undertook an intensive application of what we call the "socio-technical" approach at five facilities around the country. They also conducted individual and group interviews with 2,000 employees throughout the FAA. This group came up with a working definition of the relationship between quality of work life and productivity which included the idea that quality of work life was a function of employees at all levels meaningfully participating in decisions--socially and technically related, as well as procedural--which affect them. That sounds very simple and perhaps highfalutin and idealistic, but in the course of these demonstration projects thus far, it has been a vital process for improving decision making and change at the local level in the facilities involved.

The first order of business for the task forces was to become exposed to new concepts and tools, to try them out and, if they approved of them, to recommend them to the agency. It was basically a learning process and I don't want you to come away today with the feeling that massive changes are now brewing. I mentioned that this month (November 1978) members of the Technology Group are convening to examine a new feature of air traffic control technology. I have slightly misled you as to the timing of things. What I meant to say was that these two task forces submitted their recommendations to the head of the agency in June of this year. The recommendations of both groups were endorsed and the technology assessment process was adopted as agency policy. It is now an agency order that new technology be subjected in advance to this assessment--a key element of which being the human factor--to render a global reading of the relative acceptability of that new technology. This is intended to increase sensitivity to the role that people play in holding our air traffic control system together, and to qualify our reverence for the magic of machines and electronics. It is not machines but people who are filling the voids created by technical systems and procedures, as well as bureaucratic rules. Therefore, the technology assessment process, carried out by a team of representatives from all levels of the FAA, will be applied in an effort to "head off at the pass" significant dislocations, both personal and social, which could be experienced by the work force with the introduction of advanced forms of automation.

The next phase of the project is the creation of another steering committee, more broad in scope, which will include Engineering and

Development, Aviation Medicine, Administration, and other FAA de-
partments, as well as its Air Traffic and Airways Facilities compon-
ents. The agency employs 56,000 people. The majority work in the
latter two areas. The next phase of the project will bring together
a steering group which will appoint more sub-task forces. They will
be broader based in how they attack the problems of quality of work
life, productivity and occupational stress. Stress, of course, is
an important concern in this organization development project. How-
ever, it is viewed more as a by-product of organizational influences
rather than individual-based inadequacies. Also, when the next pro-
ject phase begins in January 1979, a concerted effort will be made
to include union representation at the steering group, as well as
the sub-task force, level.

One of the other outcomes from the work of the task forces is that
the socio-technical approach to organization design will be intro-
duced into the curriculum of the FAA's management training school
in Oklahoma City, where all prospective and existing managers are
trained. This approach will be one option for use as a diagnostic
tool with which to solve problems, one which involves employee par-
ticipation and a very hard look at the relationship between social
and technical factors at the work place.

The Quality of Work Life Task Force also recommended that the socio-
technical approach be used as a tool for evaluation, that is, as a
method for evaluating the performance of an operating facility.
This is in contrast to the current procedure of sending a team from
Washington with clipboards who perform what might be best described

as a ritualistic checkoff of details which do not easily lend them-
selves to fruitful application. Because of the basic purpose of e-
valuation is for correction, these task forces recommended using
more participative methods in the evaluation process. In other
words, employees and managers would join with the outsiders in con-
ducting a deeper evaluation of their own facility in order to come
up with weaknesses, strengths and programs for improvement. So you
can see that there is a bias in this scheme towards pushing decision
making and accountability to the lowest possible levels of the or-
ganization. It is an active attempt to do just that. The FAA, like
other government agencies, is a very bureaucratic system. It is
very difficult to change. This project is a very modest attempt to
complement bureaucracy with better problem-solving methods and to
open up new alternatives. It is much too early to tell whether or
not the prognosis will be favorable.

I wish to close by quoting a phrase from a favorite writer of mine,
E.B. White, who, in 1927, said something which is apposite to the
entire field of stress. He predicted "a brilliant future for com-
plexity in the United States." His statement about our unique ob-
session rings true. There is much we do not know about stress.
There are things we may never know about the determinants of stress
and there are obviously dangers of scientism and the illusion of
certainty in the pursuit of such an exercise. But we should use
what we do know, along with what we value in human terms, as our
point of departure for attacking some of the problems I have dis-
cussed in the past half-hour.

LABOR AND MANAGEMENT COLLABORATE
ON OCCUPATIONAL HEALTH

Jean Spencer Felton, M.D.*

It has been mentioned at previous conferences on occupational
stress and cumulative injury that there has been a collaborative
relationship established between labor and management in the area
of occupational health at the Long Beach Naval Shipyard. I am
pleased to report that after four years of such a program, it still
exists and is flourishing. We are succeeding despite counterproduc-
tive influences from reports in the media regarding the health ef-
fects of asbestos.

PROGRAM INITIATION

The initiation of a new program in occupational health is always
carried out with some difficulty. An experienced professional per-
son joins an organization and although he or she has been engaged
in the practice of occupational medicine for years, to the people
of the working group he is an unknown, as is his staff, if he has
brought new people with him. The burden of proof of competence and
confidence lies with these newcomers.

A new program is stressful to management for it is not known which

way it will head, or what its philosophy will be. It is stressful
to labor, particularly if previous programs have not been good.
Naturally, the situation is stressful to the occupational health
professionals themselves because they will have to test the envir-
onment in which they will be working and offering their services.

When I reported to the shipyard four years ago, the commanding of-
ficer during our first conference said, "There is a man in the ship-
yard who wears size 13 shoes. He sent a wire to the Secretary of
the Navy which stated, 'Please disregard first telegram,' when
there had been no first communication." This was the introduction
to a work situation in which we immediately decided we would have to
woo and win the union in order to have a successful program in oc-
cupational health.

Let me tell you briefly about our Metal Trades Council, the labor
bargaining agent at the Long Beach Naval Shipyard. The Council
represents some twelve individual locals of the craft workers that
make up the civilian force at the shipyard engaged in the overhaul
and repair of craft from the Pacific fleet. The twelve locals
elect their officers, some of whom represent them as officers of
the Metal Trades Council, serving full-time in union activities.
Their constituency makes up almost the entire caseload of the occu-
pational health facility.

ESTABLISHING A RELATIONSHIP

Early on in the program we requested a meeting with the presidents

of the various unions and with the labor relations chief. We spent
1 1/2 hours in my office one day reviewing the past occupational
health program and their concepts of the new program just being for-
mulated. I learned months later that the one action at that inter-
change which gave us credibility was the fact that we had taken ex-
tensive notes. They felt that their opinions were being regarded,
were being noted, and that, in essence, someone cared. The next
three months were characterized by a stream of workers out of the
shipyard who presented the most unbelievable, unsolved problems.
Our team went to work with these employees, and at the end of about
three months the rush suddenly stopped. We couldn't understand the
change until we began to analyze the situation and realized that we
were being tested. These employees were being sent in with the
same difficulties which had been presented to our predecessors, but
which had not been resolved. Now in each case action was taken
which was definitive, helpful, supportive, and in some way was re-
solving the problem that was unique to that individual.

APPOINTMENT OF A MEDICAL LIAISON OFFICER

We experienced a second set of difficulties. For each problem we
would get calls from three union people, each of whom would call
the medical director, the associate medical director, and the chief
nurse, individually. This kind of confusion couldn't persist, so
an agreement was reached whereby the Council would designate a medi-
cal liaison person who would be the sole contact with the medical
facility--and it was he, the man who wore the large shoes, who es-
tablished a system of triage. If the problem concerned policy, he

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would meet with the medical director; if there was something of a serious nature, but not a matter of policy affecting the entire delivery of service, he would meet with the associate medical director; and if there was a problem of a lesser nature, like immediate medical care, he would consult the chief occupational health nurse.

From that point on to the present day we receive about five to eight telephone calls per day, and there are about two conferences each week. This has led to an extremely harmonious relationship between management and labor, and it is our feeling that this is the only way an occupational health program will function. If one does not have the union on one's side and working with one collaboratively, one can readily fail and recovery will be extraordinarily difficult.

MEET AND CONFER

On new issues, we meet on an informal basis and explain in some detail what it is we would like to do, such as change a procedure or introduce a different appointment system. This kind of session is followed by the "Meet and Confer" formal conference required under the collective agreement. This conference is usually attended by three or four of the union presidents, the labor relations representative, and our own staff from the medical department. With this action, the union officials have not been caught off guard, although when one sits down with them there still is a good deal of noise and there is much questioning. But in the end the item which is being offered is accepted; the union people are prepared to go out

into the Yard and provide support when an official directive an-
nouncing a change of direction or a change of program is issued.

VALUES

Does this approach pay off? Let me give you just one factor of
evaluation. In the four years that we have followed this procedure
there has not been a single grievance submitted on a medical issue,
while prior to this time such actions averaged two per month.

What are some of the other features of this working relationship?
First, whenever the union has visitors from its international or-
ganization in Washington, or from regional boards, or from offices
here on the Coast, they come to the medical director's office. We
meet and give some impressions of the state of the art of occupa-
tional medicine at the shipyard. And when we have visitors, we in-
vite the medical liaison person in so our visitor can meet with him.
Everything is open and there is free discussion, and the union can
give its view of the medicine-labor relationship.

ADVISORY COMMITTEE

A second element of this working relationship has been the estab-
lishment of an occupational health advisory committee with represen-
tatives of all the unions, in addition to management and other or-
ganizations. The members have been able to have a voice as consum-
ers, so that those of us who are directing the program come to know
their wishes and feelings about the services which have been pre-
sented. We have also been asked to participate in union seminars

involving occupational health or asbestos-related disease, and we always accept these invitations.

One of the main things that I would suggest to you is that when a union representative--in our case it's the medical liaison officer--calls, be sure he gets a response. A telephone call, if there is no one in the medical director's office, should be answered as quickly as possible. Keep in mind that one must allow the union spokesman to save face in front of his constituents because usually he will call when the involved employee is sitting right at his desk. The liaison officer is then able to demonstrate that the medical department is going to do something for the employee, and when he can demonstrate his own effectiveness he gains strength as an opinion maker and leader in his own organization.

Frequently no particular action is needed beyond a response. One may look into the situation and even have to come up with a negative action, but at least there was a response.

OPERATING TENETS

If one considers a working relationship of this type, one must accept these tenets: First, the man representing the trade union is just as important in his organization as we are in ours. Second, he is never to be taken for granted. You cannot be sure, given a certain situation, given a certain issue, of his opinion. He is still his own man. Third, there has to be a constant nurturing of this relationship, for one cannot go on past performance. If you

did something last week and you didn't do it yesterday, there goes your credibility. Keeping in mind that the representative is the opinion maker and that he confers with management on his own, this approach can help diminish some of the stress in labor-management relations.

In a large, heavy industry there is a great deal that involves medical care. There are many potential occupational health hazards. All of you are perfectly familiar with the issue of asbestos-related disease. A good working relationship between occupational health personnel and labor and management in such situations must be built on mutual respect. Then problems can be settled bilaterally before they attain out-of-proportion dimension. We can explain the problem and we can familiarize everyone with it in advance if there is difficulty in understanding it. And again, we can respond from our point of view.

When we have an employee in a situation that requires an adverse action for him, we frequently go to the union and ask, "What do you know about so-and-so?", and they will give us some insight. And they always admonish us to document carefully any such action.

SENSITIVITY RETAINED

There must be sensitivity to the feelings and needs of union officials. I remember a situation in which a meeting was called by personnel in our safety office in order to discuss with the union some issue concerning emergency medical care. For more than an hour

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there was the most intense, bitter wrangling between the safety of-
ficers and those individuals representing the Metal Trades Council.
I heard later that there was going to be a repeat meeting, "and would
you please attend." So we went, not knowing exactly what we would
be facing. One of the people from the union asked two questions and
the meeting was over in five minutes. What actually happened was
that when the safety officer had called the meeting, the safety de-
partment had sent over the most junior member of the staff. There
was a mismatching between the level of that particular safety ana-
lyst and the head of the union and his staff who had been present.
The union people wanted equity in positions when they met and con-
ferred. They were insulted, and so they tried this new approach;
when there was accommodation, the meeting was simple and was fin-
ished with dispatch.

We hold orientation X-ray sessions with our employees on whom we
have positive chest findings indicative of asbestosis. We show them
the X-rays; we explain what the disease pattern is and what the dis-
ability is, if any at all; and we discuss what the retirement op-
tions are. Our word, even after four years, frequently is ques-
tioned. The union members will go back to the Council headquarters
and check out what we say. The union representative will relate
what we have said in previous meetings, truthfully and consistently.
The employees then get confirmation and support to face up to the
medical message.

Here is an example of how not to go about establishing a working re-
lationship. The medical director at one installation thought he

would try our system. He had heard one would have to meet with the
union. So he brought all of the union presidents into his office,
gathered the six people around him, and announced, "O.K., I have
brought the union in, you are in my office. Gentlemen, goodbye."
And he left. I assure you, that is not the way to establish a good
working relationship.

How do you get over the usual adversary situation that exists be-
tween occupational health professionals and the union? Can you be
comfortable in that relationship? Can you be as comfortable with
the union as you can be with management?

ADVANTAGES

My feeling is that you can be comfortable with the union, as ambig-
uous and ambivalent as the situation might be at times. There are
distinct mutual advantages. I commend this kind of system to you
because such a relationship will defuse the stress between manage-
ment and labor and between medicine and labor. It will allow the
mission of the organization to continue without excessive losses
that could result from extensive grievance hearings at all levels
or, more importantly, from devastating strikes.

CONCLUDING REMARKS
Jean Spencer Felton, M.D.

I shall present some areas in occupational stress which I feel need
development. In an effort to mitigate the stress which all of us
have been hearing about and have been experiencing, I believe that
the first-line foreman should be trained in handling stress. He
is caught in the middle, getting pressure from above and below.
The watchword is "Get the production out." He cannot be a Simon Le-
gree and a humanitarian at the same time. I think that if we give
him some techniques for living with that ambiguity, we will be do-
ing a great deal better than if we were to train some of the top
managers, which sometimes we are more inclined to do.

Second, I believe that we should prepare people for retirement much
better than we do. There was a movement in the 1940s when we saw
considerable pre-retirement counseling in industry. This program
disappeared with the recession and it never returned. A general
foreman was in my office not too long ago relating to me his re-
tirement experience. He said, "I put thirty-three years into the
yard here and you know what retirement meant? All they were con-
cerned about was that I turned in the decal to my car. They didn't
care a damn about anything else, while I was being pushed out into
a completely different kind of existence." I believe that there
has to be something done to preclude that kind of anxiety, that
stress, which builds up before a person makes this tremendous

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change in his career.

Third, I believe that workers should be allowed to express their feelings of stress without penalty. As it goes now, if anybody in the lower levels speaks up, he is dubbed a troublemaker. He is marked, will not be promoted, and will be penalized. I think that in the same way that the individual is allowed to request an OSHA compliance officer to come in, he should be allowed to express the difficulty that he is having on a job.

Fourth, I believe there should be a social worker-counselor as part of every medical department. I have been saying this for about forty years, and I believe that today, with inflation and wide-spread social and economic problems, there is greater anxiety and stress. Counseling is needed and I think that a better job of counseling can be done if there is some kind of casework background.

Fifth, we are seeing a rise of occupational disease. We are reading about it in the papers every day. This disease potential is leading to a tremendous amount of anxiety. We in the medical department should be equipped to handle the anxiety of individuals who do not know if, or when, they may manifest full, flagrant evidence of a debilitating work-incurred illness.

Sixth, I believe there should be increased communication to every employee when he comes on the job as to really what the job consists of. Many work applicants are given false descriptions of the jobs they are seeking to fill. In a sense, they may join the Navy to

see the world, but for the next four years are working in the fire
rooms.   Or they get a job in the plant that in no way resembles
what they were told when they came to work. Whatever the illness
potential is, whatever the hazards are, the individual should be
made aware of these at the beginning, and periodically thereafter.
I believe this will reduce the stress level.

Seventh, I believe that physicians who get into the situations in
which some of us are finding ourselves should be given a sense of
epidemiology so that they see the stress among groups rather then
just within the individual who walks into his office. They should
be able to identify stress as it affects a unit of people. My per-
sonal feeling is that one inroad would be to build into the family
practice residency some content of what the father or the wage earn-
er faces on the job.

Next, and I get this from some of my occupational therapy friends,
I think one of the great deficits in our culture has been the lack
of good vocational guidance for the child, and particularly for the
handicapped youngster. Children might be taught to think in terms
of what their needs are. They could be helped to imagine what kinds
of vocations that they would be most comfortable in, and which would
be most rewarding to them.

Last, I think that we need good cost-benefit studies. This is get-
ting back to the point that several of our speakers made concerning
evaluation. I think that we don't have good studies because they
are difficult to derive. A couple of supported programs have fallen

because they were not able to derive adequate data.

These are the things I feel we should develop in order to deal con-
structively and preventively with occupational stress.