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SUPPLEMENT 1

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Scientific Approach to the Assessment and Management of Activity-related Spinal Disorders

A Monograph for Clinicians
Report of the Quebec Task Force on Spinal Disorders

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Scientific Approach to the Assessment and Management of Activity-related Spinal Disorders
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This Monograph for Clinicians is an abridged version of the full report of the Quebec Task Force on Spinal Disorders, published originally in French with the title *Rapport du groupe de travail québecois sur les aspects cliniques des affections vertébrales chez les travailleurs*. The longer report, which includes methodologic, administrative, legal, and social considerations, is the authorized and endorsed report of the Task Force. Readers of this Monograph for Clinicians who wish to explore selected issues in more detail should refer to the original Rapport. It can be obtained from the Institut de la recherche en santé et sécurité au travail, 505 de Maisonneuve Ouest, Montréal, Québec H3A 3C2, Canada.

Translation and abridgement of the original report of the Quebec Task Force on Spinal Disorders, published in French, was entrusted to an English language editorial board. The entire Task Force endorsed the English version.

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The monograph was prepared with the secretarial assistance of Mrs. Patricia Hodorek.

The Editorial Board of this monograph acknowledges and appreciates the excellent assistance rendered by these professionals in the preparation of these documents.

Foreword

DISORDERS OF THE spine are epidemic in the modern world. Although mortality from spinal disorders is low, morbidity and health care costs are high and the economic burden on society is significant. Not all spinal disorders are work related, but nearly all are activity related. This monograph for clinicians grew out of the deliberations of a group formed to study spinal disorders in the workplace in Quebec.

The constitution of this group was divided equally between clinicians, allied health professionals, and methodologists, a mix that led to some exciting revelations in the process of mutual education. The catalytic enzyme in this process was Dr. W. O. Spitzer, a "task master" *par excellence.* The methodologists and epidemiologists, led by Dr. Lucien Abenhaim, challenged the clinicians to identify "the gold standard" in the diagnosis and management of spinal disorders. The clinicians, energized by the encyclopedic Dr. Alf Nachemson, responded by developing a diagnostic classification of spinal disorders and evaluating the myriad of diagnostic and therapeutic interventions on the basis of scientifically admissible evidence. Little weight was given to unsubstantiated opinion, no matter how prestigious the source. Once scientific admissibility was defined, the Task Force created a hierarchy of strength of evidence that was consistently applied to the world literature.

This scientific approach should appeal to the clinician who must make an accurate diagnosis and choose an appropriate management strategy in a clinical area where diagnostic precision is difficult and unproven remedies abound.

Accordingly, the deliberations and observations of a Task Force that dedicated months to the study of spinal disorders have been distilled in this monograph for clinicians.

FRANCIS E. LEBLANC, M.D.
Chairman and Editorial Coordinator

Editorial

HENRY LAROCCA, MD

IT IS APPROPRIATE that this monograph, the Report of the Quebec Task Force on Spinal Disorders, should appear as the first supplement to be issued by SPINE, for there is obvious harmony between the impulses that prompted its generation and the purposes for which SPINE was founded more than a decade ago. At that juncture, it was already axiomatic that the impact of spinal disorders on individuals and society is immense. Even brief reflection confirms that this state of affairs still prevails, in spite of the significant advances that have emerged. The thousands of pages published here and elsewhere have broadened the conceptual base for understanding the spine immeasurably, but no bridgehead has been seized securely enough to curb the burgeoning spinal pain problem that is seen, by some at least, as having reached epidemic proportions.

This predicament is not the result of an inadequate fund of available information with which to address the matter; to contend otherwise is to engage in counterproductive sophistry. Instead, the problem emanates from the lack of a comprehensive and unifying problem-solving strategy to appraise the relevant data and from them to establish policy and procedures for implementing effective management while remaining receptive to new learning. This monograph addresses the correction of this deficiency in that it describes logistics potent enough to interrupt the stalemate.

In the description of the problem, the Province of Quebec represents modern society at large, and the issues raised by spinal pain specifically in the industrial setting are transferrable to the general population in which statistics regarding such items as incidence and costs can only be larger. In Quebec in 1981, 1.69% of the employed population of 2.7 million was compensated at least once for a spinal disorder acquired at work. The costs for these claims was 150 million dollars, only 14% of which went for medical care; 86% was spent for compensation. (Notably absent was any mention of litigation expenses, an inescapable reality in the United States.) Of particular interest, 7.4% of all claims for spinal disorder consumed 75% of all compensation costs. These data are not unique to Quebec.

Underlying these expenditures is a system of medical practice that is not focused, again not something unique to Quebec. As a result, the medical task of making a diagnosis—the essential prerequisite for rational prognostication and therapy—is discharged with so much variability that the initial step in the processing of cases introduces inaccuracy; this can only compound with each succeeding step. The Task Force recognized that the terminology used in diagnosis is the fundamental source of error, sometimes based on symptom description or radiographic findings and at other times on physiopathologic hypotheses. This discordance reflects the idiosyncracies of the agents making the diagnosis who, out of practical necessity, have been required to formulate their own plausible explanations of observed phenomena. The Duranceau Report that is cited concluded that there is inadequate medical education relating to disorders of the locomotor system. Extending beyond that report, these inadequacies persist in postgraduate medical education as regards the spine specifically, again not something unique to Quebec. As a consequence, the Task Force found the lack of uniformity in diagnostic terminology both a major barrier and a key challenge. It identified some 20 current diagnostic terms, ranging from the mundane "lumbar sprain" to the exotic "metameric cellulotenoperiostomyalgic syndrome," each purporting to distinguish a pathologic entity causing spinal pain. Facing uncertainty, clinicians become inventive.

To deal with this conundrum, the Task Force developed a classification of spinal disorders based on simple clinical criteria that represent most cases seen in clinical practice. They admit that it "is neither a nosologic description nor a real terminology," but offer it instead as something of utility in making clinical decisions, determining prognoses, evaluating the quality of care, and conducting scientific research. This classification is an admirable stroke, for it not only organizes observed phenomena, it also clearly defines specific clinical complexes that can over time be judiciously developed into diagnostic entities with appropriate research efforts. Thus, it is immediately useful, but ultimately may also generate the needed definitive nosology of spinal pain disorders.

Equally perplexing is the topic of therapy. After all, treatment either is deliberately designed to reverse or control some component of a physiopathologic hypothesis or is applied empirically as the result of some fortuitous happenstance remembered from things past. Recognizing these alternatives, the Task Force defined 13 objectives of treatment of spinal pain disorders. The obvious goal of simply relieving pain is not always attainable because spinal pain disorders are not analogous to bacterial infections. Therefore, Koch's postulates do not neatly apply; the simple thrust to eradicate one etiologic agent is insufficient for management of this multifactorial disease. Hence, regardless of whether pain can be eliminated, the treatment of spinal disorders must seek to preserve at least a modicum of function. To those with an industrial orientation, this means work. The goals demanded of therapy by the Quebec Task Force are no less than the maximization of the number of spinal pain patients returning to work within 1 month of symptom onset and the minimization of the number idle for 6 months or more. Whether these goals are too idealistic and inconsistent with the nature of spinal disorders is not yet determined, and demands a closer look at the factors responsible for both pain and disability and how they interrelate.

Prospectively the most important contribution the Task Force makes is the sense of timing embodied in its recommended management guidelines. By definition, acute pain is restricted to 7 days' duration, subacute from 7 days' to 7 weeks', and chronic more than 7 weeks'. The Task Force recognizes that the outlook for recovery grows more ominous as time elapses. Thus, it signals a first alert if symptoms persist to the seventh week after onset and treatment. Consultation with a certified specialist is mandated at that point for identifying new objectives and selecting new modalities of therapy in attempts to deflect the clinical course away from chronicity. At this point, more detailed investigative studies are necessary to define the problem as exactly as possible, thus avoiding continuation of inappropriate treatment. (Fortunately, excellent noninvasive studies are available to facilitate this step safely.)

The second alert is sounded after 3 months of continuous symptoms, again in an attempt to prevent the chronic phase of the disorder from taking root. It is well established that the probability of a patient unable to work for more than 6 months ever returning has already dropped precipitously. After 1 year, practically none return. These realizations demand action. Nothing is to be gained by protracted expectant therapy other than the guarantee of permanent pain and/or disability.

Specifically, the action selected by the Task Force after 3 months of symptoms is consultation with a multidisciplinary team to appraise all aspects of the individual case. This approach recognizes that protracted pain unleashes previously controlled psychologic conflicts and interjects the threat of loss of socioeconomic order in the patient's life. The emotional reactions that emerge then play directly into the perpetuation of pain. Further, the physical inactivity dictated by the pain leads to a bodily deconditioning that aggravates the organic foundation of the problem. The team approach is proposed to address these multiple factors in a timely fashion.

In principle, the approach of the Task Force is to be heartily espoused. In practice, however, there are problems, both social and scientific in scope. First and most obvious is the question of availability of a multidisciplinary team. In a closed social system, one can be readily summoned; this is not done so easily in more open systems. Second is the issue of the efficiency and effectiveness with which such a team can operate; certain bureaucratic entities have been known to traffic more in lead than in quicksilver. Third, the legal prerogative of individuals who consider themselves to have been injured, whether justly so or not, will disrupt any foreordained time sequence. This entire dimension has been ignored thus far.

By the painstaking procedure for review of the literature on spinal disorders, the Task Force has rendered the service of defining the current state of knowledge as the point of departure for all of its recommendations. Rightly, it has endorsed only that which has been proven with valid scientific study, eschewing statements of opinion. However, the totality of what has been proven regarding causation, diagnosis, and treatment of activity-related spinal pain is too limited to resolve the problem fully. This is the basis for the call for further research. The clinical neurology of spinal pain has been the topic investigated most thoroughly (eg, radiculopathy secondary to herniated dise), yet the vast majority of victims of spinal disorders are neurologically intact. The articular aspects of spinal dysfunction probably account for the preponderance of cases, but have been relegated to second-class status, if only by neglect. Hypotheses exploring the role of the deranged motion segment (alias functional spinal unit) as the initiator of spinal pain, possibly in association with chronic inflammation, must be emphasized and vigorously studied to help reduce the conceptual void into which so many cases lapse. Some presumed entities (eg, instability) can then be both verified and specified.

A sense of disquiet is generated by too broad a use of the term "chronic pain syndrome," if only because the connotation implies hopelessness. Many patients with symptoms of 6 months' duration or more can still have treatable organic disease without significant psychologic components. Every effort must be made to identify them so that they are not automatically included under this rubric. Further, modern algology has identified distinct differences between acute and chronic pain, in which the latter is not merely a continuation of the former over time. Instead, a host of organic changes occur in the neuraxis in response to nociception that perpetuate pain independent of psychosocial considerations. This information has hardly been introduced into the clinical setting.

To conclude, the substantial contributions of the Quebec Task Force on Spinal Disorders contained in this supplement will be readily apparent, and these invited comments are humbly offered to further in some small way the achievement of its mission.

Chapter 1
Approach to the Problem

THE FORMATION OF a Quebec Task Force on Spinal Disorders (QTFSD) followed a request in February 1983 to the Institute for Workers' Health and Safety (IRSST/IWHS) from the Quebec Workers' Health and Safety Commission (CSST/WHSC).

The original concern of the Commission was the continual increase in physiotherapy treatments in Quebec, which had risen to 641,197 in 1982. Approximately 40% of these treatments were for conditions affecting the spinal column, the anatomic site that accounted for approximately 20% of all work injuries. Other aspects of the problem also disturbed the Commission, particularly the wide variation in duration of treatment for the same condition from one treating institution to another. Finally, the Commission was influenced by the conclusions of the Duranceau Report[690] on diseases of the "locomotor system," which include the following:

1. It is possible to estimate in advance of therapy the time required to regain normal function in cases of injuries to ligaments or tendons.
2. The value of physiotherapy has not really been demonstrated, except in the rehabilitation phase of treatment.
3. The use of electrodiagnosis and electrotherapy should be substantially reduced.
4. There is inadequate medical education with respect to the management of disorders of the locomotor system.
5. There is a need to develop specific clinical profiles that will identify distinct pathologic conditions, based on the presenting clinical symptoms and signs.

The Commission asked the Institute to undertake clinical research on the problem of spinal disorders occurring in the work place. Dr. Lucien Abenhaim, who at the time was in charge of Special Projects for the Institute, decided that a Task Force would be the most appropriate means to address the many different problems related to the management of spinal disorders in workers. A preliminary proposal was submitted to the management of the Institute in June 1983.

In response to this proposal, the IRSST/IWHS approached Dr. Walter O. Spitzer, Chairman of the Department of Clinical Epidemiology, McGill University, to organize and chair a Task Force on Spinal Disorders in consultation with the research staff of the Institute.

OPERATING PRINCIPLES

From the outset, Dr. Spitzer adopted certain operating principles, which were carefully observed during the 2 years of deliberations.

1. The members of the Task Force, as well as outside experts invited to lend their support to the project, were to represent a wide range of disciplines holding diverse points of view. This multidisciplinary Task Force would include scientists expert in the evaluation of statistical data relating to clinical problems, clinical specialists in relevant clinical disciplines,* and other professionals working in nonmedical fields capable of assessing functional, economic, social, and legal consequences of spinal disorders. To ensure that the members selected to the Task Force enjoyed the confidence of the professional bodies officially established in Quebec, the various associations governing professional practice in Quebec were requested to nominate candidates. The QTFSD also heard briefs from a variety of sources, including a faculty member of a chiropractic college, an expert in spinal biomechanics, a legal expert in labor and compensation law, and experts in the field of ergonomics. The membership of the Task Force and the Research Team are listed on page iii.

2. The work of the Task Force would be restricted to certain fields of discussion, deliberation, and decision making, as defined in the mandate presented by the Institute and accepted unanimously by the Task Force.

3. The basic approach of the Task Force would be to collect scientific findings relevant to clinical interventions and operational policies. Above all, the study was to avoid collecting opinions, unsupported by valid scientific findings, no matter how erudite or eminent the holder of these opinions, and without regard to the degree of acceptance of these opinions among professional groups or the general public. Areas lacking a scientific basis sufficient to support the making of a given clinical decision or the formulation of specific recommendations would be identified as research priorities.

MANDATE OF THE TASK FORCE

In June 1983, the IRSST charged the QTFSD with the following specific instructions.

1. To develop and test a typology for the various treatments utilized in a variety of morbid conditions of the spinal column found in injured workers (develop matrices for the evaluation of both diagnostic and therapeutic measures).
2. To evaluate the effectiveness of physiotherapy in the course of different stages of these disorders. (Are the results of these treatments effective? If not, is it because of inaccurate diagnosis? If the diagnosis is accurate, is the selected therapy appropriate?)
3. To determine the causes of the differences in duration of treatment from one institution to another for identical morbid conditions.
4. To make recommendations designed to improve the quality of treatment for injured workers with these morbid conditions of the spine.

In summary, the mandate of the QTFSD was to address the burden on workers, employees, employers, and society imposed by disorders of the spinal column as they occur in the workplace.

At its first meeting, in September 1983, the QTFSD deliberated on these instructions and crystallized them into a nine-point mandate, which would lead to the following activities.

1. For assessment of the burden on workers, their dependents, employers, and society, to describe the frequency and distribution of morbid spinal disorders among Quebec workers. This burden should not be considered only in terms of pain or restriction

*The following special fields were included: primary care, rehabilitation medicine, rheumatology, orthopaedics, neurosurgery, and physiotherapy.

activity, but also in terms of the economic and social impact of workers being idle.

2. Taking into account the different practices, norms, and rules that exist in national and international health care delivery systems, to propose a classification of the various pathologic and functional disorders affecting the spinal column, related to occupational impairments that can present as a work disability (total or partial, permanent or temporary) and can prevent the workers from resuming their usual work activity.

Accordingly, an attempt should be made to classify disorders and functional states in such a way that the findings in individual cases and the statistical data on such a work-prevention problem could be compiled in a homogeneous manner. This classification should be practical for both the rural and urban regions of the province and its institutions and useful to the various health professionals who provide health care services, so that data from all sources describing spinal disorders in workers would be comparable.

3. To propose a classification of the different types of treatment and intervention, based on an internationally recognized nomenclature.

4. To establish methods of intervention compatible with scientific, ergonomic, and professional principles as they relate to each category of disease or functional incapacity of the spinal column and to the physical demands of employment. This envisages recommendations for methods of intervention acceptable in that they could become usual and customary therapies for clearly defined spinal disorders.

5. To define the criteria or standards for methods of investigation and diagnosis of disorders of the spinal column.

6. To establish criteria for the evaluation of the quality of care for workers with spinal column disorders. These criteria should be objective, practical, and verifiable, yet consistent with the requirements of providing high-quality health care in a society with advanced technology.

7. To make recommendations to set up a quality-of-care evaluation system for these disorders, recommendations consistent with Quebec law, with the rules and practices of various professional bodies, and with all other relevant rules and practices of the CSST/WHSC.

8. To identify research priorities for topics that the QTFSD could not address, for lack of data or because of poor-quality data.

9. To provide a report prepared in language readily understandable not only by health care professionals but also by professionals in allied fields who assess and treat disabled workers and by members of organizations interested in occupational health and safety.

THE STUDY OF SCIENTIFIC LITERATURE ON SPINAL DISORDERS

The QTFSD reviewed the scientific literature on spinal disorders, with the objective of basing its recommendations on the scientific evidence available. To this end, the review of epidemiologic and clinical publications focused on two aspects of the studies: type and quality. This two-way classification yielded an assessment of the strength of the scientific evidence under consideration.

Bibliographic Research

The following data banks were consulted: Medline (National Library of Medicine), Excerpta Medica, NTIS data base (National Technical Information Service), CIS (Centre international d'information de sécurité et d'hygiène au travail, Bureau international du travail), INSPEC (Institution of Electrical Engineers), Compendex base (Engineering index), Sociological abstracts, Psychological abstracts, and PASCAL (Centre national de la recherche scientifique, France).

The initial search, based on appropriate key words, identified more than 7,000 articles related to spinal disorders, published over the past 10 years. Older publications considered important were also included. The large number of articles led the QTFSD to adopt a bibliographic research strategy aimed at selecting the most pertinent studies and analyzing only publications considered to be of better quality. The number of such studies published in English, French, or Swedish was approximately 4,000. To decrease the risk of ignoring important studies, members of the QTFSD were invited to add to the bibliography based on their knowledge of the literature. This permitted the selective inclusion of monographs, manuscripts, and unpublished research reports. An analysis of the abstracts for the listed publications decreased the number of relevant articles to 721; these were submitted to a two-way assessment as to study type and quality. In addition, specific bibliographic searches were performed in each field wherein the QTFSD had observed a lack of scientific evidence. A monthly update of the literature up to December 1985 was obtained and appropriate studies selected for assessment.

Classification According to Type of Study

The studies were classified according to the strength of the scientific evidence, conferred by the type of methodology used as to 1) randomized controlled trial; 2) well-conducted cohort or case–control study; 3) descriptive study without control group, case series, or opinion of experts; and 4) literature review, other study not otherwise classified.

This classification, which is similar to that used by the Task Force on Periodic Health Examinations,[648] represents the basis for the evaluation of scientific evidence in this report.

Classification According to Quality of the Study

A quality evaluation of the literature was performed by the Task Force members, using four evaluation matrices: 1) the evaluation matrix of scientific articles, for controlled epidemiologic studies; 2) the evaluation matrix of descriptive studies (studies without a control group); 3) the clinical evaluation matrix of articles, for use by clinical assessors; and 4) the rejection matrix, to document the reason(s) for rejecting an article. Each matrix contained selected evaluation criteria, which led to classification as very good, good, acceptable, mediocre, or study rejected.

Two hundred fifty-two of the 721 publications were rejected in the evaluation process. The distribution of the remaining 469 publications in the two-way classification revealed that more than one half of the Class I and Class II evidence was rated good or very good, and less than one third of the Class III evidence studies were high-quality (Table 1.1).

The classification by type and quality of studies in the scientific literature pertaining to spinal disorders enabled the QTFSD to examine specifically the scientific proof related to each diagnostic and therapeutic intervention known and utilized for spinal disorders and put into use by health professionals.

The strength of the scientific proof, in decreasing order, was as follows:

1. The intervention was *demonstrated useful* through one or more scientifically acceptable controlled randomized trials. This category represented the strongest scientific proof supporting an intervention. (Color code, dark green*)

2. The intervention was *demonstrated useful* through one or more scientifically acceptable nonrandomized controlled studies

Table 1. Clasifications of Publications Selected by the Task Force, According to Type and Quality of Study

	I Randomized controlled trials	*II Cohort or case–control studies**	*III Descriptive studies (without control group)*	*IV Literature review*	*Total (quality, column %)*
Very good	14	15	8	13	50 (10.7%)
Good	33	42	38	38	151 (32.2%)
Acceptable or mediocre	37	59	111	61	268 (57.1%)
Total (type, row %)	84 (17.9%)	116 (24.7%)	157 (33.5%)	112 (23.9%)	469 (100%)

*Also known as case–referent studies.

(eg, cohort or case–control studies). This category represented the second strongest scientific proof supporting an intervention. (Color code, dark green)

3. The intervention is *considered useful* in current practice, but without scientific proof as to this effect. This category represented the opinion of expert health professionals who use the intervention and find it useful despite the lack of scientific proof. (Color code, light green)

4. The intervention has *not been demonstrated useful* in the scientific literature and it is currently not used in practice. This category represents a neutral point where there exists a lack of argument concerning the benefit or harm a given intervention might provide. (Color code, yellow)

5. The intervention is *contraindicated,* because scientific evidence demonstrated it either harmful or more harmful than beneficial. (Color code, red)

It cannot be overemphasized that these gradients of scientific evidence apply not to the usefulness of a given intervention, but rather to the strength of the scientific arguments and evidence supporting or rejecting the intervention. A lack of evidence supporting such interventions does not demonstrate them to be useless.

Chapter 2
Magnitude of the Problem

WORKERS' COMPENSATION LAW in Quebec provides for payment of medical care and salary replacement in cases of work disability to all employees who are injured on the job. The Quebec Workers' Compensation Board (QWCB, Commission de la santé et sécurité au travail, CSST) was therefore the most readily available source of information for the Task Force to determine the frequency of work-related spinal disorders. Given the possibility of errors occurring in the coding of the diagnosis at the QWCB, a validation of the data base was performed.

INCIDENCE RATES OF SPINAL DISORDERS AMONG WORKERS IN QUEBEC

In this chapter, the methods used and results and conclusions obtained from the validation of QWCB data base and from the study of the frequency of work-related spinal disorders in Quebec are reported.

This special project was conducted by an interuniversity team from the Department of Epidemiology and Biostatistics, McGill University, École de Relations industrielles, Université de Montréal, and the Clinical Epidemiology Service, Montreal General Hospital.

METHODS

Objective and Definitions. The study was designed to measure the frequency of spinal disorders in terms of incidence rate. Incidence was defined as the proportion of workers who were compensated, with absence from work of at least 1 day, for a spinal disorder at least one time during 1981, regardless of the number of times. This definition was adopted because of the lack of objective clinical evidence to distinguish between a recurrence and a new episode of spinal disorder.

Source of Data. To compute incidence rate, numerators and denominators were needed with comparable data related to age, sex, and industrial sector of employment.

Denominators were available from the last Canadian census, carried out in 1981.[650] Information included the total actively employed population in Quebec by age, sex, and industrial sector. Numerators were obtained from the QWCB for the same year. Included were all workers who had filed at least one claim for a spinal disorder during that year and had been compensated. Spinal disorders included all workers with musculoskeletal complaints relating to the entire spine but excluded those suffering multiple injuries in a given accident. Two sources of information were used from the QWCB: the computerized files and the clinical records from each claim.

Validation of the Numerators and Sampling Method. It was possible to validate the diagnosis of spinal disorder in the QWCB computerized claim files by comparing the file with the original clinical record on each claim. These records included the accident report(s) and the physician's report(s). In addition, the complete medical report was available for workers whose disability lasted more than 3 months or who had surgery.

A random sample from all claims related to the anatomic region of the back and neck in 1981, stratified for the type of compensation (medical care and/or work disability payments) and for the 12 administrative regions of Quebec, was obtained. For each case in the sample, a copy of the clinical and computerized record was reviewed. The comparison was performed on the diagnosis, anatomic site of the disorder, date of birth, sex, and marital status. The sample size was determined to be adequate to identify a discrepancy as low as 2% between the two records obtained. The clinical charts were read and coded by two physicians and a nurse with respect to the five variables under study. Double coding and verification were done independently on a subsample by another physician for quality control. In addition, a random sample of claims related to areas other than the back and neck were reviewed to determine the rate of spinal disorders in these unrelated categories.

Frequency of Spinal Disorder in Quebec. Information on the frequency and cost of spinal disorders was obtained from the computerized files, after adjustment for error rate in diagnosis, obtained from the validation study.

RESULTS

In 1981, a total of 347,131 claims for work-related injuries of all types were received at the QWCB. For the validation study, the sample size was estimated at 3,077 claims related to the back and neck and 200 claims related to other areas of the body. Of these 3,277 claims, 187 (5.8%) had been rejected for compensation and were therefore eliminated from the study. Of the remaining claims, there were 43 (1.3%) for which physical records could not be traced (all had fewer than 20 days of working disability). Therefore, the validation study was based on 3,047 compensated claims, related primarily to the back and neck, for which the reports were obtained and individually reviewed.

Validation of Data Base

The comparison of the diagnosis between the computerized file and the original chart revealed an overall agreement on the diagnosis of spinal disorder of 63.5%. In other words, 36.5% of the compensated claims related to the anatomic region of the back and neck were misclassified in the computerized files. The bulk of the misclassified files resulted in the exclusion from the diagnosis of spinal disorder of claims that were truly spinal in nature. This caused an apparent reduction in the QWCB figures for the diagnosis of spinal disorder.

The comparison for age, sex, and marital status showed agreement greater than 99%. The analysis of claims unrelated to the back and neck revealed 0.5% spinal disorders; this was considered negligible.

Frequency of Spinal Disorders

The following descriptive results were based on the computerized files, after adjustment for the proportion of misclassifications found in the diagnosis of spinal disorder. All of the results refer to compensated claims for a spinal disorder with work disability (ie, absent from work for at least 1 day) unless indicated otherwise. (Claims compensated for medical care only are excluded from Figures 2.1 to 2.5.)

Table 2.1. Frequency of Compensated Spinal Disorders* in Quebec† (1981)

	Without absence from work (medical care only)	*With absence from work*	*Total*
No. of compensated claims†	8,670 (18.9%)	37,188 (81.1%)	45,858 (100%)
Incidence rate‡	0.32%	1.37%	1.69%

*Validated diagnosis.

†The total number of compensated claims for all causes in Quebec (1981) was 320,157, of which 45,858 (14.3%) were for a spinal disorder.

‡Denominator = total actively employed population in Quebec (1981): 2,719,575.

The distribution of compensated spinal disorders by anatomic site of symptoms showed the lumbar region to be the most common, accounting for 70.0% of all compensated claims (Figure 2.1).

The duration of absence from work was short in most cases (Figure 2.2): 74.2% of workers were absent less than 1 month. This figure sharply reduced to 9.4% for the second month. The curve flattens for absence of more than 3 months, indicating that workers still absent from work at that time tend to remain absent. After 1 year (not shown), 4.3% of workers remained absent from work.

Incidence Rates

After validation of the diagnosis, the global frequency of compensated spinal disorders could be obtained (Table 2.1). The total number of compensated claims was 45,858; this represents 14.3% of compensations for all causes at the QWCB. The rates were computed using the total actively employed population in 1981 (2,719,545) as the denominator. In that year, 1.69% of that population was compensated at least one time for a spinal disorder acquired at work. Compensation for medical care only was paid to 8,670 (18.9%) and for work disability to 37,188 (81.1%) workers.

Incidence rates of spinal disorders were computed by age and sex (Figure 2.3). The difference between sexes was greatest between 15 and 19 years of age and decreased steadily with age. For both sexes, the maximum rates were reached at 20–24 years of age: 2.8% for men and 1.8% for women. Thereafter, the rates steadily decreased to 0.9% and 0.7%, respectively, at 55–64 years of age.

Incidence rates computed by industrial sector (left side of Figure 2.4) showed forestry and mining at the top, with rates of 4.9% and 3.3%, respectively. Agriculture and finance were lowest, with rates of 0.3% each. The right side of Figure 2.4 shows the proportion from the total number of compensated spinal disorders in 1981 in each category. That proportion is a reflection of the incidence rate and of the number of people employed in each sector. By and large, the manufacturing sector employs the largest number of people and tops the list, with 36.8% of all compensated spinal disorders with absence from work. This is followed by service industries (19.3%) and wholesale and trade (12.6%). For the manufacturing industry, the following sectors were most important, in terms of both incidence rate and proportion of the total: food, metal (primary and secondary), transportation equipment, rubber, and paper.

Compensation Costs

The total compensation cost for claims opened for spinal disorders in 1981 was $150 million. Of this, $21 million (14%) was spent for medical care and the remaining $129 million (86%) for salary replacement due to work disability (calculations included actuarial estimated costs for permanent disability cases). This represented 28.5% of total compensation costs for claims from all injuries at the QWCB in 1981. The average total cost per compensated case was $4,027. Of this, $574 (14.3%) was spent for medical care (including hospitalization, surgery, orthosis, etc.) and $3,453 (85.7%) for salary replacement.

There was a direct relationship between compensation cost and duration of absence from work (Figure 2.5). On the other hand, the costs tend to be inversely related to the number of claims in each category of absence from work. This was because: 1) most workers with claims had a very short absence from work; and 2) 86% of the compensation costs were generated by salary replacement. The result was that the 7.4% of all compensated claims for spinal disorder with absence from work of more than 6 months accounted for 75.6% of all compensation costs.

DISCUSSION

The validation study on a representative sample of 3,047 compensated claims in the QWCB data base showed that the diagnosis of spinal disorder was correct in only 63.5% of claims relating to the back and neck. The misclassification was mainly in the direction of underestimating the frequency of spinal disorder. In spite of this, the incidence rate of spinal disorder with absence from work (1.37%) was remarkably similar to those found by Svensson and Anderson[660] (1.3%), Horal[311] (2%), in Sweden, and Gibson et al.[232] (1.3%), in Ontario, Canada. It is also within the range published by Klein et al.[372] (0.15–2.08%) for 26 American states.

However, these figures are well below the 7.9% published by Gyntelberg,[272] in Denmark. This is explained by the fact that the source of the Danish data was obtained by questionnaire, rather than Workers' Compensation Board (WCB) records. This raises the problem of a reporting bias—an overestimation of the problem in groups of workers who have an easy and unthreatening access to WCB for reporting and an underestimation for those without such easy access for various reasons, for example agriculture workers and fishers.

The distribution of spinal disorders by anatomic site of symptoms favors the lumbar area. However, depending on the type of industry, this distribution might drastically change. For example, Bergquist–Ullman[39] and Kvarnström[386] reported as many sick leaves for cervical as for lumbar problems in the Swedish manufacturing sector.

The distribution of compensated spinal disorders, by duration of absence from work, indicated that the vast majority were of short duration (less than 1 month). This observation agrees with those published by Horal[311] in Sweden, Benn and Wood[36] in the United States, Bergquist–Ullman[39] in Sweden, and Troup et al.[683] in England. It was also apparent that workers who remained absent from work after 3 months had a strong tendency to remain absent for more extended periods.

The incidence rates by age and sex were similar to those published in the United States[372] and Denmark.[558] The overall rate was higher in men than in women; this can be explained by a difference in the physical demands of their jobs. The steady decrease with age in both sexes can be explained by the healthy worker effect and by changes in task assignment in the evolution of a career as a worker ages.

The distribution by industrial sector also agreed with observations by Klein et al.[372] and Rowe.[601] However, classification by industrial sectors hides the more important effect of occupation. Magora and Taustein[457] identified certain groups, such as nurses, agricultural workers, and bus drivers, as having occupations with high prevalence rates. Data on fishers and agricultural workers are not reliable for comparison with other sectors, because the self-employment nature of the work alters the way in which work-related

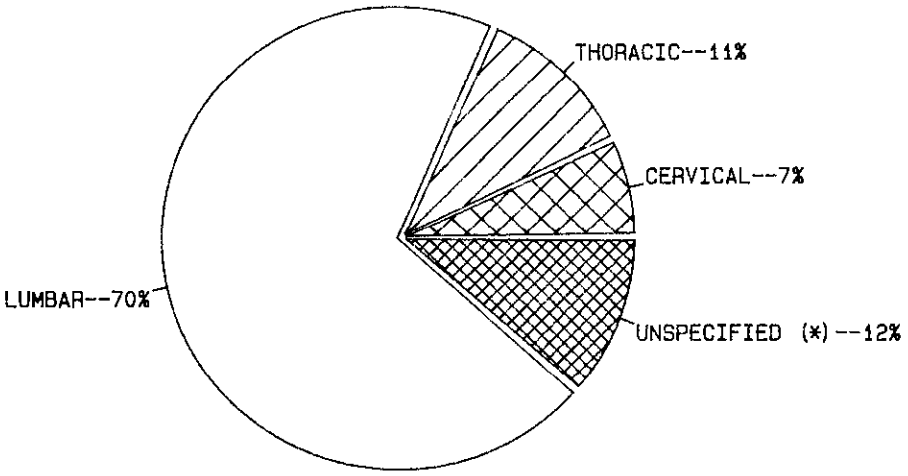

Fig 2.1. Compensated back injury by anatomic site of symptoms, Quebec, 1981. (*Thoracic and lumbar in most cases.)

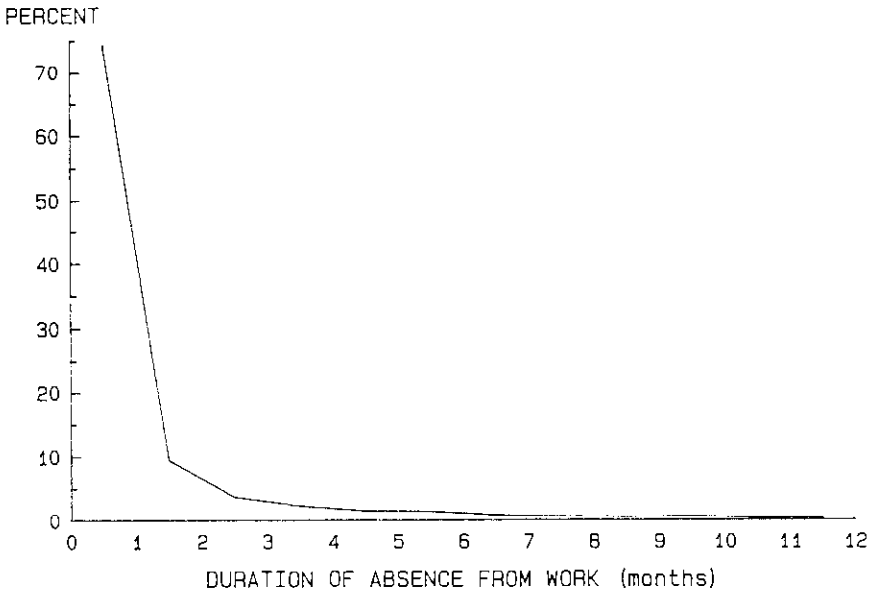

Fig 2.2. Compensated back injury by duration of absence from work, Quebec, 1981. Nineteen percent of compensated workers did not lose any time from work and are not included in this graph (compensated for medical care only).

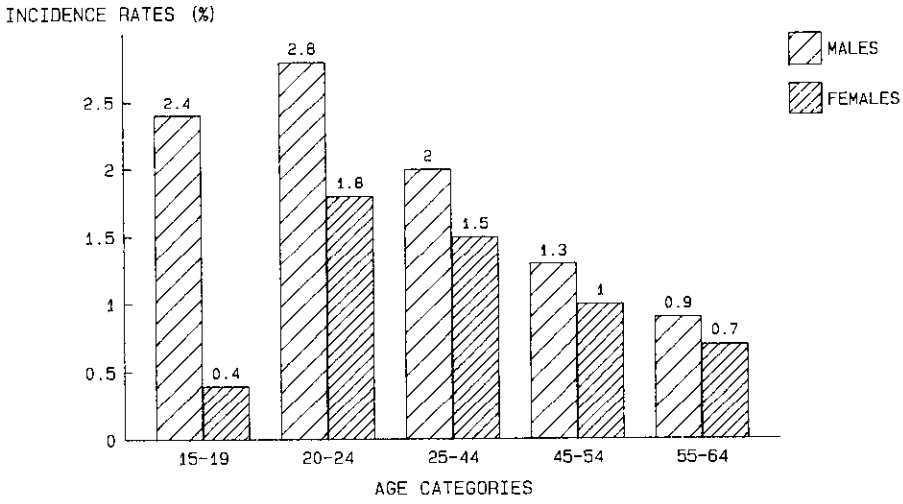

Fig 2.3. Incidence rate of compensated back injury by age and sex, Quebec, 1981.

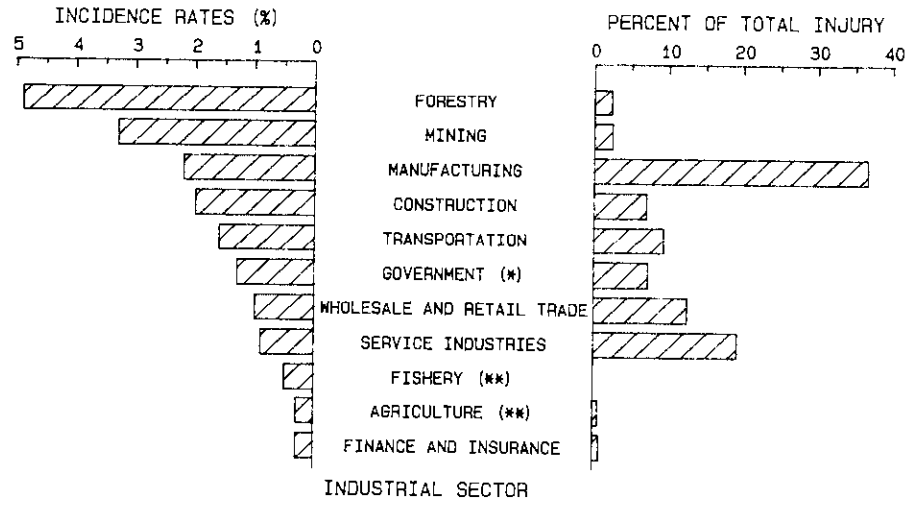

Fig 2.4. Incidence rate of compensated back injury by industrial sector, Quebec, 1981. (*Without military, **data less reliable for the sectors.)

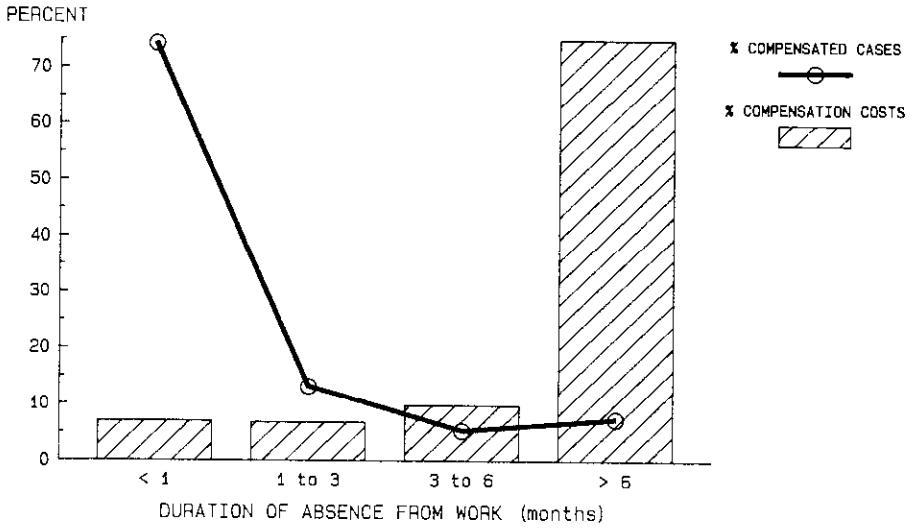

Fig 2.5. Compensation costs for back injury by duration of absence from work, Quebec, 1981.

health problems are reported to any WCB. Thus the low rates in these sectors cannot be interpreted accurately.

The cost analysis revealed that the 7.4% who were absent from work for 6 months or more accounted for 75.6% of the total compensation costs for spinal disorder and 21.4% of total compensation costs for all injuries at the QWCB (1981). These data agree with those published by Spengler et al.[645] in Washington: 10% of all claims for "back injuries" accounted for 79% of costs for a "back injury" and 32% of total compensation costs. Analysis of the QWCB data discloses that the costs were related to the number of days absent from work, rather than to the number of claims; 14% were for medical care and 86% for salary replacement. This suggests that the purely medical care impact of work-related spinal disorders is not as important as disability, work rehabilitation, and the social problem.

SUMMARY

From the QWCB validated statistics on spinal disorders, the following conclusions can be made.

1. Of compensated injury claims for all causes in Quebec (1981), 14.3% were due to a spinal disorder.

2. Of compensation costs for all causes, $150 million, or 28.5% were spent for spinal disorder claims opened in 1981.

3. Of all compensated workers with spinal disorders 70.0% had a problem in the lumbar region.

4. Of all compensated workers with spinal disorders 74.2% were absent from work for less than 1 month.

5. The global incidence rate of compensated spinal disorders among workers in Quebec (1981) was 1.69%.* The maximum incidence rates were for men aged 20–24 years and forestry, mining, and manufacturing industrial sectors (Figure 2.4).

6. Of all compensation costs and days of absence from work for a spinal disorder, 75.6% were accounted for by the 7.4% of workers who were absent from work for more than 6 months.

7. The QWCB unvalidated data base was unreliable for direct use, because the rate of error in the diagnosis of spinal disorder was 36.5% among claims related to the back and neck.

8. A full appreciation of the magnitude of the problem is limited by the fact that there were no variables other than diagnosis, compensation costs, and basic demographic characteristics in the QWCB computerized data base.

*A total of 1.69% of the employed population was compensated at least one time for a spinal disorder acquired at work (Table 2.1). This compares favorably with incidence rates determined in other Western industrialized countries.

Chapter 3
Diagnosis of the Problem (The Problem of Diagnosis)

PAIN IS THE primordial, and often the only, symptom of the vast majority of spinal disorders. During the acute phase, pain is of nociceptive origin, but the influence of psychologic and social factors[33,202] on the continuation of pain toward a chronic phase is now increasingly recognized.

Although there are considerably more clinical studies on patients suffering from problems of the lumbar area than there are on patients with problems in the cervical region, pain develops because of the irritation of structures sensitive to pain, and these are the same for all segments of the spine. These structures are bones, discs, joints, nerves, muscles, and soft tissues. They may be affected by an inflammatory, infectious, neoplastic, or traumatic disease or be the site of a congenital or developmental mechanical defect.

Nevertheless, it is difficult to identify precisely the origin of the pain, because even if its characteristics may sometimes point to a given structure, the pain often remains unspecific. In addition, it is generally impossible to corroborate clinical observations through histologic studies, because on one hand the usual benignity of spinal disorders does not justify that tissue be removed and, on the other, there is often no modification of tissue identifiable through current methods.

This mainly explains why terminology varies with the setting, being based sometimes on a radiologic diagnosis, a physiopathologic hypothesis, or a response to certain treatments, whereas nosology of the different syndromes is often based solely on physiopathologic hypotheses.

The literature is therefore replete with diagnostic terms: lumbar sprain, lumbar strain, lumbago, sciatica, discal hernia, discopathy, facet syndrome, lumbar myositis, ligamentitis, minor intervertebral displacement, dysfunction of the intervertebral joint, fibromyositis, fibrositis, fasciitis, myofasciitis, articular hypomobility and hypermobility, discarthrosis, metameric cellulotenoperiostomyalgic syndrome, posterior branch syndrome, rhizopathy, etc. Frequently, one finds in a patient's medical chart two or three of these diagnoses, made by different physicians, depending on whether they focused on the main symptom (acute lumbago), on the radiologic aspect (discarthrosis), or on a physiopathologic hypothesis (facet syndrome, minor intervertebral displacement, myofasciitis, or disc degeneration).

This lack of uniformity in the diagnostic terminology of spinal disorders was a major barrier for the Task Force and became a key challenge. We therefore thought it necessary to propose an original classification of spinal disorders that is not based solely on pathologic entities, since they remain too vague in most cases, but that reflects instead the clinical entities encountered in practice. Thus, this is neither a nosologic description nor a real terminology, but rather a diagnostic classification that can be used in occupational health to help in making a clinical decision, establishing a prognosis, evaluating the quality of care, and conducting scientific research.

We also thought it important that the proposed classification, without supposing *a priori* a pathologic entity, be based mostly on simple clinical criteria that represent the majority of cases seen in clinical practice.

CHARACTERISTICS OF A USEFUL CLASSIFICATION OF SPINAL DISORDERS

A consensus was reached that any classification meet the following criteria.

1. Biologic plausibility: the classification is compatible with current knowledge of vertebral physiopathology.
2. Exhaustive classification: it can encompass all clinical cases seen in occupational health.
3. Mutually exclusive categories: the great majority of clinical cases, at one point, shall fit into one and only one category; however, the patient may subsequently move into another category.
4. Reliability: a given case of a vertebral disorder shall be classified in the same manner by two or several practitioners.
5. Clinical usefulness: it will facilitate the making of clinical decisions as well as the evaluation of care.
6. Simplicity: its use will be simple and will neither call for complex paraclinical examinations nor encourage superfluous investigations.

Throughout this monograph, the term *clinical examination* refers to assessment by clinical human observers on intact human patients, relying on all senses for the measurements; *paraclinical examination* is used for laboratory, radiologic, and other ancillary determinations that rely heavily on technology for the measurements.

CLASSIFICATION OF ACTIVITY-RELATED SPINAL DISORDERS

The proposed classification includes 11 categories (Table 3.1), based on history, clinical and paraclinical examinations, and response to treatment. Categories 1–3 are based only on the localization of pain (history), 4 on the results of the clinical examination, 5–7 on the result of paraclinical investigations, and 8–10 on the response to treatment. Spinal disorders that are seldom seen or of little importance in occupational medicine are classified in category 11, on the basis of paraclinical examinations.

Each of the first four categories is subdivided by stage (acute, subacute, or chronic) as well as whether or not the patient returns to work, because this may influence the choice of treatment. Category 10 is also subdivided according to whether or not the patient works. Based on the distribution of claims of spinal disorders by duration of absence from work (see Chapter 2), stages were defined as follows: acute (fewer than 7 days); subacute (7 days to 7 weeks); and chronic (more than 7 weeks).

After week 7, the patient's prognosis is different. This demarcation point was selected to encourage a more intensive approach at that stage for both diagnosis and treatment.

For recurrent episodic cases, the scientific literature does not justify an approach different from that for acute cases, therefore we did not take this aspect into account in our classification. However,

any relapse should alert the clinician to possible specific risk factors (regarding the worker, work environment, or other factors).

The 11 categories of the classification are as follows.

1. Pain in the lumbar, dorsal, or cervical areas, *without* radiation below the gluteal fold or beyond the shoulder, respectively, and in the absence of neurologic signs.

We believe that this category represents most cases. The pain is intermittent or constant, its intensity varying with the patient's tolerance, and is almost always aggravated by mechanical factors.

2. Pain in the lumbar, dorsal, or cervical areas, *with* radiation proximally (ie, to an upper or lower limb but not beyond the knee or the elbow, respectively) and not accompanied by neurologic signs.

In this category, the pain that radiates to the proximal part of the limb can be neurogenic, but it originates most often from the deep structures of the rachis, as demonstrated by the studies of Kellgren[349] and McCall et al.[477]

3. Pain in the lumbar, dorsal, or cervical areas, with radiation distally (ie, beyond the knee or the elbow, respectively) but without neurologic signs.

In this instance, the pain radiates to the whole limb. It may occupy a specific dermatome, thereby suggesting a radicular origin, or it may be more diffuse. In the latter case, it may also be of a vascular or metameric type (pseudosciatica).

4. Pain in the lumbar, dorsal, or cervical areas, with radiation to a limb and with the presence of neurologic signs (eg, focal muscular weakness, asymmetry of reflexes, sensory loss in a dermatome, or specific loss of intestinal, bladder, or sexual function).

This category includes the radicular syndromes, which are well described in classic textbooks. These radicular syndromes may be due to various affections, the most frequent one being the discal hernia. However, other mechanical distortions of the spine may trigger an irritation or a radicular deficit.

Common suffixes of Categories 1–4 (Figure 3.1) are as follows:

Duration of Symptoms from Onset
- a = 7 days or less
- b = 7 days to 7 weeks
- c = more than 7 weeks

Working Status at Time of Evaluation
- W = Working
- I = Idle (used in the context of *absent from work, unemployed, or inactive)*

5. Presumptive compression of a spinal nerve root, on the basis of simple roentgenograms of the spine (eg, instability or fracture of the vertebral column). Simple roentgenograms are of little help in diagnosing a radicular compression, especially of discal origin. It is well known that the narrowing of an intervertebral space, although indicative of disc degeneration, in no way indicates a radicular compression. On the other hand, a normal radiologic image of the intervertebral space does not exclude the possibility of a discal protrusion at that level.

In rare cases of fractures, infectious or neoplastic osseous lesions, reduction in the diameter of the foramen, or vertebral instability, however, simple radiographs may allow the assumption of a radicular compression. A diagnosis of instability must nevertheless be made with caution and must be limited to cases in which radiographs in flexion and in extension show an obvious increase of the angle drawn by the adjacent vertebral plates and/or a motion of 4 mm or more.[560] It is therefore evident that simple radiographs do not provide information adequate to justify discal surgery.

6. Compression of a spinal nerve root confirmed with either specific imaging techniques (computerized axial tomography, myelography, discography, venography, or magnetic resonance imaging) or other methods (EMG, nerve blocks). The relatively low specificity of diagnostic imaging techniques should nevertheless be noted. For example, 20–30% of asymptomatic subjects may have a disc protrusion, as demonstrated with myelography or computerized axial tomography. However, in prospective studies of subjects with radicular pain and neurologic signs, myelography and computerized axial tomography had high sensitivity and specificity.[209,261]

Electrodiagnosis, including electrostimulating techniques (F wave, H reflex), can detect a radicular lesion. Studies referring to surgical observations have an 85% correlation with myelography. Also, electrodiagnosis allows for differential diagnosis between a radicular lesion and other neurologic disorders.[63,168,373,465,466]

Thermography, sometimes used to demonstrate a radicular

Table 3.1. Classification of Activity-related Spinal Disorders

Classification	*Symptoms*	*Duration of symptoms from onset*	*Working status at time of evaluation*
1	Pain without radiation	a (<7 days)	W (working)
2	Pain + radiation to extremity, proximally	b (7 days–7 weeks)	I (idle)
3	Pain + radiation to extremity, distally*	c (>7 weeks)	
4	Pain + radiation to upper/lower limb neurologic signs		
5	Presumptive compression of a spinal nerve root on a simple roentgenogram (ie, spinal instability or fracture)		
6	Compression of a spinal nerve root confirmed by Specific imaging techniques (ie, computerized axial tomography, myelography, or magnetic resonance imaging) Other diagnostic techniques (eg, electromyography, venography)		
7	Spinal stenosis		
8	Postsurgical status, 1–6 months after intervention		
9	Postsurgical status, >6 months after intervention 9.1 Asymptomatic 9.2 Symptomatic		
10	Chronic pain syndrome		W (working) I (idle)
11	Other diagnoses		

*Not applicable to the thoracic segment.

compression, still has not been evaluated scientifically in a satisfactory manner.

7. Spinal stenosis, confirmed objectively with the use of computerized axial tomography or myelography. The spinal stenosis syndrome generally affects patients aged 50 years or older. It is characterized by a lumbar pain increasing during the day, pain in one or both legs, and parethesias triggered and increased by walking. Degenerative changes are generally seen on ordinary roentgenograms, and the diagnosis is confirmed with the use of myelography or axial tomography.[700]

8. Postsurgical status *within 6 months after surgical interventions* (eg, discectomy, laminectomy). This category refers to patients who had surgery in the preceding 6 months. It includes: 1) patients who do not suffer from pain but are still going through a rehabilitation program with the objective of resuming their usual work; and 2) patients for whom surgery has been unsuccessful. Generally, patients who have had a laminectomy and/or discectomy return to work after approximately 3 months, whereas patients who have had a vertebral arthrodesis do so after about 6 months.

9. Postsurgical status *more than 6 months* after surgical intervention.

9.1. Asymptomatic. Patients who were operated upon and either became asymptomatic or suffer from occasional pain not sufficient to interfere with their work.

9.2. Symptomatic. Patients who still suffer from spinal and/or radicular pain, which has persisted after the operation or recurred after an asymptomatic period. In the former instance, the possibility of another discal hernia is less than 20%; in the latter, with the usual diagnostic evidence, a second surgical intervention will confirm the diagnosis in 70–80% of cases. However, there is no certain means to distinguish a new discal hernia from a compression due to perineural fibrosis.

10. Chronic pain syndrome. The presence of a treatable active disease has been carefully eliminated. Pain, with its consequences, has become the patient's main preoccupation, limiting his/her daily activities. Some psychologists[201] maintain that this pain represents a behavior reaction, whereas neurophysiologists lean toward the hypothesis that nervous structures irritated for a prolonged period generate new mechanisms of pain generation. Chronic pain has also been described as a variant of depression. The chronic pain syndrome is sometimes associated with objective signs (ie, limitation of motion, hyperesthesia, muscular weakness, etc.). However, in the majority (70–80%) of patients, there is no evident major objective sign.[693] To this category is attached the suffix W (working) or I (idle), as in Categories 1–4.

11. All other diagnoses (eg, metastases, visceral disease, compression fracture, spondylitis).

The different combinations of diagnostic elements used in the various diagnostic categories are summarized in Table 3.2. The 11 categories of spinal disorders are summarized in Table 3.1. These categories form the basis for selecting the diagnosis and optimal therapeutic modality, as described in the following chapters. Moreover, the application of this classification will introduce the use of more standard diagnostic terms in medical reports than is currently available.

MATRIX OF DIAGNOSTIC PROCEDURES BASED ON SCIENTIFIC EVIDENCE

To complement the diagnostic classification, a matrix of diagnostic procedures is proposed for the various categories of spinal disorders (Figure 3.1). The matrix applies to all segments of the spine.

The matrices are constructed using, on the horizontal axis, the list of diagnoses according to the classification just described and, on the vertical axis, the list of diagnostic interventions commonly used for spinal disorders. The content of the matrices is a color code that represents the strength of scientific evidence available in the literature to support or reject a diagnostic procedure under each diagnostic category. For each cell in a matrix, the literature was reviewed to find the scientific information applicable. The color code corresponds to the strength of scientific evidence, as described on page S19, as follows.

Dark green*	Usefulness demonstrated by randomized controlled trial
Dark green	Usefulness demonstrated by a nonrandomized controlled study
Light green	Use is considered on the basis of common practice, without support of scientific evidence
Red	Contraindicated on the basis of scientific evidence
Yellow	Not part of the common practice and no scientific evidence
Blank	Not applicable

Again, the gradient in the scientific evidence does not apply to the *usefulness* of a given intervention, but rather to the strength of the arguments and evidence supporting or rejecting the intervention.

SUMMARY

The terminology and nosology of spinal disorders are neither standardized nor validated. This explains in part the heterogeneity, the differences, and the contradictory findings in the literature and in practice regarding diagnosis, therapy, and rehabilitation and in the criteria for evaluating the effectiveness of treatment. The literature on spinal disorders, though extensive, is deficient in scientifically admissible studies. This poor quality of the literature, as well as the lack of standardization and validation of the terminology and nosology, has imposed a significant constraint on the adoption of uniform scientific strategies for all aspects of spinal disorders.

Of the numerous pathologic conditions of the spine, nonspecific ailments of back pain in the lumbar, dorsal, and cervical regions, with or without radiation of the pain, comprise the vast majority of problems found among workers.

The etiologic diagnosis of spinal disorders is difficult because the

Table 3.2. Diagnostic Elements Used in Diagnostic Classification

Diagnostic category	*Symptoms*	*Clinical signs**	*Paraclinical findings*	*Therapeutic response*
1–3	+	–	–	NA
4	+	+	–	NA
5	+	+/–	+	NA
6–8	+	+/–	+	NA
9–10	+	+/–	+/–	+/–
11	+	+/–	+	NA

+, yes; +/–, more or less; –, no; NA, not applicable.

*Major physical signs (eg, focal muscular weakness, asymmetry of reflexes, sensory loss in a dermatome, specific loss of intestinal, bladder, or sexual function).

Figure 3-1 DIAGNOSTIC PROCEDURES — SPINAL DISORDERS

	Localized spinal pain						Pain radiating to extremity — proximally						Pain radiating to extremity — distally					
	7 days or less		> 7 days & < 7 weeks		over 7 weeks		7 days or less		> 7 days & < 7 weeks		over 7 weeks		7 days or less		> 7 days & < 7 weeks		over 7 weeks	
	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle
	1aW	**1aI**	**1bW**	**1bI**	**1cW**	**1cI**	**2aW**	**2aI**	**2bW**	**2bI**	**2cW**	**2cI**	**3aW**	**3aI**	**3bW**	**3bI**	**3cW**	**3cI**
HX & PHYSICAL EXAM.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
PLAIN X-RAYS †	■	■	▒	▒	■	■	■	■	▒	▒	■	■	■	■	▒	▒	■	■
INFLAMMATION SCREEN			▒	▒	■	■			▒	▒	■	■			▒	▒	■	■
CINERADIOGRAPHY																		
CAT SCAN																		
ELECTRODIAGNOSIS																		
MYELOGRAM	■	■	■	■			■	■	■	■			■	■	■	■		
DISCOGRAM	■	■					■	■					■	■				

	Pain radiating to extremity + neurologic signs						Radicular compression presumed	Radicular compression confirmed	Spinal stenosis confirmed	Post surgery 1-6 months	Post surgery > 6 months		Chronic pain syndrome	
	7 days or less		> 7 days & < 7 weeks		over 7 weeks									
	at work	idle	at work	idle	at work	idle					pain free	symptomatic	at work	idle
	4aW	**4aI**	**4bW**	**4bI**	**4cW**	**4cI**	**5**	**6**	**7**	**8**	**9.1**	**9.2**	**10 W**	**10 I**
HX & PHYSICAL EXAM.	■	■	■	■	■	■	■	■	■	■	■	■	■	■
PLAIN X-RAYS †	▒	▒	▒	▒	■	■			■	▒		▒		
INFLAMMATION SCREEN	▒	▒	▒	▒	■	■				■		■		
CINERADIOGRAPHY							■		*	▒		■		
CAT SCAN	▒	▒	▒	▒	▒	▒			*	▒		▒		
ELECTRODIAGNOSIS												■		
MYELOGRAM	▒	▒	▒	▒	▒	▒			■			▒		
DISCOGRAM	■	■	▒	▒	▒	▒						▒		

■* usefulness **DEMONSTRATED** by randomized controlled trial

■ usefulness **DEMONSTRATED** by non-randomized controlled trial

■ **CONTRAINDICATED** on basis of scientific evidence

▒ common practice but **NO** scientific evidence

NOT in common practice and **NO** scientific evidence

not applicable

† Contraindicated as shown, given the *absence* of specific orienting elements: age below 20 or above 50, history or sign of trauma, neoplasm, fever, neurological deficit or recurrent nature of the spinal disorder.

physicial signs and symptoms often have little specificity. There is often a discrepancy between the level of pain and the loss of function, on the one hand, and the minimal physical signs on the other.

The Task Force has developed a diagnostic classification starting with the most frequent clinical entities, taking into account their stage of development, and a matrix of recommended diagnostic procedures.

Diagnosis can be guided by knowledge of the circumstances surrounding an injury and of work-related risk factors that can be implicated in the cause of the disorder.

A history and physical examination alone are usually sufficient to identify the majority of patients for whom a specific therapy is required.

Based upon the literature reviewed by the Task Force, diagnostic radiology is of limited value in the first evaluation of the majority of spinal disorders.

Chapter 4
Treatment of Activity-related Spinal Disorders

THROUGHOUT ITS REVIEW of the scientific literature, the Task Force aimed at clarifying the value of each therapeutic modality applicable to the different clinical spinal disorders, taking into account their course of progression.

This chapter is devoted to an analysis of the therapeutic modalities available for treating spinal disorders. This analysis is threefold: first, therapies are defined and grouped according to their therapeutic objectives; second, each modality, listed in alphabetic order, is reviewed with regard to the published scientific evidence concerning its value and use at various clinical stages of a spinal disorder; and third, summary matrices, similar to those for the diagnostic procedures of spinal disorders, are presented. These matrices are a reference to assist the health professional in the choice of a therapeutic modality in each of the described diagnostic categories.

CLASSIFICATION OF TREATMENT ACCORDING TO OBJECTIVE

The members of the Task Force developed a classification of therapeutic objectives in the treatment of spinal disorders. These objectives were determined so as to take into account the aims of all partners entering the therapeutic milieu, to apply to all patients suffering from one of the clinical conditions included in the diagnostic classification. Therefore, the therapeutic objectives were delineated by an analysis of all treatment modalities used for spinal disorders of the cervical, thoracic, and lumbar levels and at different stages of their progression. In addition, they incorporate the physical, psychologic, and social elements of therapy. All modalities applying to each therapeutic objective are listed and numbered in Table 4.1. Some modalities, such as bed rest, are listed more than once, because they fulfill more than one therapeutic objective.

The therapeutic objectives are as follows.

1. To promote rest for the affected anatomic structures. This objective, common to most diseases, aims at enhancing natural mechanisms of healing, or at least at preventing the aggravation of problems.

2. To diminish spasm. Muscular spasm occurs in most acute ailments of the spine. These spasms are mainly protective in nature, but it is appropriate to attempt to diminish them while eliminating their underlying cause, to prevent the development of a pain–spasm cycle.

3. To diminish inflammation. Several acute or chronic disorders include an inflammatory element, which might be primary but also often results from the abnormal postures related to a mechanical spinal problem. Treatment of the inflammatory component is often a necessary first step in the correction of the mechanical problem. Treatment of the inflammatory component is often a necessary first step in the correction of the mechanical problem.

4. To reduce pain. Relief of pain remains the most concrete and sustained objective of treatment.

5. To increase strength. Certain spinal disorders are caused or aggravated by a preexisting weakness of spinal and/or abdominal muscles. In other cases, the weakness results from prolonged inactivity due to a spinal disorder. There are also instances in which muscular weakness of the limbs follows a radicular injury. In all of these cases, increasing muscular strength is a primary therapeutic objective.

6. To increase the range of motion. Certain spinal disorders that have resulted in persistent spasm, decreased range of motion, or prolonged inactivity can be complicated with a loss of flexibility, which should be corrected.

7. To increase endurance. Continued inactivity generally brings a loss of muscular fitness that, if uncorrected, may contribute to relapses.

8. To alter mechanical structures. It is sometimes necessary to modify a mechanical structure surgically, by resection (eg, discal hernia), by modification of function (eg, arthrodesis), or by restoration of anatomic proportions (eg, foraminotomy) or to explore or approach other structures (eg, laminectomy).

9. To alter neurologic structures. Some extreme cases justify the surgical destruction of neurologic structures to abolish the perception of pain (eg, facet rhizolysis).

10. To increase functional and physical work capacity. This is a more general objective, which integrates Objectives 5–7 and incorporates them with respect to the functional demands of daily living and the workplace.

11. To modify the work environment. In some instances, the spinal disorder may be caused by an occupational determinant, such as required torsion movements or extreme axial loading. The disorder may have caused a temporary or permanent reduction in work capacity. It then becomes necessary to adjust the work environment.

12. To modify the social environment. Social factors may strongly alter the perception of pain and functional incapacity. Similary, all of the problems associated with a disorder and its resulting inactivity may have an impact on the social environment. It is therefore necessary to intervene at this level, especially in the assessment and treatment of chronic disorders.

13. To provide treatment adapted to the psychologic aspects of the problem. Like social factors, psychologic factors can affect or be altered greatly by the spinal disorder and its consequences. An intervention at this level may therefore be necessary.

GLOSSARY OF THERAPEUTIC MODALITIES AND ASSESSMENT OF THEIR VALUE

The numbers shown below for each modality refer to the list in Table 4.1. They are presented here alphabetically, for ease of reference

Acupuncture (4.4)

Insertion of needles at predetermined sites in cutaneous and subcutaneous tissues, with a therapeutic goal. The efficacy of acupuncture has not been scientifically validated, but the results seem to indicate that it can lessen pain in a cumulative manner during a series of treatments. Although some studies point out that acupuncture can reduce chronic pain,[230,498,499] there is no scientific study demonstrating the superiority of acupuncture over other treatment modalities.

Table 4.1. Therapeutic Objectives and Modalities in the Treatment of Spinal Disorders*

1. Promote rest for the affected anatomic structures
   - 1.1 Rest
   - 1.1.1 Bed rest for <2/7 days†
   - 1.1.2 Bed rest for >2/7 days†
   - 1.2.1 Orthosis
   - 1.2.2 Support
   - 1.3 Work cessation
2. Diminish spasm
   - 2.1 Systemic medication
   - 2.2 Thermotherapy (heat)
   - 2.3 Cryotherapy (cold)
   - 2.4 Biofeedback (EMG)
   - 2.5 Mobilization/manipulation
   - 2.6 Massage
3. Diminish inflammation
   - 3.1.1 Systemic medication
   - 3.1.2 Local medication
   - 3.2 Cryotherapy (cold)
4. Reduce symptomatic pain
   - 4.1.1 Systemic medication
   - 4.1.2 Local medication
   - 4.2 Electroanalgesia
   - 4.3 Pain clinic
   - 4.4 Acupuncture
   - 4.5 Cryotherapy (cold)
   - 4.6 Thermotherapy (heat)
   - 4.7.1 Bed rest for <2/7 days†
   - 4.7.2 Bed rest for >2/7 days†
5. Increase strength
   - 5.1 Strengthening exercises
6. Increase range of motion
   - 6.1 Stretching exercises
   - 6.2 Mobilization/manipulation
   - 6.3 Traction
7. Increase endurance
   - 7.1 Home exercises
   - 7.2 Exercises in a specialized center
8. Alter mechanical structures
   - 8.1 Surgery
   - 8.2 Chemonucleolysis
9. Alter neurologic structures
   - 9.1 Denervation
10. Increase functional and physical work capacity
    - 10.1 Postural information
    - 10.2 Functional training
    - 10.3 Back school
    - 10.4 Return to work
11. Modify work environment
    - 11.1 Intervention on occupational aspects
12. Modify social environment
    - 12.1 Social services
13. Provide treatment adapted to the psychologic aspects of the problem
    - 13.1 Psychologic support
    - 13.2 Psychopharmacology
    - 13.3 Psychotherapy
    - 13.4 Specialized psychopharmacology and psychotherapy

*Some modalities are listed in more than one objective.
†The number of days depends on the vertebral region affected: 7 days for the cervical area and 2 days for the lumbar area.

Back School (10.3)

Structured intervention program aimed at a group of individuals and including the provision of general information on the spine, recommended posture and physical activities, prevention, and exercises for the back. The main objectives of lectures pertaining to the back are to transmit information to the patient on the anatomy and disorders of the spine and to teach the principles underlying healthy posture, daily activities, and sports. The content of these courses varies considerably from place to place.[1,39]

Bed Rest (1.1.1, 1.1.2, 4.7.1, 4.7.2)

Bed rest with or without authorization to get up to use the bathroom. In patients with a demonstrated radicular compression, bed rest is efficacious, as shown in Weber's study[723] on 2 weeks of bed rest. There is no study on the optimal duration of bed rest, but several biologic arguments lead one to limit the duration of immobility to a maximum of 2 weeks, with few exceptions.

In instances of lumbago radiating beyond the knee, even if no radicular compression is proven, the majority of authors recommend prolonged bed rest to decompress the nerve root. However, bed rest need not be total: activities related to feeding and personal hygiene may be more difficult to achieve in bed than out of bed. In cases of lumbago not radiating to the lower limbs, 2 days of bed rest appears to yield results equivalent to those of 7 days of bed rest.[148] An earlier study demonstrated that 10 days of bed rest allowed for better recovery and faster return to work than no rest.[742] In patients whose pain is not severe enough to justify prolonged bed rest, it seems useless to impose it for even a few days.

Biofeedback (EMG) (2.4)

Training technique that includes transposing the physiologic activity of a patient's muscular response into a visual or auditory signal, enabling the patient to control his/her response. The objective may be to facilitate or to inhibit the muscular activity. This method, sometimes used in chronic pain syndromes, has not yet been demonstrated efficacious.

Chemonucleolysis (8.2)

Injection of an enzyme in the nucleus pulposus of a disc to modify its biophysical properties. Chemonucleolysis is a semiconservative approach used in patients suffering from radicular pain sufficiently intense to raise the possibility of surgery; it requires that the discal hernia first be objectively demonstrated through the usual means. The value of chemonucleolysis has been established in scientific studies,[207,327] although the results are inferior to those of surgery.[126,170] If after 4–6 weeks the result is not satisfactory, surgery should be considered. Chemonucleolysis is not useful in recurring low back pain, and a second injection is contraindicated because of the increased risk of allergic reaction.

Cryotherapy (2.3, 3.2, 4.5)

Local application of ice or ice and water, with ice wrappings or compresses. The immediate application of cold compresses appears to reduce edema and pain, but there is no precise in-depth study on this point.

Denervation (9.1)

Destruction of a nervous structure through various techniques. Rhizotomy and, more recently, destruction of the articular ramus of the spinal nerve posterior branch have been used with varying results. There are several other neurosurgical techniques such as cordotomy and thalamotomy that are rarely used.

Discectomy (8.1)

Complete surgical removal of the intervertebral disc. Discal surgery has a limited role in the treatment of lumbosciatica and must be reserved for patients with a proven discal hernia who have not responded to conservative treatment. A randomized prospective study[723] showed that surgical results are better if the patients have surgery early in the treatment of their disorder. Moreover, there is no scientific study nor any other evidence in the literature to demonstrate the efficacy of surgery in patients suffering solely from spinal pain without radicular radiation.

Discotomy (8.1)

Partial surgical removal. See Discectomy.

Electroanalgesia (4.2)

Technique aimed at reducing the physiologic perception of pain through the use of an electrical stimulator and electrodes applied to the skin. Some studies, including that of Melzack et al.,[495] suggest that transcutaneous electrical stimulation can significantly decrease acute or chronic pain. However, this treatment has not been shown to accelerate return to work or to a normal degree of functioning.

Exercises in Specialized Center (7.2)

Series of exercises and therapeutic activities prescribed, directed, or supervised by health professionals. Generally, exercises are done in a specialized center for a limited time only, mainly to instruct the patient, and are then continued at home by the patient. Sometimes specific rehabilitation demands prolonged therapy in a specialized environment.

Functional Training (10.2)

Structured intervention program that includes the identification of routine daily living and work postures and activities, reeducation exercises for required performance, and instruction to acquire a safe mode of functioning. Mayer et al.[475] showed a better rate of return to work in patients who had dynamic functional training than in patients from a control group.

Home Exercises (7.1)

A series of prescribed therapeutic exercises or activities taught to the patient and done at home or at work, following a given schedule. Exercises can be divided into two broad categories: dynamic or isotonic exercises; and static or isometric exercises.

Dynamic exercises involve active voluntary contraction of a muscle or group of muscles to bring a change in both muscle length and the range of articular movement.

Static exercises involve voluntary contractions of a muscle or group of muscles, without a change in muscle length or movement at the joint. The muscles of patients suffering from chronic pain are usually weakened, which presents an additional risk of a lumbar lesion. Individuals with general fitness and endurance of the muscles affecting the spine are less prone to back problems.[46,82,394,475] However, some exercises when they are done in an isotonic manner, may increase intradiscal pressure.[523]

Intervention of Occupational Aspects (11.1)

Advice based on the knowledge of a specific work environment and a functional evaluation of the worker to assure a better balance between his/her capability and his/her tasks. Information is available only on chronic conditions for which ergonomic interventions represent an integral component of the therapeutic program.[475] Not enough is known about the acute and subacute episodes of lumbar pain for which ergonomic modifications could be considered.

Laminectomy (8.1)

Total surgical excision of one or several vertebral arches (lamina) to decompress or visualize nervous structures of the medullary canal. See Discectomy.

Laminotomy (8.1)

Partial excision of one or several vertebral arches (lamina). See Discectomy.

Local Medication (3.1.2, 4.1.2)

Medication given at the precise or adjacent site of disease or presumed disease. Infiltrations are often used to reduce pain and to induce an antiinflammatory or anesthetic effect. Infiltrations of trigger points have not been studied in controlled trials. Epidural infiltrations of cortisone and local anesthetics have been the topic of a number of clinical studies, with variable results,[92] and their utility remains controversial.[62,128,640]

Manipulation (2.5, 6.2)

Abrupt passive movement of a vertebra beyond its physiologic range but within its anatomic range. Vertebral manipulation is probably the therapeutic modality most frequently studied in controlled trials.[242,306,329,541,636] A few studies have shown a temporary relief of pain, versus other methods of treatment, but none has shown a reduction in the duration of work absences. All of these studies were conducted in a medical or osteopathic milieu; there is no properly controlled chiropractic study on this subject.

Massage (2.6)

Deep or superficial manipulation of soft tissues according to defined techniques. Massage may be the most frequently used therapy for musculoskeletal disorders; in many instances it is useful in controlling pain. However, there is no controlled study to support this. It is interesting that the elevation of endorphins in the central nervous system is now thought to explain the effect of massage and other corporal manipulations.[529]

Medication (2.1, 3.1, 4.1)

Any substance, other than food, used in the following instances: to aid diagnosis, to relieve symptoms, and to treat or prevent disease. Medications are the most frequently prescribed treatment for patients with spinal problems.* They are used for their myorelaxing, antiinflammatory, or analgesic effects. Several studies have demonstrated the usefulness of nonsteroid antiinflammatory drugs and muscle relaxants during the acute phase,[145] but their utility in the chronic phase still has not been clearly established. Analgesics (eg, aspirin and acetaminophen derivatives) are useful: these are basic medications whose usefulness is scientifically proven. Some authors believe that antidepressants are useful in the treatment of chronic pain, but their utility has not been established in the literature.

*Although the literature contains numerous references, none are quoted, to avoid favoring specific products.

Figure 4-1

THERAPEUTIC MODALITIES — LUMBAR SPINAL DISORDERS

		Low back pain						LBP radiating to posterior thigh						LBP radiating to calf ± feet						LBP radiating to leg + neurologic signs						Radicular compression presumed	Radicular compression confirmed	Spinal stenosis confirmed	Post surgery 1-6 months	Post surgery > 6 months		Chronic pain syndrome	
		7 days or less		> 7 days & < 7 weeks		over 7 weeks		7 days or less		> 7 days & < 7 weeks		over 7 weeks		7 days or less		> 7 days & < 7 weeks		over 7 weeks		7 days or less		> 7 days & < 7 weeks		over 7 weeks						pain free	symptomatic	at work	idle
		at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle								
		1aW	1aI	1bW	1bI	1cW	1cI	2aW	2aI	2bW	2bI	2cW	2cI	3aW	3aI	3bW	3bI	3cW	3cI	4aW	4aI	4bW	4bI	4cW	4cI	5	6	7	8	9.1	9.2	10 W	10 I
1.	**PROMOTE REST**																																
1.1.1	Bed rest for < 2 days		*		*				*		*				*		*				*		*										
1.1.2	Bed rest for > 2 days																										*						
1.2.1	Orthosis																																
1.2.2	Support																																
1.3	Work cessation																																
2.	**DIMINISH SPASM**																																
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2.2	Thermotherapy (heat)																																
2.3	Cryotherapy (cold)																																
2.4	Biofeedback (EMG)																																
2.5	Mobilisation/manipulation																																
2.6	Massage																																
3.	**DIMINISH INFLAMMATION**																																
3.1.1	Systemic medication																																
3.1.2	Local medication																																
3.2	Cryotherapy (cold)																																
4.	**REDUCE PAIN**																																
4.1.1	Systemic medication																																
4.1.2	Local medication																																
4.2	Electroanalgesia																																
4.3	Pain clinic																																
4.4	Acupuncture																																
4.5	Cryotherapy (cold)																																
4.6	Thermotherapy (heat)																																
4.7.1	Bed rest for < 2 days		*		*				*		*				*		*				*		*										
4.7.2	Bed rest for > 2 days																										*						
5.	**INCREASE STRENGTH**																																
5.1	Strengthening exercises																																
6.	**INCREASE RANGE OF MOTION**																																
6.1	Stretching exercises																																
6.2	Mobilisation/manipulation																																
6.3	Traction																																
7.	**INCREASE ENDURANCE**																																
7.1	Home exercises																																
7.2	Exer. in special. centre																																
8.	**ALTER JOINT TISSUE**																																
8.1	Surgery																										*						
8.2	Chemanucleolysis																										*						
9.	**ALTER NERVE TISSUE**																																
9.1	Denervation																																
10.	**INCREASE FUNCTION**																																
10.1	Postural information																																
10.2	Functional training																																
10.3	Back school		*		*				*		*				*		*																
10.4	Return to work																																
11.	**MODIFY WORK ENVIRONMENT**																																
11.1	Ergonomic intervention																																
12.	**MODIFY SOCIAL ENVIRONMENT**																																
12.1	Social services																																
13.	**MODIFY THE PSYCHE**																																
13.1	Psychological support																																
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CONTRAINDICATED on basis of scientific evidence

common practice but **NO** scientific evidence

NOT in common practice and **NO** scientific evidence

not applicable

Figure 4-2

THERAPEUTIC MODALITIES — CERVICAL SPINAL DISORDERS

		Cervical pain						Cervical pain radiating to arm						Cervical pain radiating to forearm ± hand						Cervical pain radiating to arm + neurologic signs						Radicular compression presumed	Radicular compression confirmed	Spinal stenosis confirmed	Post surgery 1-6 months	Post surgery > 6 months		Chronic pain syndrome	
		7 days or less		> 7 days & < 7 weeks		over 7 weeks		7 days or less		> 7 days & < 7 weeks		over 7 weeks		7 days or less		> 7 days & < 7 weeks		over 7 weeks		7 days or less		> 7 days & < 7 weeks		over 7 weeks						pain free	symptomatic		
		at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle	at work	idle								
		1aW	1al	1bW	1bl	1cW	1cl	2aW	2al	2bW	2bl	2cW	2cl	3aW	3al	3bW	3bl	3cW	3cl	4aW	4al	4bW	4bl	4cW	4cl	5	6	7	8	9.1	9.2	10 W	10 I
1.	**PROMOTE REST**																																
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8.1	Surgery																																
8.2	Chemonucleolysis																																
9.	**ALTER NERVE TISSUE**																																
9.1	Denervation																																
10.	**INCREASE FUNCTION**																																
10.1	Postural information																																
10.2	Functional training																																
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13.	**MODIFY THE PSYCHE**																																
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CONTRAINDICATED on basis of scientific evidence

common practice but **NO** scientific evidence

NOT in common practice and **NO** scientific evidence

not applicable

Mobilization (2.5, 6.2)

Vertebral mobilization technique of large amplitude and low velocity, carried out with patient control within normal limits or articular amplitude. See Manipulation.

Pain Clinic (4.3)

Polyvalent global therapeutic approach that focuses principally on the behavioral adaptation of patients to help them withstand and control their condition in the long term. The basic disease has been identified but is not treated as such. This intervention is recommended solely to evaluate the factors that modify the patient's perception of pain and to support the patient. A nonrandomized study showed a significant result of this program on the return to work of patients operated on and still symptomatic after 1 year or longer.[475] Other controlled studies have shown various results.

Postural Information (10.1)

Professional teaching regarding healthy vertebral posture at rest and during activities. A bedridden patient is generally more comfortable lying on the back or side, with flexed knees and hips. To get up, it is preferable that he/she first turn onto the side and help himself/herself with the upper limbs.

The ambulatory patient must know that standing is preferable to sitting, that flexion and torsion motions must be avoided, that low chairs must be avoided, and that armrests and lumbar supports are useful. This advice is based on studies conducted by Nachemson,[523] who measured intradiscal pressure for different postures and activities. However, raised intradiscal pressure is but one parameter of spinal distress. Other factors, such as paravertebral muscle spasm or joint inflammation, may require specific attention.

Nachemson recommended that a patient returning to work receive the following advice:

1. Do not lift heavy objects.
2. Be as close as possible to the object to be manipulated.
3. Avoid bending over.
4. Avoid any torsion movement.
5. Change positions frequently.
6. Avoid sitting on a low chair.
7. Use an armrest and a support for the lumbar spine when sitting.

Some studies appear to demonstrate the usefulness of this postural information; others have not.[39,107,656]

Psychopharmacology (13.2)

Use of pharmacologic agents to modify the mood or tension, which may contribute to or result from the patient's ailment. See Medications.

Psychotherapy (13.3)

Planned therapeutic and diagnostic effort to identify and modify basic personality traits, the influence of previous experiences, expectations, and strategies of adaptive behavior in an attempt to reduce the effect of subconscious and conscious factors that increase the patient's handicap. Certain social and/or psychologic problems generated by spinal disorders from which the patient suffers may lead the attending physician or consultant to request the assistance of a psychologist or social worker, particularly in instances of persistent chronic pain. Special consultation is rarely in order during the initial stages.

Return to Work (10.4)

Occupational rehabilitation through part-time or complete resumption of usual work or other tasks selected according to the patient's limitations. Work rehabilitation must be considered at every evolutionary stage, inasmuch as it does not carry the risk of worsening the injury. The earliness of returning to work depends on the nature of the injured tissue and the extent of the injury. Biologic studies have revealed that the affected structures heal relatively quickly, except for the disc. There is no study comparing the timing of return to work. The nonrandomized study conducted by Mayer et al.[475] showed that resuming work benefits patients suffering from chronic pain.

Specialized Psychopharmacology and Psychotherapy (13.4)

Use by appropriate specialists of psychotherapy and psychopharmacology. See Psychopharmacology and Psychotherapy.

Spinal Arthrodesis (8.1)

Surgical methods aimed at immobilizing contiguous vertebrae by inserting bone grafts with or without supplemental internal fixation. Some clinical uncontrolled studies have shown 70–80% satisfactory results following vertebral arthrodesis in patients suffering from clearly demonstrated instability. However, seldom can instability be established objectively, and the effects of stabilization through arthrodesis probably should be verified first by studying the response obtained with an orthosis.[197,748]

Spinal Orthosis (1.2.1)

Rigid orthopedic apparatus, custom-made for long-term use (eg, lumbar and cervical brace). Lumbar supports are widely used for pain relief, but there is no documented evidence to suggest that they significantly reduce the period of disability. However, one study showed a rigid orthosis of the lumbar spine to be superior to a simple support aid.[504] There are also biomechanical studies showing that orthoses may effectively limit lumbar mobility[748] and that they decrease intradiscal pressure in certain postures of lumbar flexion.[521] In patients with spinal stenosis, a rigid orthosis that puts the lumbar spine in flexion seems to result in some enlargement of the lumbar spinal canal. The compliance of patients in wearing a lumbar orthosis is often poor.

Spinal Support (1.2.2)

Semirigid or flexible orthopedic apparatus used temporarily (eg, abdominal support, flexible collar). See Spinal Orthosis.

Strengthening Exercises (5.1)

Exercises to increase muscular strength, generally making use of enough external resistance to bring a maximal contraction of the muscle. See Home Exercises.

Stretching Exercises (6.1)

Exercises to improve the extensibility of muscles and other soft tissues to reestablish a normal articular range of motion. See Home Exercises.

Systemic Medication (2.1, 3.1.1, 4.1.1)

Medication given via a systemic route. See Medication.

Thermotherapy (2.2, 4.6)

Local application of superficial or deep heat, with the use of diathermy, ultrasound, infrared rays, warm fomentations, heating pads, or hydrotherapy. Although the application of warm compresses might reduce edema and pain, there is no specific in-depth study to support this.

Traction (6.3)

Intermittent or continuous longitudinal elongation of the spine, either mechanical or manual. Spinal traction is widely used in mechanical spinal disorders, but the assessment of its efficacy is complicated by parameters such as preparation of the patient, posture, friction, traction angle, intensity, and type of apparatus. Experimental studies have shown that it is possible to obtain various degrees of enlargement of intervertebral spaces with the use of traction, but other studies have shown that in certain cases an initial increase of muscular activity and even intradiscal pressure during traction. Some clinical studies have compared the effect of different types of traction, but no controlled study has demonstrated their efficacy.[725,769]

Work Cessation (1.3)

Cessation of usual activities of all work: paid, housework, volunteer, and school. During the acute phase that follows the injury, it is imperative that the patient abstain from vigorous activities, because protecting the back facilitates recovery. This is an integral part of the initial treatment. There are no epidemiologic and clinical studies based on the modalities of work cessation. Continuing or resuming an activity alone may appear to help decrease the pain, especially for patients suffering from a chronic pain syndrome, but this has not been formally proven. Ergonomically and biomechanically acceptable work is considered by some authors to be a therapeutic modality and is part of the usual therapeutic procedure.

MATRIX OF THERAPEUTIC PROCEDURES

To summarize previous discussion on the scientific evidence published on the various therapeutic modalities, a matrix of therapeutic procedures is proposed for the various categories of spinal disorders, for the lumbar and cervical segments of the spine (Figures 4.1 and 4.2). It was not considered useful to prepare a separate matrix for the dorsal spine.

As described in the section on diagnostic classification, the matrices are constructed using, on the horizontal axis, the list of diagnoses according to the diagnostic classification, and, on the vertical axis, the list of therapeutic modalities listed by therapeutic objective. The content of the matrices is a color code that represents the strength of scientific evidence available in the literature to support or reject a therapeutic procedure under each diagnostic category. For each cell in the matrix, the literature was reviewed for applicable scientific information. The color code corresponds to the strength of scientific evidence, as described on page S25 and S27, as follows:

Dark green*	Usefulness demonstrated in a randomized controlled trial
Dark green	Usefulness demonstrated in a nonrandomized controlled study
Light green	Use is considered on the basis of common practice, without support of scientific evidence
Red	Contraindicated on the basis of scientific evidence
Yellow	Not part of common practice and no scientific evidence
Blank	Not applicable

The matrices are best used by selecting a diagnostic category and reading down to find the appropriateness of the different treatments for the category. Dark colors represent the presence of scientific evidence supporting (green) or rejecting (red) a therapeutic modality.

SUMMARY

Biologic effects provide the rationale for the use of most treatments. However, few have been validated in scientifically admissible clinical or epidemiologic investigations. Of those that have been studied, few have been shown to facilitate healing of nonspecific spinal disorders.

Based on a review of the literature, a therapeutic matrix was constructed that takes into account all clinical entities and their stage of evolution. The following therapeutic guidelines emerge:

In general, the symptoms of acute pain in the lumbar, dorsal, and cervical regions tend to resolve spontaneously.

Bed rest is not necessary for low back pain without significant radiation. When prescribed, it should last no longer than 2 days. Prolonged bed rest may be counterproductive.

Surgery, including chemonucleolysis, is indicated in the treatment of spinal disorders only after conservative treatments have failed.

Surgery is not a proven remedy for back pain alone, and is generally contraindicated in the absence of hard neurologic signs or demonstrated anatomic distortion. A second surgical intervention carries the same contraindications.

Chapter 5
Management Guidelines

PATIENTS AND WORKERS with activity-related spinal disorders rarely recover overnight. However, we know from aggregate data that 74.2% of workers reporting activity-related spinal disorders will be returned to work within 1 month. Also, the 7.4% of workers with activity-related spinal disorders who remain idle for more than 6 months account for 75.6% of compensation and medical costs related to these disorders. Accordingly, management strategies should be directed at maximizing the number of workers returning to work before 1 month and minimizing the number whose spinal disorder keeps them idle for longer than 6 months. Thus returning to work as a management objective is both sound clinically and economically.

A review of the problem of diagnosis presented in Chapter 3 stresses the development of an objective clinical examination in patients with activity-related spinal disorders and the need for the primary contact physician to do it, record it, and act upon it in a careful and consistent fashion. Collection of incomplete clinical data and lack of recognition of clinical indicators of more sinister processes are the nuclear features of clinical confusion. Any therapy prescribed in this clinical scenario will be "hit-and-miss," at best. The therapeutic matrix presented in Chapter 4 is based on defining the objectives of treatment, then selecting the modalities most likely to achieve them.

In this chapter, the clinical, psychosocial, and ergonomic aspects of activity-related spinal disorders are drawn together to create a comprehensive management model, which respects the roles and objectives of all members of the multidisciplinary team in the quest to return workers with spinal disorders to the workplace.

STANDARDIZATION OF CLINICAL DATA

The most practical way to standardize clinical data is to create a format for its collection and registration.

The QTFSD has developed three clinical formats for standardizing data relating to the assessment and management of workers with spinal disorders. These are presented in their original form as Appendix I and represent the documentation of clinical data that the Task Force considers essential for the proper management of workers with activity-related spinal disorders (Forms A, B, C, Appendix I). All of the forms referred to in this chapter can be found in Appendix I.

ROLE OF MANAGEMENT TEAM MEMBERS

The part of the attending physician (first clinician) is crucial because of the responsibility to ascertain the pathologic nature of the spinal disorder. The attending physician must:

1. Perform and document a standardized clinical assessment (Forms A and B). These data are essential to proper follow-up evaluation, particularly if the clinical problem lasts longer than 4 weeks, possibly necessitating the intervention of other clinical professionals.

2. Use the diagnostic and therapeutic matrices. Some of the therapeutic modalities require specialized services, such as physical or occupational therapy; the attending physician should request an initial assessment and follow-up progress notes from the service. It is essential to maintain ongoing communication with allied health professionals, who spend much time interacting with the patients, often on a daily basis.

The matrices should not be considered the final word, because they were prepared on the basis of current knowledge, subjected to scientific validation. The efficacy of some treatments has not been verified through scientific studies, but this does not mean that treatments prescribed because of a known biologic effect are useless.

3. Communicate and cooperate with the occupational physician.

4. Request appropriate consultations with either certified specialists involved in the management of patients with neuromusculoskeletal disorders or a multidisciplinary team. The attending physician must ensure that pertinent information on clinical (Forms A and B) and ergonomic factors (Form D) be forwarded and used as needed.

5. Participate, if appropriate, as a primary consultant to the multidisciplinary team to provide clinical information and ongoing care.

Certified specialists in the neuromusculoskeletal system (orthopedic surgeons, neurosurgeons, neurologists, physiatrists, and rheumatologists) act as attending physicians, consultants, or members of multidisciplinary evaluation teams. Certified specialist should provide additional standardized clinical information (Form C).

Many allied health professionals play a major role in the assessment of physical, psychologic, and functional performance and in the application of treatment in their specialized areas. It is important that these professionals be familiar with the therapeutic matrix and essential that the physician provide them with as accurate a diagnosis as possible and any paraclinical information that may relate to their areas of interventional expertise. They, in turn, are responsible for providing the attending physician with pertinent data from their specialized assessments and with information concerning the patient's response to treatment and his/her performance status. It is particularly important that the allied health professionals exchange information with the physician in cases where the worker has not resumed work within 4 weeks.

All occupational health professionals are expected to cooperate with all medical professionals, in particular the attending physician and specialists; to promote the adjustment of work to the worker and of the worker to his/her task; and to play a prominent role in the multidisciplinary team. The occupational health specialists, and ergonomists in particular, should provide an increasing contribution to knowledge of the workplace, not only to facilitate research but also to improve the management of workers with activity-related spinal disorders.

The roles of the various health professionals and the therapeutic goals for the management of activity-related spinal disorders fall into a specific time sequence that promotes functional recovery and return to work with a minimum delay (Table 5.1).

Table 5.1. Goal-oriented Management of Spinal Disorders

Time from onset	*Involved professional*	*Goals*
0–4 weeks	Treating physician	Rule out specific disease process; conservative treatment oriented toward return to work
4 weeks	Treating physician	Complete reevaluation; rule out specific disease process; pursue conservative measures oriented toward return to work
7 weeks	Treating physician	Seek consultation; act on recommendations
	Consultant	Promote functional recovery; rule out specific disease process
3–6 months	Treating physician	Seek multidisciplinary evaluation; act on recommendations
	Multidisciplinary team	Assess psychosocial aspects of pain; assess ergonomic aspects; promote functional recovery and return to work before 6 months

MANAGEMENT BY CRITICAL PATHWAY

The development of a critical pathway for the management of activity-related spinal disorders aims at facilitating the return of the worker to normal work activity or appropriate work in the shortest possible time (Figure 5.1). Because most workers (74.2%) are likely to return to work within 4 weeks of the onset of their spinal disability, their management will probably rest totally in the hands of the first clinician they encounter. A minority of workers (25.8%) will remain idle for periods longer than 4 weeks, and periodic complete reevaluation may be necessary to identify new therapeutic objectives and select new therapeutic modalities. However, after 7 weeks of disability, it is prudent from a clinical point of view to propose mandatory consultation with a certified specialist.

An important component of this approach is the gathering at different times in the clinical course of the patient's disorder of data that will be useful to all clinicians entering the critical path management flow chart. If these data are in a standardized format, they will not only bring consistency into the clinical evaluation of such patients but will provide a bank of information from which to develop research programs aimed at promoting the spinal health of workers.

CRITICAL PATHWAY FOR MANAGEMENT FOR THE FIRST 4 WEEKS

The initial medical visit, most often to a general practitioner but possibly to a specialist, must include a complete physical examination with history. Form A is completed at that time. The history must specify the characteristics of the pain, in particular its mode of onset, which may lead to identifying work factors that may have caused the problem. The physical examination must include a static and dynamic examination of the vertebral column, an assessment for the presence of spasm or inflammation of the soft tissues, and a complete neurologic examination. There is generally no need for any paraclinical examination at the time of the initial medical visit. Radiographs of the spine, in particular, have no diagnostic value at this time.[456] However, if certain signs suggest a specific or serious disease, appropriate paraclinical tests may be ordered.

The following clinical indicators may disclose more serious disease: age less than 20 or greater than 50 years; history and/or signs of serious trauma; recurring problem; history of neoplasm; fever; or neurologic deficit. Upon identifying such clinical indicators, the clinician should order appropriate paraclinical test (eg, plain roentgenograms of the spine, inflammatory or osseous laboratory evaluation, myelography, CT scan, or radionucleotide bone scan). All physical signs and results must be noted and Form B completed. If the test results are normal, the patient will follow the cycle used for subjects who do not present these signs; if not, the advice of an appropriate specialist should be sought.

In the absence of serious disease, the treatment of workers presenting with activity-related spinal disorders includes analgesics and/or nonsteroidal antiinflammatory agents, based on the patient's symptoms and the clinical signs of soft tissue malfunction. If the pain and/or spasm is intense, 2 days of bed rest may be prescribed. The patient is then reassessed, and the prescription may be renewed if the pain and/or spasm is still intense. If certain signs of severity, such as neurologic signs, appear, the patient joins this cohort and undergoes the appropriate paraclinical evaluation. If the second period of bed rest does not alter the pain and/or spasm, other therapeutic modalities can be considered, for example a limited course of physical therapy. Based on the clinical and functional assessment, this may include a variety of physiotherapeutic modalities but must include instruction and practice in proper posture and body mechanics at rest and during movement.

Regardless of the stage, if symptoms and signs have improved or do not cause functional restriction, return to work should be considered. This may take place in a progressive fashion, if necessary, depending on ergonomic risk factors in the work environment.

Reassuring the patient on the benignity of his/her affliction and on its compatibility with work and counseling on posture and lifestyle is an integral part of this process.

CRITICAL PATHWAY FOR MANAGEMENT FROM 4 TO 7 WEEKS

If the patient has not resumed work after 4 weeks, the attending physician must complete Form A again and completely reevaluate the problem. In addition, the physician should order an appropriate paraclinical assessment, with at least one simple radiograph and measurement of the sedimentation rate (Form B).

If a previously undetected specific lesion (eg, fracture, neoplasm, infection, spondylolisthesis, or compression of a neurologic structure) is identified, appropriate specialists should be consulted. If no specific lesion is identified and the patient has been receiving physical therapy, the program must be reevaluated, in collaboration with the therapist, and adjusted according to the status of the patient. If the patient has not been receiving physical therapy, it should be implemented. Occupational skills should be assessed to assist the patient in returning to work in his/her customary environment.

If the clinical and paraclinical examinations remain negative, return to work should be considered. The patient should be reassured on the benignity of the lesion and counselled on posture, work, and lifestyle.

If the patient has not been able to resume work after 6 weeks, a specialist of the neuromusculoskeletal system should be consulted. Form C will be completed by the consulted specialists.

The specialist must indicate the diagnosis, if possible, and make appropriate recommendations for ongoing treatment or initiation of another therapeutic approach. He/she may also consider return to appropriate work.

Although myelography is an optimal tool in the diagnosis of

spinal nerve root compression, it is an invasive method with potential complications. There are precise indications for myelography, and these must be followed. Usually it can be replaced by axial tomography, which carries minimal risks but is less accessible and more expensive. Discography, like myelography, carries certain risks, and must be used sparingly and for specific reasons.

CRITICAL PATHWAY FOR MANAGEMENT BEYOND 3 MONTHS

If after 3 months the patient has not resumed work, the attending physician should consult a multidisciplinary team whose composition will depend on the underlying problem. The physician may be present during the consultation and may provide the team with clinical information and discuss the future plan of action. The attending physician does not organize directly this multidisciplinary consultation; presumably, he/she requests assistance from a Workers' Compensation Board (CSST/QWCB). The request should be made after 3 months of work cessation, so that the meeting may take place before 6 months.

The management and follow-up evaluation should follow the critical pathway flow chart, maintaining as the prime objective return of the worker to the workplace.

PSYCHOSOCIAL CHARACTERISTICS OF CHRONIC PAIN RELATED TO THE MANAGEMENT OF SPINAL DISORDERS

In most cases of spinal disorder, pain, rather than spinal weakness or stiffness, is the symptom that forces workers to stop working and consult a physician. The Task Force thought it important to include chronic pain syndrome[496] and its psychosocial elements in the diagnostic classification and management of spinal disorders.

Research activity has developed over the past two decades on the biologic, psychologic, and sociologic aspects of pain associated with spinal disorders.[39,201,496,529,605,654,693] This interest is not surprising: biologic pain in a psychosocial environment leads to various degrees of suffering, which determine the degree of functional disability in individuals.

Psychosocial factors associated with pain tend to complicate the clinical problem after 3 months from the onset of a spinal disorder. Before that time, the physiologic factors predominate. However, social and psychologic distress can be manifested in the first weeks following cessation of work, with the development of financial problems.

Individual susceptibility to chronic pain syndrome is apparently the result of an interaction between a physiologic state and the past, present, and anticipated psychologic and sociologic consequences of pain. It appears that somatic and psychosocial factors must be present for chronic pain syndrome to occur.[496] However, no cause–effect relationship between psychosocial factors and chronic pain syndrome in workers has been demonstrated in a controlled epidemiologic study.

Melzack and Wall[496] stated:

> Pain is not simply a function of the amount of bodily damage alone. Rather, the amount and quality of pain we feel are also determined by our previous experiences and how well we remember them, by our ability to understand the cause of the pain and to grasp its consequences. Even the culture in which we have been brought up plays an essential role in how we feel and respond to pain. . . . Pain perception, then, cannot be defined simply in terms of particular kinds of stimuli. Rather, it is a highly personal experience, depending on cultural learning, the meaning of the situation, and other factors that are unique to each individual.

As the clinical picture evolves toward the diagnosis of chronic pain syndrome, the clinician and patient are forced to recognize the disparity between the physical trauma and the amount of pain felt and described. The accepted time frame for the diagnosis of chronic pain syndrome is pain persisting beyond 6 months, despite apparently appropriate treatment of the physically injured part. In the management of activity-related spinal disorders, it is essential that appropriate treatment be instituted before this 6-month evaluation point, so that patients and workers tending toward chronicity in their disability may be recognized as early as possible and appropriate evaluations and therapies can be instituted. Therefore, the 6-month point represents a therapeutic "precipice" in the critical pathway flow chart (Figure 5.1).

Some investigators[496] have identified several important psychologic factors in the subjective sensation of pain: 1) cultural factors; 2) previous experience of pain; 3) the meaning of the context in which pain is experienced; 4) the degree of attention, anxiety, or distraction given to the pain; 5) the impression of control over the pain; and 6) the autosuggestion and placebo effect from outside influences.

Others[201,654] have identified psychosocial factors modulating pain: 1) the development, in time, of a "pain behavior"; 2) financial compensation following a work injury; 3) environmental stress (anxiety, depression); 4) attribution to pain of the incapacity to work and assume familial duties; 5) attribution to pain of the incapacity to attain personal and societal objectives; and 6) attribution to pain of overuse of drugs, including alcohol.

There is a void in the scientific study of postinjury and posttherapy societal functioning among pain victims.[605] Current therapy focuses mainly on the pain-killing properties of drugs, physical therapy, and surgery. What happens when these fail? In fact, a work-related injury leading to prolonged incapacity has a profound impact on the individual, which contributes to maintaining and increasing the perception of pain. A large part of the anxiety is generated by the lack of a standardized terminology for diagnosis and standardized approach to the therapy. This leads to a variety of diagnostic opinions among the different clinicians consulted by the patient. The burden on the patient is also increased by the common prejudice that a compensated worker is faking and taking advantage of the system. With time, these factors and financial insecurity take on more importance as the quality of life decays. The patient becomes more irritable, and familial and professional conflicts contribute to maintaining a vicious cycle that becomes increasingly difficult to break. In summary, pain in humans has consequences that extend well beyond its biologic origin. Chronic suffering affects the individual psychologically and in social relationships with others.

The Task Force, recognizing these important factors, has included chronic pain syndrome in its diagnostic classification. The medical and fiscal challenge imposed on the workers, health professionals, and Workers' Compensation Board by this diagnostic category is tremendous. The management goals* for the treatment of

*These management goals for the treatment of chronic pain were developed by the QTFSD and in no way are meant to replace or conflict with the important recommendations anticipated from the Committee for the Study of Pain, Disability and Chronic Illness Behavior of the Institutes of Medicine, National Academy of Sciences of the United States of America, 2101 Constitution Avenue N.W., Washington, D.C. 20418

chronic pain from a spinal disorder include: 1) early recognition of individuals who fall into the chronic pain syndrome category; 2) assurance of validity and consistency in diagnosis; 3) early coordination in the management of the condition with specialists in the areas of spinal disorders, pain, and work rehabilitation; and 4) delivery of consistent reassurance to the worker throughout the condition.

ERGONOMIC ASPECTS IN THE MANAGEMENT OF SPINAL DISORDERS

As defined by Keyserling,[365] "Ergonomics, sometimes called human factors engineering, is an applied science concerned with the design of facilities, equipment, tools and tasks that are compatible with the anatomical, physiological, biomechanical, perceptual and behavioral characteristics of humans."

Occupational risk factors for developing spinal disorders constitute a large part of the scientific literature. The main motive underlying this research effort is the amount of money spent every year on compensation to affected workers. Consequently, the insight into the causes of spinal disorders is largely biased by compensation policies and laws ruling different industries and countries and the systems that collect compensation data. Nevertheless, occupational factors are known to be implicated in the cause of spinal disorders, as summarized in several reviews of the subject.[13,360,739,764]

The multifactorial origin of spinal disorders is generally accepted: it is not solely a personal predisposition,[637,764] nor a problem of maladaptation of the machine to humans, but a combination of both plus the effect of the task and the general working environment.[100,422,712] This multifactorial approach is called ergonomy.

In addition, spinal disorders may not solely be the result of an injury at work (eg, from lifting),[95,220,221,432,641] but can also result from other factors, including chronic exposure to vibrations,[253,577,610] and repetitive motion of the upper limb.[276,278,715,716]

This knowledge of the ergonomic basis of spinal disorders has oriented some of the recommendations of the Task Force on their management. Namely, the occupational history and description of the circumstances of onset of a spinal disorder should always be obtained, to orient the diagnosis and the rehabilitation of disabled workers (Form D).

COMPREHENSIVE MANAGEMENT MODEL

Prevention, of course, is the ultimate management strategy. The need to educate, orient, and train workers in matters of spinal health and safety and to identify and correct ergonomic risk factors that lead to spinal disorders in workers cannot be overstressed. In that 75% of workers with activity-related spinal disorders are returned to work within 1 month or less, the management strategy currently operational in industrialized nations would appear to be acceptable. However, if the management strategy of minimizing the number of workers whose spinal disorder keeps them idle for longer than 6 months is to be effective, it will require a comprehensive team approach, with each member cognizant of the clinical, psychosocial, and ergonomic aspects of work-related spinal disorders (Table 5.1).

This, in essence, is the role of the multidisciplinary team in its evaluation of the long-term disability (greater than 6 months) worker. However, for this team to operate as a management tool, it must be perceived by the worker as a team of professionals dedicated to his/her recovery and return to work, not as a tribunal to adjudicate his/her compensation claim. To this end, the participation of the worker's attending physician in the multidisciplinary team is central to the process of ongoing care and realization of the treatment objective, which is return to work.

SUMMARY

A guideline to the management of patients with a spinal disorder was developed, based on the knowledge of its natural history and the effectiveness of diagnostic and therapeutic procedures.

A management model stresses three chronologic points in the evolution of a spinal disorder: 4 weeks, 7 weeks, and 3 months. These are based on knowledge of the natural history of spinal disorders and serve in the early detection of patients with a tendency toward chronic pain.

Management over the first 4 weeks emphasizes the initial physical examination and history of onset and identification of work-related risk factors. All laboratory evaluation, including plain roentgenograms of the spine, are generally useless at this stage, unless clinical signs suggest a specific disease.

Therapy over the first 4 weeks deemphasizes prolonged bed rest. If used, bed rest should be prescribed for 2 days at a time, to a maximum of 4 days for low back pain and 7 days for neck pain. Functional rehabilitation, including return to work (progressive, if necessary), should be the goal and modality of treatment.

Follow-up study between 4 and 7 weeks should focus on a complete reevaluation of the problem, including history and physical examination and simple laboratory procedures (plain roentgenograms and sedimentation rate). If these indicators are negative, the role of the clinician is to reassure and educate the patient about the benignity of the condition, encourage functional recuperation, and anticipate with the patient the physiologic consequences of pain and inactivity.

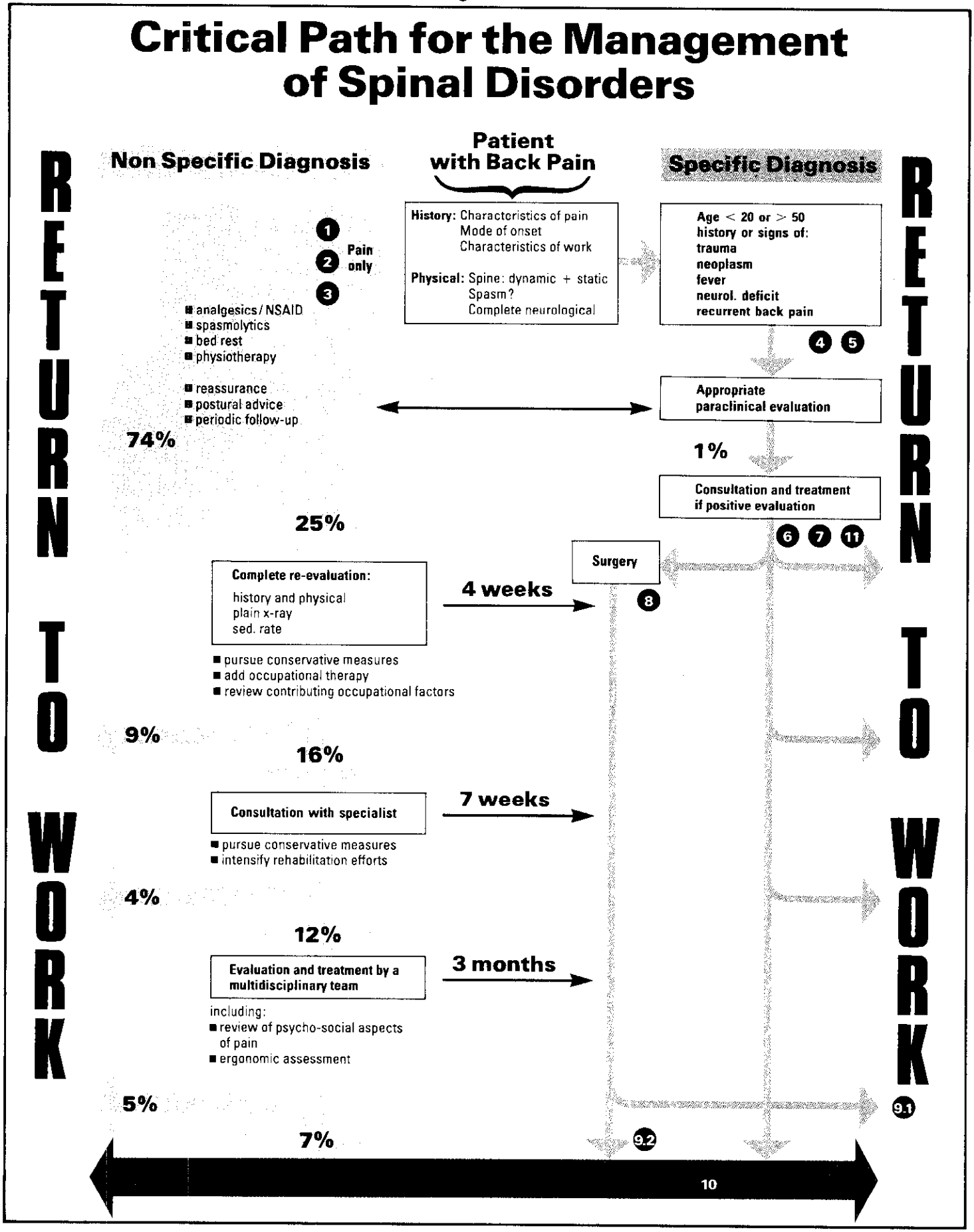
If the patient has not been able to resume work after 6 weeks, a specialist of the neuromusculoskeletal system should be consulted.

After 3 months of follow-up evaluation, the clinician should request a consultation for unimproved patients. The consultation could be multidisciplinary, including specialists for the spine, psyche, and functional and occupational rehabilitation. Only 2–3% of all patients require specialist or multidisciplinary consultation. The clinician must regard these cases not as therapeutic failures but as part of the natural history of spinal disorders and the consultants must address the specific needs of the patient.

Standardization of the diagnostic (using the diagnostic classification of spinal disorders) and therapeutic approach to the patient (with the understanding of therapeutic objectives and use of a systematic and consistent approach) is the key to increasing knowledge of spinal disorders and making communications more efficient among treating physicians and from patient to patient.

Figure 5-1

Critical Path for the Management of Spinal Disorders



Chapter 6
Conclusions, Recommendations, and Research Priorities

BECAUSE WORK-RELATED spinal disorders account for such a high percentage of worker absenteeism and institutional compensatory costs, it is important to identify ways to ameliorate the problem.

CONCLUSIONS

1. Data

1.1. Quebec is similar to other industrialized regions in the incidence of work-related spinal disorders among workers.

1.2. The majority (74.2%) of compensated workers with spinal disorders in Quebec are absent from work for less than 1 month; however, 7.4% of compensated workers lose more than 6 months from work.

1.3. Spinal disorders incur high costs (greater than $150 million annually in Quebec). Of these costs, 75.6% are associated with the same 7.4% of chronic cases with more than 6 months lost from work.

1.4. The baseline data on all aspects of workers' spinal disorders in Quebec are limited in quality and usefulness.

1.5. Few reports have appeared in the literature to demonstrate admissible research being done in the field of spinal disorders in the workplace in Quebec or in Canada.

2. Clinical Aspects

Preliminary Observations

The terminology and nosology regarding spinal disorders are neither standardized nor validated. This explains in part the heterogeneity, differences, and contradictory findings in the literature and in practice regarding diagnosis, therapy, and rehabilitation and in the criteria for evaluating the effectiveness of treatment. The literature on therapies for spinal disorders in particular, though extensive, is deficient in studies that are scientifically admissible.

This poor quality of the literature, as well as the lack of standardization and validation of the terminology and nosology, has imposed a significant constraint on the adoption of uniform, scientifically based clinical strategies for the management of spinal disorders.

General Conclusions

Of the many pathologic conditions of the spinal column, the nonspecific ailments of back pain in the lumbar, dorsal, and cervical regions, with or without radiation of the pain, comprise all but a few of the problems found among workers.

Diagnostic Aspects

2.1. The etiologic diagnosis of spinal disorders is difficult because the physical signs and symptoms often have little specificity. There is often a discrepancy between the level of pain and the loss of function reported by the patient and the paucity of physical signs observed by the physician.

2.2. The Task Force has developed a diagnostic classification, starting with the most frequent clinical entities and taking into account the chronology of their development. A matrix of recommended diagnostic procedures was developed according to the same chronology.

The following points deserve special mention.

2.2.1. Diagnosis can be guided by a knowledge of the circumstances surrounding an injury and work-related risk factors implicated in the cause of the disorder.

2.2.2. A clinical history and physical examination are usually sufficient to identify the majority of patients for whom a specific therapy is required.

2.2.3. Diagnostic radiologic studies of the spine are of limited value in the primary evaluation of the majority of activity-related spinal disorders.

Therapeutic Aspects

2.3. Biologic effects provide the rationale for use of most treatments. However, few have been validated in scientifically admissible clinical or epidemiologic investigations. Few of the treatments studied have been shown to improve the natural process of resolution of nonspecific spinal disorders.

2.4. A review of the literature has made it possible to recommend a therapeutic matrix that takes into account all clinical entities and their chronologic stage of evolution.

The following points deserve special mention.

2.4.1. In general, the symptoms of acute pain in the lumbar, dorsal, and cervical regions tend to resolve spontaneously.

2.4.2. There is no need for obligatory bed rest in low back pain without significant radiation. When it is prescribed, usually it should not be continued for more than 2 days for lumbar or 7 days for cervical pain. Prolonged bed rest can have adverse effects.

2.4.3. Low back pain without anatomic disorder objectively demonstrated is not an indication for spinal surgery.

2.4.4. Surgery including chemonucleolysis, is indicated in the treatment of activity-related spinal disorders only after conservative treatments have failed.

2.4.5. A second spinal surgical intervention is indicated only in exceptional circumstances.

2.4.6. Even if there is residual chronic pain, return to work is not contraindicated. Return to work may be therapeutic, assuming the work is not likely to aggravate the basic problem or increase pain.

RECOMMENDATIONS

1. Clinical Recommendations

General Principles

1.1. The ultimate goal of treatment of work-related spinal disorders should be returning the worker to his/her usual occupation or rehabilitation to an appropriate work activity, with minimum delay.

1.2. All of a worker's episodes of spinal disorders should be docu-

mented according to a standard method of evaluation that makes it possible to retrieve all relevant clinical data.

First Contact

The method of evaluating spinal disorders should include, on the first visit, a complete clinical history and physical examination, to establish a specific diagnosis. This could be done by adhering to the following recommendations.

1.3. Physicians should be encouraged to use the diagnostic classification proposed by the Task Force (Table 3.2) for standardization and validation.

1.4. On the first visit, the physician should fill out Form A (Appendix I) or a suitable counterpart.

1.5. Laboratory and radiologic examinations should be reduced to a minimum. Plain roentgenograms of the spine are of little use in the initial assessment of most cases of work-related spinal disorders. The physician is encouraged to use the proposed diagnostic matrix (Figure 3.1).

Therapeutic Management and Follow-up Study

1.6. The attending physician is encouraged to follow the critical pathway presented in Figure 5.1.

1.7. The choice of treatment is best made according to selected therapeutic goals based on current knowledge of effectiveness, as shown on the therapeutic matrix (Figures 4.1 and 4.2). The matrices will require periodic updating.

1.8. In the rare case in which a specific treatment is indicated, it should be instituted without delay.

1.9. Bed rest should be reserved for specific acute cases of activity-related spinal disorders and in most cases should be limited to a few days.

1.10. Indications for surgery must always be specific, ie, failure of conservative treatment, presence of hard neurologic signs, and demonstrated anatomic distortion.

1.11. The physician is encouraged to reevaluate the worker after 4 weeks of absence from work and complete Form B (Appendix I) or a suitable counterpart.

1.12. The physician should request an appropriate consultation from a certified specialist for workers whose spinal disorders are likely to become chronic (ie, when 7 weeks of 1 year have been lost from work). The specialist is encouraged to use Form C (Appendix I) or a suitable counterpart at the time of consultation.

1.13. If a worker loses 3 months from work in the course of 1 year (consecutive or cumulative) following his/her first work absence due to a spinal disorder, a consultation should be requested from a multidisciplinary team so that a comprehensive management strategy can be developed on his/her behalf. This team should consist of neuromusculoskeletal specialists, occupational health advisors, psychologists, ergonomists, and, if possible, the worker's attending physician.

1.14. The attending physician should reassure the patient regarding the small risk of his/her condition when such is the case; encourage him/her to return to work with minimum delay; and monitor and participate in all stages of the management of the worker's spinal disorder and communicate with all management partners.

1.15. All physicians should be knowledgeable about the demands of the workplace and take them into account when authorizing return to usual work or establishing restrictions on work activity.

2. Professional Recommendations

2.1. Working conditions and circumstances surrounding the occurrence of injuries in the workplace should be documented.

2.2. For this purpose, a standard form describing the conditions of work and the inherent risk factors for spinal injury should be signed by the employee and the employer and filled in by the plant physician, safety officer, nurse, or local committee on occupational health and safety (Form D, Appendix I, or a suitable counterpart).

2.3. The attending physician should use this form by week 7 of disability, if not before, and especially when establishing the conditions for return to work. This should be done by taking into account the working conditions that led to the disability or its aggravation.

2.4. If return to usual work activity on a full-time basis is not possible, return to light work or part-time work during rehabilitation is recommended.

2.5. If after rehabilitation, functional limitations sufficient to prevent return to full-time usual work activities persist, one consideration is an agreement between the worker, employer, and physician to select and train for a modified or alternate job.

2.6. If this is not possible, the worker should be evaluated and treated by a multidisciplinary rehabilitation team.

3. Administrative Recommendations

3.1. Workers' Compensation Boards (CSST/WHSC) and disability insurance carriers should require the use of a uniform nomenclature and a standardized evaluation, by providing appropriate forms to the physician (see Recommendations 1.4, 1.11, 1.12, 1.13), specifically designed to record clinical data on spinal disorders.

3.2. Workers' Compensation Boards (CSST/WHSC) or disability insurance carriers should maintain patients' records that include, for each absence from work, the findings from these standardized forms once they are validated, as completed by each partner in the management strategy, and including history, diagnostic and therapeutic procedures, and modifications of the work environment. The costs associated with each episode should be included in the record, categorized according to the type of diagnostic or therapeutic procedure.

RESEARCH PRIORITIES

In the preceding chapters are outlined methods used to perform a systematic, exhaustive review of the scientific literature on spinal disorders. The goal of this review was to develop recommendations for the practical medical management of workers with spinal disorders, based on hard scientific evidence. There was little clinical proof or epidemiologic validation to support the current methods of treating disorders of the spine. In certain areas, there were studies in which the hypothesis was weak or the analysis of the data faulty. In other areas, no studies of any kind exist. Because of these deficiencies in the available scientific literature, below are identified priorities for future research efforts. These priorities address basic medical and clinical research and include investigations into the causes of spinal disorders in the workplace, the distribution of appropriate medical and paramedical services, the role of ergonomic and psychologic factors in recovery and recurrence, and the economic burden of these disorders to society.

We believe that an enumeration of research priorities is important for assisting organizations that fund research in identifying and evaluating programs worthy of support.

Research priorities in the field of spinal disorders fall into four categories: causation, prevention, clinical terminology, and clinical management.

Causation of Spinal Disorders

There is a need for 1) investigation as to the precise origin of pain; 2) correlation studies between the mechanisms of injury, the nature

of tissue damage, and their distressing acute and chronic effects; and 3) studies on the mechanical properties of biologic tissues.

Prevention of Spinal Disorders

Studies are required to improve the work environment and to evaluate the effectiveness of on-the-job education, functional rehabilitation, and workplace modification in the prevention of spinal disorders and the reintegration of the worker into the work force after an episode of spinal distress.

Clinical Terminology

The QTFSD found a great deal of inconsistency as to clinical diagnosis, methods used to arrive at a diagnosis, implication and prognosis of a given diagnosis, and management strategies used in the treatment of workers suffering activity-related spinal disorders. Accordingly, the need to standardize the clinical terminology and nosology of a diagnostic classification with respect to clinical observations of workers suffering activity-related spinal disorders is an obvious clinical, epidemiologic, and administrative research priority. There is an acute need to develop a widely acceptable diagnostic classification and to record it in a standardized format that maximizes clinical observation and minimizes inappropriate prognostication. Such formats are research activities in that they must be validated in the clinic and the workplace as to their scientific merit and pretested in these arenas as to their practicality.

Clinical Management

Research in clinical management falls conveniently into three categories: diagnosis, prognosis, and therapeutic modalities.

1. Before we become mesmerized with the developing diagnostic imaging technology, it is imperative that studies into the sensitivity, specificity, and predictability of the newer, as well as the established, diagnostic techniques be developed. Such techniques must be adjudicated rigidly as to their scientific merits and analyzed as to their cost–benefit, risk–benefit, and cost–effectiveness ratios.

2. Prognosis has become a matter of opinion and not of fact. Accordingly, the prudent clinician should be conscious of the need to identify, as early as possible, factors likely to lead to chronic distress and chronic functional disability. Research into these factors is essential if management strategies are to succeed.

3. There is a pressing need to improve the mechanisms by which the various therapeutic modalities may be specifically evaluated. Generally, such modalities should be identified and evaluated as to those in which the outcome objective is to reduce the duration of disability and those that have appeared in the therapeutic grids (Figures 4.1 and 4.2) which we suspect are clinically beneficial but which have not as yet been subjected to scientific studies.

Finally, the QTFSD decided that there was no single research priority that deserves unique and special attention. As parts of an identifiable whole, no particulate solution could be expected to rectify the integral problem.

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This list of references represents a compendium of the references reviewed by the Task Force for the study of scientific evidences concerning spinal disorders. Not all are cited in the text, but their use is implicit in the construction of the diagnostic and therapeutic matrices presented. The method for the selection of references is explained in Chapter 1. An exhaustive list of references is also available from Pope MH, Frymoyer JW, Andersson G: Occupational Low-Back Pain. New York, Praeger, 1984; Wyke B: A Back Pain Bibliography. London, Lloyd Luke Ltd, 1983; Nachemson A, Bigos S: The low back, Adult Orthopaedics. Vol 2. Edited by J Cruess, WRS Rennie. New York, Churchill Livingstone, 1984, pp 842–937

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Appendix I

Form A: Evaluation of Patient with Spinal Disorder

PATIENT IDENTIFICATION
Surname_____
First Name_____
Occupation_____

Date of birth____ ____ ____
Sex M F
Social Security no._____
Address_____
Tel:_____

1. Has patient stopped working?____ If yes: for how many days?____
   Reason
   __Spinal disorder
   __Other cause

2. Site(s) of symptoms __Cervical
   __Thoracic
   __Lumbar
   First episode?____
   If no: Number of previous episode(s)____
   Number of compensated episode(s)____
   Last episode ended____ ____
   Month Year
   Pain since last episode?____

3. Does pain radiate to
   Right arm or leg?____ If yes: below elbow/knee level?____
   Left arm or leg?____ If yes: below elbow/knee level?____

4. Are there neurologic signs?____
   If yes: which
   __Lasègue (__degrees)
   __Sensory deficit
   __Motor deficit
   __Reflex diminished
   __Other____

	None	Slight	Moderate	Severe
5. Functional limitation at work, as described by patient				
6. Pain described by patient				
7. Signs observed by clinician				

8. Other clinical information____

9. Other information from patient____

10. Diagnosis at this visit____

11. Duration of current episode __< one month __1–2 months
    __2–3 months __> 3 months

12. Were major diagnostic or therapeutic procedures ordered?____
    If yes, fill out Form B

EXAMINER
Name_____
Title_____
Date____ ____ ____

Address_____
Tel:_____

Form B: Evaluation of Patient with Spinal Disorder (Diagnostic and Therapeutic Procedures)

PATIENT IDENTIFICATION
Surname_____
First Name_____
Occupation_____

Date of birth_____
Sex M F
Social Security no._____
Address_____
Tel:_____

DIAGNOSTIC PROCEDURE PERFORMED

__Plain x-ray Date_____
Result
Normal__
Abnormal
__Fracture
__Radicular compression presumed
__Other_____

__CT Scan Date_____
Result
Normal__
Abnormal
__Radicular compression confirmed
__Other_____

__Myelogram Date_____
Result
Normal__
Abnormal
__Radicular compression confirmed
__Other_____

__Other procedure_____ Date_____
Result
Normal__
Abnormal
__Radicular compression presumed
__Other_____

TREATMENT RECOMMENDED OR PERFORMED

EXAMINER
Name_____ Address_____
Title_____
Tel:_____
Date_____

Form C: Evaluation of Patient with Spinal Disorder (Consultation)

PATIENT IDENTIFICATION
Surname_____
First Name_____
Occupation_____
_____

Date of birth_____ _____ _____
Sex M F
Social Security no._____
Address_____
_____ Tel:_____

1. Was the clinical and paraclinical information available to you?_____
   If yes, did you have access to Forms A and B?_____

2. Were you able to verify the signs and symptoms reported?_____

3. Do you agree with the interpretation of the paraclinical evaluation (Form B)?_____

4. Do you have a specific diagnosis for this patient?
   If yes what is it?
   __Disc hernia
   __Musculo-ligament disorder
   __Other:_____
   Evidence suggesting the diagnosis:
   _____
   _____

   If no:
   Is there a reason other than pain to reduce the activity of this patient?_____
   If yes, what is it?_____
   _____

5. Is ergonomic counseling appropriate and recommended?___

EXAMINER
Name_____
Title_____
Date_____ _____ _____

Address_____
_____ Tel:_____

Form D: Evaluation of Patient with Spinal Disorder (Ergonomic Description of Work)

PATIENT IDENTIFICATION
Surname
First Name
Occupation
Type of industry

Date of birth
Sex M F
Social Security no.
Address
Tel:
Employer's address

1. Job description

2. Was the injury a consequence of a specific event?
   - No: go to question 3
   - Yes: describe the event

   Was this specific event a frequent or usual task in your job?

3. Does some of your usual work involve *little* muscular effort but *prolonged sitting or standing*?
   - No: go to question 4
   - Yes: answer the following:

   a. What position(s) do you assume for prolonged periods?
      - Sitting and standing
      - Standing only
      - Sitting only
      - Other, specify:

   b. If standing, can you move around?
   c. Do you change position often during your shift?
   d. During your main activity, what is the main position of your body:
      - Bent forward
      - Bent from side to side
      - Twisted from the waist
      - Head bent forward

   e. What is the main position of your arms?
      - Below shoulder or
      - At or above shoulder level

   f. Can you easily rest your arms on something?

4. Does some of your usual work involve muscular effort?
   - No: go to question 5
   - Yes: answer the following:

   a. What efforts are the most frequent and hard to perform in your usual work?
      - Pushing
      - Pulling
      - Lifting
      - Lowering
      - Carrying
      - Throwing
      - Other

   b. For each type of effort listed in the column on the left, indicate the amount of time usually spent in doing it:

	Seldom	Some of the time	A lot of the time
Little or no effort			
Some effort			
A lot of effort			

   c. When you perform muscular effort, are you usually:
      - Bent forward
      - Twisted from the waist

   d. Do you usually have to work
      - Above shoulders
      - Below the knees

5. Does motion in your usual job mainly consist of reaching out or reaching up movements? Without handling a load?
   ___No: go to question 6
   ___Yes: answer the following:
   a. Do you often bend forward?_____
   b. Do you often twist the trunk?_____

6. Are you exposted to vibrations?
   No: thanks for completing this questionnaire
   ___Yes: answer the following:
   What is the source of vibrations?
   ___Tools
   ___Vehicle
   ___Other_____