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Low back pain assessment training of industry-based physicians

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Abstract—We have developed an educational program to train industry-based physicians in a new low back pain assessment procedure based on the recommendation of *The Clinical Practice Guidelines on Acute Low Back Pain Problems in Adults* published by the Agency for Health Care Policy and Research, U.S. Department of Health and Human Services. The clinical classification system based on the findings from the Quebec Task Force was used to categorize the subjects. The educational program included group and individual sessions with an extensive period of active follow-up. Protocol compliance was measured through a computer-based surveillance system that monitored evaluation form completion. The results showed significant change ($p<0.001$) in physician compliance in completing a standardized examination following an administrative mandate to change. Little change in clinical practice was recorded with an educational training program only. Further research into the factors responsible for the results is suggested.

Key words: *compliance, in-service training, low back pain, physician education.*

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INTRODUCTION

Low back pain (LBP) is common in the United States, having an annual prevalence rate of from 15 to 20 percent (1). It is the most common reason for disability in individuals less than 45 years of age (2). Andersson reported that the mean number of days of restricted activity is 23.5 days and the mean number of days lost from work is 8 days due to LBP (1). LBP is the most common reason for office visits to orthopedic surgeons, neurosurgeons, and occupational medicine physicians. Additionally, it is the second most frequent reason for a primary care physician office visit (3).

The cause of LBP is difficult to discern (4). Nachemson reports that a specific lesion is found in only 10 to 20 percent of persons with acute LBP (5). Therefore, the majority of cases presenting with LBP can be classified as non-specific.

The estimated annual expense of LBP medical care in the U.S. has been reported by Nachemson as ranging from $20 to $50 billion (5). Cats-Baril and Frymoyer estimated the total direct costs of spinal disorders for 1991 to be $24 billion (6), and Spengler et al. report that disability payments for work-related low back problems are as much as three times the medical costs (7). In an era of cost

containment and emphasis on fiscal responsibility, interest should be focused on the medical practices related to LBP as we search for the most cost-effective treatments.

Field and Lohr have discussed the importance of providing a standardized approach to clinical evaluation (8). Several authors have reported marked regional differences for diagnostic tests and surgery (9–11). These variations indicate a lack of consensus of appropriate assessment and treatment methods of persons with acute low back problems (12). The lack of consensus can lead to suboptimal or even inappropriate health care delivery, unnecessary costs, and uncertainty for the person.

The purpose of this paper is twofold: to describe the training of a group of industry-based physicians in a standardized evaluation and classification of persons with LBP, and to report physician compliance outcomes. The standardized evaluation and classification system described in this study is based largely on the recommendations put forth by The Quebec Task Force (4) and the Agency for Health Care Policy and Research (AHCPR), *Clinical Practice Guideline on Acute Low Back Problems in Adults* (*Guideline,* 13). To our knowledge, there is no study published that uses this type of standardized evaluation form on persons with acute LBP.

Background

Recent evidence suggests that practice standards are needed for the evaluation and treatment of LBP (12). Cherkin et al. (13) investigated the patterns of diagnostic test selection in eight physician specialties. The authors surveyed 2,604 randomly selected physicians in the United States for their diagnostic test selections on three case studies. With a response rate of 43 percent, they found that diagnostic test selection depended more on individual physician practice habits and specialty rather than on the symptoms of the subject. They found little consensus on the use of diagnostic tests for persons with LBP, either within or among specialties. Additionally, a poor association was found between the Quebec Task Force recommendations for diagnostic test selection and what the physicians currently practiced (4).

There are regional inconsistencies in LBP management. Taylor et al. analyzed the National Hospital Discharge Survey data from 1979 to 1990 to investigate management trends for mechanical LBP (14). Over the study period, a substantial increase in surgery rates (55 percent) and a decrease in nonsurgical hospitalization (73 percent) for LBP were found. These trends were not uniformly distributed throughout the United States. Sternbach found the prevalence of back pain to be nearly identical throughout the same geographical distribution (15). Combining these findings, the results suggest that the disparity found was most likely due to differences in physician training and practice style.

The use of a standardized method of evaluating persons with LBP may reduce the variability in physician training and practice. The *Guideline* recommendations include an initial assessment based on clinical history and physical examination (12). This assessment focuses on the detection of "red flags" for serious spinal or nonspinal pathology rather than on determining a specific diagnostic label. Additionally, the *AHCPR Guideline* advocates standardization of both the evaluation and clinical care.

The effect of a standardized evaluation on outcome has been described. Weisel et al. investigated the use of a subject-based, standardized assessment and treatment protocol on two groups of industrial workers with LBP (16). Although the study was not randomized, the results remain compelling. Over the 2-year study, both industrial groups showed a significant decrease in the prevalence of LBP, a decrease in days lost from work, and a decrease in medical and compensation costs. The authors conclude that the use of a standardized medical approach and nomenclature with unbiased medical surveillance led to the observed changes.

Waddell stresses the importance that the standardized evaluation should reflect multiple dimensions of LBP (17). He reports that as medical and health care resources for LBP continue to increase, disability grows and suggests that the traditional medical model has failed. A more integrated model "The Biopsychosocial Model," incorporating the physical, psychological, and social aspects of disability, is required for appropriate LBP care. For practicing physicians, the incorporation of a new model would require changing clinical practice and attitude.

Educational programs are necessary to change clinical practice. Unfortunately, little information on successful education programs for physicians is available. Geyman and Gordon hypothesize that in order for knowledge to lead to the intent to change, certain conditions are necessary, including: the acceptance of the new knowledge as valid and useful, and the conviction that the anticipated benefits of the new behavior will outweigh the tangible and intangible costs required to change (18). They further report that only some physicians who intend to change actually do.

Testing these hypotheses, Geyman and Gordon investigated the relationship between physician knowledge, intention, and actual change in clinical behavior. Using a sample of 83 primary care physicians, the authors tested cognitive knowledge and the intention to change clinical behavior through written clinical exercises based on an educational program. Additionally, they measured actual change in clinical behavior through a follow-up survey of three procedures covered in the original training. The results showed a significant gain in retention of knowledge. Also, some changes in clinical practice occurred in two of the three procedures. Moreover, a consistent trend toward under-treating the individual was found, which was in direct opposition to the recommendations they provided. The authors view this conservative approach to clinical practice change as multidimensional and conclude that factors, such as habit, economic disincentives, practice pressures, and skepticism, need to be more closely examined (18).

Further evidence suggests that education directed at experienced physicians should be performance-based. Ashbaugh and McKean categorized deficiencies in care as knowledge-based or performance-based in a medical record audit of a department of surgery (19). In 55 audits of 5,499 subject records covering 37 specific topics, 94 percent of the deficiencies were performance-based while only 6 percent were categorized as deficiencies in knowledge. The authors conclude that educational programs targeting medical personnel should be performance-based.

METHODS

This study was a component of a larger project conducted by the National Institute for Occupational Safety and Health (NIOSH). The NIOSH Model Clinic Project had as its primary goal the prevention of chronicity of persons with non-specific LBP. A brief description of the Model Clinic Project is included in Appendix A.

This study was conducted at the medical department of a large metropolitan transportation company with approximately 45,000 employees. The medical department consists of five medical assessment centers (MACs), each staffed with two to seven physicians. All physicians (n=19) and nurses were required to attend the educational program provided during company time. The training occurred either at the company or at the clinical site of the researchers. Continuing Medical Education (CME) credits were given. Prior to beginning the program, the medical director and the research team informed the management and the unions of the program and obtained their consent. The study was approved by the internal review board of the Hospital for Joint Disease Orthopedic Institute, New York University Medical Center.

To supplement the training program, the Model Clinic team, in collaboration with the company physicians, wrote clinical and procedure manuals. The manuals describe in detail the clinical examination, the clinical classification system, and all administrative procedures for completing the Model Clinic medical evaluation form. The manual was distributed to each physician and each MAC for easy access.

Training and Education of Industry-based Physicians

A training program was designed to instruct the participating physicians in the rationale and implementation of the standardized medical examination. The standardized protocol for the examination of persons complaining of LBP was developed by the Model Clinic team, which included an orthopedic surgeon, a nurse, physical therapists, a psychologist, an ergonomist, and epidemiologists. The examination protocol is based on the recommendations made by the Quebec Task Force (4) and conforms to the recommendations made by the Agency for Health Care Policy (12). The protocol and medical form were inspected and modified by outside reviewers, including experts in the field of LBP, company physicians, union representatives, and the legal department and management of the participating organization. The medical examination form may be seen in Appendix B.

Training Implementation

The training program was presented in three periods during the study (**Table 1**); the first two periods were performed prior to collecting data. Period 1, May through July 1992, consisted of a 16-hour formal course provided by experienced clinicians and teachers and members of the research team. The subject headings of the course are listed in **Table 2**. Written material was provided to each participant and later published (20). Following the sessions, an anonymous course evaluation was collected from 79 percent of the participants by an independent rater. Under a four-point scale (poor, fair, good, excellent), 32 percent rated the course excellent and 68 percent rated it good.

Table 1.
Summary table detailing the physician training implementation and changes to the inclusion criteria for the study periods. No data were collected during Periods 1 and 2.

Per	Dates	Physician Training	Inclusion Population	Criteria Subject
1	5/92-7/92	Formal Course	—	—
2	8/92-1/94	Ind. Sessions	—	—
3	2/94-5/94	Wkly Ind. Sessions	Dept. A	Broad LBP
4	6/94-10/94	No training	Dept. A	Broad LBP
5	11/94-1/95	No training	All Depts.	Broad LBP
6	2/95-8/95	No training	All Depts.	Nonspec. LBP

Per = Period; Ind. = Individual; Wkly = Weekly; Dept. = Department; Dept. A = 12,000; All Depts. = 45,000; Nonspec. LBP = Specific definition of nonspecific LBP.

Table 2.
Content headings for the 16-hour course on LBP for industry-based physicians.

I. Epidemiology of LBP
- A. Definition of terms and study design
- B. Individual and workplace factors affecting LBP

II. NIOSH Model Clinic Project
- B. Goals
- B. Components

III. Clinical evaluation and diagnosis of acute and subacute LBP
- A. Baseline information
- B. Employee history
- C. Physical examination
- D. Practicum

IV. LBP and psychosical factors
- A. Stress management
- B. Psychosocial risk factors in the development of chronic LBP
- C. Psychosocial Evaluation
- D. Treatment

V. Lifestyle factors
- A. Nutrition
- B. Medication use

VI. Exercise
- A. Theoretical basis of exercise
- B. Benefits of exercise
- C. Practicum

Period 2 included three performance-based practice sessions from August 1992 to just prior to data collection in January 1994. Concurrent negotiations among the research team, management, and unions delayed the initiation of data collection, necessitating the length of this period. The sessions were led by a board-certified orthopedic surgeon specializing in treatment of the low back; he reviewed the clinical procedures of the standardized evaluation.

Period 3, February to May 1994, was the last phase of the training; it was provided by the NIOSH Model Clinic physical therapist in weekly visits to each MAC. The therapist reviewed the background information and procedures for completing the standardized evaluation form, practiced the evaluation procedures, and answered questions. Physicians received supplemental one-on-one training upon request. Additionally, physicians were encouraged, but not required, to complete the medical examination form during this phase of the project. This phase required approximately 100 contact hours.

Data Collection

Data collection of physician compliance for completing the standardized medical examination forms for eligible clinic visits began in February 1994 and continued until August 1995. A clinic visit was considered eligible if the employee visited the medical department for a complaint of LBP. The back complaint did not have to be the primary reason for the visit: all LBP visits, whether initial or follow-up, were considered eligible.

During Period 3, data were collected from only one department of approximately 12,000 employees. The union representatives of this department were the first supporters of the project. In Period 5 (November 1994), two changes occurred: first, agreement was reached with all departments and data were collected from the whole organization (n=45,000); second, the Medical Director mandated that all physicians complete the standardized medical examination as part of a quality assurance program.

The final change in the data collection procedure was initiated by the industry-based physicians in Period 6. The original list of eligible clinic visits included a broad definition of LBP. This broad definition included persons with all spine pain and administrative visits for

persons with a history of spine pain. Following review by the research team, a refined definition of nonspecific LBP was adopted in February 1995.

Data Analysis

The success of the training program was evaluated by examining the proportions of LBP visits for which the MAC physicians completed the standardized medical evaluation forms. The number of eligible clinic visits was ascertained from the computerized clinic visit records maintained by the medical department. A separate data base was developed to compile the standardized medical examination forms. The forms were entered by an independent research assistant trained and supervised by the research epidemiologists. Compliance data measurement started in February 1994 and is ongoing.

RESULTS

From February 1994 through August 1995, a total of 3,189 eligible visits involving LBP were made to the MACs, of which the standardized assessment form was completed for 1,838 visits (**Figure 1**). The rate of compliance by period is presented in **Table 3**.

To test which time periods were significantly different from other time periods, a chi-squared goodness-of-fit statistical measure method described by Fleiss (21) was used. This method is designed to minimize the error associated with multiple comparisons of proportional data by forming data groups. The four time periods of concern (**Table 1,** Period 3–6) were segmented into two groups, before administrative mandate (Periods 3 and 4) and after (Periods 5 and 6). For this grouping, the chi-square test statistic was highly significant ($\chi^2=261.15$, $p<0.001$).

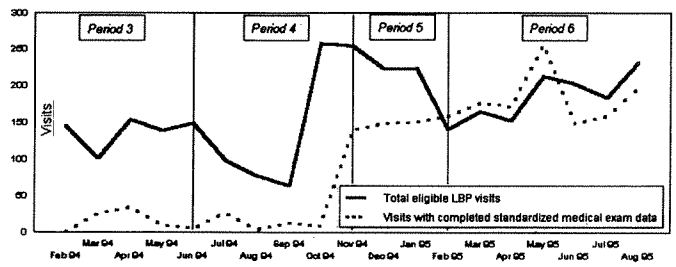

Figure 1.
Total number of eligible clinic visits to MACs and visits with completed assessment forms during the data collection phase of the study. Questionnaire data reflect number of completed subject questionnaires.

Table 3.
Physician compliance rate for completing the assessment forms during the data collection phase of the study.

Per	Dates	CAF Visits	Total Visits	CAF %
3	Feb-May 94	69	542	13
4	Jun-Oct 94	56	648	9
5	Nov 94-Jan 95	442	704	63
6	Feb-Aug 95	1,271	1,295	98

Per = Period; CAF = Completed Assessment Forms; Total Visits = Total Eligible Visits.

Within-group comparisons showed a statistical difference between Periods 5 and 6 ($\chi^2=98.952$ $p<0.001$), but no statistical difference between Periods 3 and 4 ($\chi^2=0.89$, $p<0.35$).

DISCUSSION

Little significant change occurred in physician compliance rates before or after the educational program and the training sessions. The most significant change on compliance occurred following the administrative mandate and streamlining the subject inclusion criteria. Thus, the strongest influence on physician compliance rate was due to external factors rather than individual factors.

The question of whether the training program was effective is difficult to answer. Certainly it is necessary to instruct the physicians in the procedures and administration of the research protocol, but whether instruction led to a change in practice requires further study. As Geyman and Gordon (18) indicate, knowledge is a necessary but insufficient factor. According to their model, physicians must accept the new knowledge as valid and useful, and there must be a self-perceived benefit for change. The authors also note that factors, such as habit, economic disincentives, and skepticism play an important role in changing clinical practice.

The lack of significant change in clinical practice prior to the administrative mandate may be due to a number of reasons including the difficulty in making changes in a bureaucratic environment and lack of time. Once the administrative mandate was adopted, the compliance rate increased dramatically. The initial efforts to obtain support were directed at upper management. The research group and the medical director of the organization believed that unless upper management understood the importance of the project, the project would fail. This

does not suggest that staff physician and nurse support was not important, but it was felt that a cooperative effort to implement change must be initiated and supported from upper management and the unions.

Administrative support was achieved through a series of meetings. The meetings were run by the medical director and the research team. They included information and presentation of the project to the President of the company, the heads of the Medical, Workers Compensation, and Employee Relations Departments, the specific managers of the participating departments, and the unions.

The organization had a number of unions representing the workers, each having specific requests and concerns regarding the study. These concerns included confidentiality issues of the participating employees, the extent of union endorsement, and the active participation required in the project. In addition to these specific concerns, the overall union-management relationship delayed progress. For example, changes in union representation and general apprehensiveness toward management presented obstacles. The need for continuous communication is essential.

To alleviate these concerns and allow for a greater participation from all parties, an advisory group was established in the Fall of 1992. This group was composed of management and union officials, medical department representatives, and the research staff. This group met monthly to discuss study implementation, follow-up, preliminary findings, and current problems. The new clinical protocol was initially met with little opposition. Most physicians appeared to be interested in current theories of health care and background information on LBP. However, there was resistance to changing clinical practice. The physicians' major concerns were 1) increased time required in employee contact, 2) increased administrative responsibility, 3) requirement to change clinical evaluation sequence and clinical classification systems, and 4) defining a new role for themselves within the employee management system.

These concerns were often difficult to address. The time commitment necessary to effect behavioral changes can be extensive. The temporal and administrative concerns were eventually resolved through individual practice sessions with the physical therapist, obtaining higher management approval for time spent while in training, and establishing a routine. We are currently running at 98 percent compliance rate with the new clinical practice. This change has been discussed in depth in the advisory board meeting and forwarded to the participating physicians. Reports to the advisory group from the physicians are that the protocol has facilitated the clinical evaluation and clinical decision making. This is reflected by the continuous high compliance rate and few complaints.

The measurement used for compliance in this study was quantitative rather than qualitative, having defined a compliant medical record as one that was filled out by the physician. We are not reporting the quality of the standardized medical examination. Some possibilities for assessing qualitative standards include an item analysis of completed medical examination forms and investigating interphysican agreement on examination items and the classification system.

Other ways of gauging the success of the program are needed. A study is currently underway that will investigate the agreement between physicians on the Quebec Task Force Classification (4) to determine the effectiveness of the training. The ultimate measure of success is improvement in care and a decrease in morbidity and costs due to LBP. We are currently studying both using subjective questionnaires and objective data. Follow-up data are being obtained and will be reported elsewhere.

CONCLUSION

Changing the practice of medical practitioners is a challenging task. In the case of the low back examination, it is critical that the physicians adopt current recommendations for treatment and care. The results of this study demonstrate that to enact clinical change in industry-based medical practice, physician participation, and strong administrative and union support are required. An educational program is necessary to instill valid reasons to change but must coexist with extrinsic factors to cause clinical change. Any attempts to undertake a project such as this should take the experiences of the current authors into consideration.

APPENDIX A

The NIOSH Model Clinic

In 1990, the Occupational and Industrial Orthopaedic Center (OIOC) and the Epidemiology Unit of the Hospital For Joint Diseases at New York University Medical Center received funding from the National Institute for Occupational Safety and Health (NIOSH) to establish a Model Clinic for the treatment of occupational low back pain and the prevention of chronicity.

The clinic is based on a system of primary and secondary care. Primary health care physicians at the workplace are trained to conduct standard back evaluations on persons presenting with acute low back pain. Workers who are still unable to return to work after 4 weeks are invited to enroll in a goal-oriented program at a secondary clinical facility (OIOC) where multidisciplinary, aggressive care and follow-up are implemented. The three elements of the Model Clinic are education, clinical practice, and research and evaluation at primary and secondary facilities. Education includes medical personnel and other selected staff at participating organizations. Topics include current advancements in the treatment of low back pain from a multidisciplinary perspective. Clinical practice includes care with a standardized evaluation and treatment protocol aimed at returning the worker to his or her original job. Treatment includes a 4-week outpatient multidisciplinary intervention aimed at educating the worker on current back care strategies, aggressive physical therapy, stress management, and ergonomic consultation. Research and evaluation refers to assessing the overall effectiveness of the physician training program, determining the rate of lost work days at participating companies, the effectiveness of multidisciplinary treatment, and predictors of chronicity.

APPENDIX B

Workplace Medical Examination Form

OIOC - Hospital for Joint Diseases

63 Downing Street, NY 10014

OIOC-NIOSH MODEL CLINIC MEDICAL EVALUATION

Physician Administered

Date of Visit: _____ MAC Code: _____

Employee Pass # _____ Date of Birth: _____ Sex: M F

Name: _____ S.S. # - -

Job Title: _____

Pulse: / min	**Blood pressure:** / (mm Hg)

A. Medical History (Complete this page only if first visit)	**Yes**	**No**
1. Is this a work-related injury? *(If yes, indicate date of injury):*		
Date of injury:		
2. Is this the first episode? *(If no, answer the following:)*		
Last episode ended on (date):		
Number of episodes in the last two years:		
3.a. Recent history of:		
Moving vehicle collision?		
Fall from heights?		
Trauma or strenuous activity?		
Increasing degree of back pain when supine?		
Unexplained weight loss? *(If yes, answer the following):*		
Amount lost: lbs. Rate of weight loss: lbs/week		
3.b. History of any of the following:		
Fever during the past month?		
Cancer?		
Prior spinal surgery?		
Recurrent pneumonia, diabetes, chronic infection, tuberculosis? *(Specify):*		
4. Bladder/bowel function: ***(If yes to any of the below, perform a rectal exam)***		
Urinary incontinence?		
Bowel incontinence?		
Perineal sensory abnormality?		

OIOC - NIOSH Model Clinic

Name: _____

S.S.#:

B. Signs and Symptoms **(Complete the following for every visit)** **Yes** **No**

1. Does examinee have a medical complaint involving the lumbar spine? ☐ ☐

(if yes, please answer the following):

Type of symptoms

_____pain
_____numbness/tingling
_____other

Site of symptoms

_____left
_____midline
_____right

2. Does the examinee complain of radiating pain? ☐ ☐

(if yes, please answer the following):

Above knee: _____ **Yes** _____ **No**

(if yes, note the following):

_____pain
_____numbness/tingling
_____other _____

	Left	Right
Gluteal	_____	_____
Thigh AM	_____	_____
Thigh PL	_____	_____

Below knee: _____ **Yes** _____ **No**

(if yes, note the following):

_____pain
_____numbness/tingling
_____other _____

	Left	Right
Inner Distal Leg	_____	_____
First Dorsal Web	_____	_____
Outer Foot	_____	_____

3. Other orthopedic complaints? ☐ ☐

(e.g. cervical or thoracic pain; ankle or knee pain, etc.)

a. _____

b. _____

4. Other pertinent medical problems? ☐ ☐

a. _____

b. _____

C. Physical Examination

Posture	Gait	Heel walk	Toe walk
_____normal	_____normal	_____normal	_____normal
_____stoop	_____guarded	_____abnormal:left/right	_____abnormal:left/right
_____list:left/right	_____limp:left/right		

OIOC - NIOSH Model Clinic Name: _____

S.S.#:

C. Physical Examination *(continued)*

Palpation for tenderness (check if present):	Left	Midline	Right
Lumbar upper			
Lumbar lower			

Trunk-over-Pelvis: Effect on Low Back and Leg Pain

	Low back pain	Left limb pain	Right limb pain
Flexion			
Extension			
Left Lateral Bend			
Right Lateral Bend			

Coding: N = No change in pain intensity; D = Decrease in pain intensity; I = Increase in pain intensity

D. Neurological Examination

	MOTOR		SENSORY				REFLEXES	
			Light-Touch*		Pinprick*			
	Left	Right	Left	Right	Left	Right	Left	Right
L2	/5	/5						
L3	/5	/5					/2	/2
L4	/5	/5						
L5	/5	/5						
S1	/5	/5					/2	/2

SLR Test		Back	Thigh	Calf	Angle
Right	Ipsi				°
Right	Cont				°
Left	Ipsi				°
Left	Cont				°

* Coding: N = Normal; D = Decreased; I = Increased

OIOC - NIOSH Model Clinic

Name: _____

S.S.#: _____

Diagnoses:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Low back pain classification (check only one classification):

Code	Classification
1	Pain without radiation
2	Pain + radiation above knee, without neurologic signs
3	Pain + radiation below knee, without neurologic signs
3.1	Non-dermatomal pattern
3.2	Dermatomal pattern
4	Pain + radiation to lower limb with neurologic signs
5	Presumptive compression of a spinal nerve root on simple roentgenogram (i.e., spinal instability over time)
6	Compression of a spinal nerve root confirmed by:
6.1	Specific imaging techniques (i.e. computerized axial tomography, myelography, or MRI)
6.2	Other diagnostic techniques (e.g. electromyography, venography)
7	Spinal stenosis
8	Postsurgical status, 1-6 months
9	Postsurgical status, >6 months
9.1	Asymptomatic
9.2	Symptomatic
10	Chronic pain syndrome
10.1	Pain without radiation
10.2	Pain + radiation above knee, without neurologic signs
10.3	Pain + radiation below knee, without neurologic signs
11	Other diagnoses

Recommendations:

1. _____
2. _____

Return to work:

_____ Approved for unrestricted duty in usual job

_____ Temporary restriction (check only one) Duration: weeks

- _____ No work approved for this period
- _____ Work approved, same job as usual job but with duty limitations
- _____ Work approved, but in light duty job (different from usual job)

_____ Permanent restriction

_____ _____

Signature *Print*

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