

The Rehabilitation of the Industrially
Injured Meniscectomy Patient:
An Evaluation

by

ALISA ROSE GLAZER
B.P.T., McGill University 1970
B.Sc.P.T., McGill University 1975

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
(Health Services Planning)

in

THE FACULTY OF GRADUATE STUDIES
(Department of Health Care & Epidemiology)

We accept this thesis as conforming
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA
May 1980

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Department of Health Care and Epidemiology

The University of British Columbia
2075 Wesbrook Place
Vancouver, Canada
V6T 1W5

Date April 21, 1980

Abstract

The rehabilitation center of the Workers' Compensation Board (WCB) of British Columbia provides a centralized, multidisciplinary, time-intensive approach to the treatment of the industrially-injured patient. In order to evaluate the effectiveness of this system, rehabilitation outcomes measured by the number of days postoperative before return to work were compared for three groups of meniscectomy patients. The first group comprised those patients treated at the WCB rehabilitation center (commonly referred to as "the Clinic"). The second group were those WCB patients rehabilitated in community facilities, and the third group were those WCB cases who received no formal postoperative physical therapy.

The population studied, 454 cases, was a total sample of all cases from the Lower Mainland for whom the WCB paid surgeons medical aid for the performance of a meniscectomy in 1976 and 1977. Data was obtained through an examination of the records. The variables examined were type of postoperative rehabilitation and of preoperative rehabilitation, age, occupation, income, degenerative changes of the knee, latency period, history of previous knee injury, medial or lateral excision of the meniscus and presence of a posterior incision. The method of analysis was a multifactor analysis of variance. Chi square was also used to understand the differences in the population.

One hundred forty cases with complicated pathology or circumstances which might have influenced the results, and all 29 women in the initial sample, were excluded from the study. The final sample consisted of 285 cases: 85 Clinic cases, 110 Community cases, and 90 non-treated cases.

The three populations were found to differ significantly in three characteristics: the frequency of degenerative changes of the knee, occupation, and the presence of a posterior incision. There was a higher incidence of degenerative changes in the Clinic group, and fewer cases with sedentary occupations in the group treated in the Community. The occurrence of posterior incision was greater in the Community than in the other populations. Four men who took over 300 days return to work were removed from the later analyses.

The mean return to work time for the Clinic group was found to be 105.0 days, for the Community group 86.4 days, and for non-treated patients 67.5 days. These differences were significant at the .05 level.

Within each postoperative rehabilitation group, the subgroup preoperatively treated at the Clinic was found to have returned to work the latest.

With the exception of occupation, the other study variables were not found to be significant. With the Community-treated group only, the intensity of treatment was not found to affect return to work.

It is suggested that the Clinic environment may encourage attitudes of disability and dependency. Intensive therapy and a multidisciplinary approach to treatment may also encourage unrealistic expectations of ultimate "cure". Centralization of treatment may heighten a litigious atmosphere.

It is stressed that since return to work was the only criterion of outcome, other functional and pathophysiological outcomes remain unknown and long-term results were not studied.

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ACKNOWLEDGEMENTS

The author gratefully acknowledges the criticism, assistance and support of many persons and organizations.

The Workers' Compensation Board of British Columbia has been outstanding in the support it has given this project. In particular, I would like to thank Dr. Adam Little, Chairman of the WCB, whose enthusiastic reception of the initial proposal encouraged the evolution of this thesis. Many, many thanks are owing to Dr. C.M. Robertson, former Medical Officer of the WCB, who supervised the research and provided invaluable advice on project design and development.

Special mention must be made of the cooperation and genuine interest I received from my committee. Thank you to Dr. David Bates, Dr. Mort Warner, and Don Eamer, of the Department of Health Care and Epidemiology, Faculty of Medicine, U.B.C., and Dr. Ralph E. Outerbridge, Division of Orthopedics, Department of Surgery, Faculty of Medicine, U.B.C.

Dr. Anne Crichton and Dr. Annette Stark, of the Department of Health Care and Epidemiology, U.B.C., provided constructive criticism of the initial project. Statistical assistance was received from Dr. Ned Glick, Department of Health Care and Epidemiology, U.B.C., and Keith Mason, Statistical Services Coordinator, W.C.B.

Stan Kita, of the U.B.C. Computing Centre, and Gordon Muir, of the Division of Health Services Research and Development, U.B.C., helped me overcome my fear of computers.

Many thanks to Shelley Smits and Marie McKenzie of the WCB medical steno pool, and to Fred Vickman, Staff Artist.

Helpful suggestions were received from Marilyn Atkins, Elaine Harris, and Barbara Taylor, who are physiotherapists with whom I have shared a working relationship.

Financial assistance was provided by the W.C.B., and a National Health Student Fellowship, Health & Welfare Canada.

Finally, I would like to thank my cousin, Dr. Stan Shapson, and my parents, whose long-distance encouragement gave me the impetus to finish the project. And many, many thanks go to Peter Meurrens for his patience in seeing me through the final traumas.

CHAPTER I

INTRODUCTION

The Workers' Compensation Board of British Columbia (WCB), established in 1917, provides support for working people against the hazards of employment. Through a comprehensive approach, it is responsible for prevention, adjudication of claims and income maintenance, and medical aid.

The WCB's approach to physical rehabilitation* is highly centralized. The Leslie R. Peterson Rehabilitation Center (commonly referred to as the "WCB Clinic") in Richmond, British Columbia, offers a multidisciplinary programme of physical therapy, remedial therapy, occupational therapy, and industrial therapy, with additional specialist support staff, such as psychologists, where necessary. The programme is highly time intensive. No evaluation of the programme's efficiency or effectiveness in terms of outcomes has been conducted.

The multidisciplinary, time-intensive programme of the WCB Clinic is comparable to that of rehabilitation centres which treat major impairments such as spinal cord injuries, amputations, or rheumatoid arthritis. However, this approach is not usual in the treatment of sprains and strains, and most elective orthopedic surgical procedures. When noncompensable, such conditions are usually treated in the community by the attending physician and a physiotherapist, if indicated. Physiotherapy in most cases is rendered two or three times per week, rather than daily as in the WCB Clinic.

In 1976, there were 4300 admissions to the WCB Clinic. Although the total number of claims increased in that year, admissions to the Clinic were twelve percent lower than in 1975 because of increased utilization of hospital physiotherapy departments and private physiotherapy clinics. (Sixtieth Annual Report, WCB, 1976.) Based upon this information, a retrospective comparison of outcomes measured by the number of days before return to work of the WCB patient treated at the Clinic, as compared to the WCB patient treated at these other facilities was proposed. The study model was then expanded to include a comparison of outcomes between these patients and those WCB cases who did not receive physiotherapy postoperatively.

* Throughout this document, unless otherwise specified, the term "rehabilitation" refers to physical rehabilitation.

Return to work was chosen as an evaluation of outcome because it is measurable retrospectively, and is recorded in the claim files as the termination of wage loss benefits. It is realized, however, that return to work is not necessarily a true return to the work place, but rather a termination of wage loss benefits by the WCB because of the worker's presumed ability to resume employment. Because return to work is the terminology used by the WCB, the study uses this term.

In order to study return to work times, the patients compared must be as similar as possible. Although the majority of the cases treated at the Clinic are sprains and strains, it was decided that these were not the most suitable vehicles of study because there is vagueness in the diagnosis of sprains and strains, and because there is no direct visualization of the structures involved. Thus, classification of these injuries retrospectively to provide for equivalency of control groups is difficult. It is believed that postoperative meniscectomy* patients provide a realistic vehicle of study because: 1) Diagnostic aids, such as x-ray, arthrogram, and arthroscopy, when performed, provide reasonable description of bony structures and soft tissues around the knee; 2) The internal structures of the knee joint are usually well visualized during the operative procedure. These characteristics permit more accurate classification of pathology in order to control for confounding variables; 3) The operative procedure is technically less complex than many other surgical procedures; 4) Although rehabilitation routines may vary according to the treatment philosophies of the attending physician and physiotherapist, the researcher, through work experience, has noted that procedures for the rehabilitation of the meniscectomy patient tend to be more standard than treatment procedures for sprains and strains; 5) In 1976, the WCB paid for 565 meniscectomies, making meniscectomy the most frequent surgical procedure for which payment was made to orthopedic surgeons.

STUDY OBJECTIVES

The objectives of this research project are as follows:

- 1) To determine if the three different approaches to rehabilitation are related to the differences in the times of return to work of the post-operative meniscectomy patient.

* Meniscectomy is a surgical procedure by which a damaged cartilage is removed from the knee joint.

- 2) To determine if a highly time-intensive approach to the rehabilitation of the postoperative meniscectomy patient in the community is effective.
- 3) To identify those factors extraneous to postoperative rehabilitation (such as age, latency period, osteoarthritis) which most strongly affect return to work for the postoperative WCB meniscectomy patient.
- 4) To determine the cost and benefits of the different approaches to the rehabilitation of the WCB postoperative meniscectomy patient.

CHAPTER II

REVIEW OF LITERATURE

A review of the literature was conducted in the following areas:

A. Programme Evaluation; B. Meniscectomy Studies, and C. The Effects of Compensation.

A. PROGRAMME EVALUATION

Programme evaluation is a relatively recent phenomenon. Interest in programme evaluation within health care results from the concerns of professionals within the field, about programme effectiveness, as well as pressures from governments and the public. (Schulberg et al, 1967, pp.3.) Because of the escalation of health care costs, accountability to funding agencies is a strong motivation for programme evaluation. (Breckenridge 1978.)

1. The Goal Attainment Model for Programme Evaluation

In the goal attainment model the goals of the agency are identified, and its effectiveness in reaching its goals is evaluated. However, many organizations are unsure of their goals, and thus goal identification may be difficult. (Steers 1977 pp.19.) Programme objectives must be evaluated at a level which is both measurable and relevant. Therefore, programme success in reaching practical objectives rather than ideal, global goals should be evaluated. (Schulberg et al, 1967, pp.7.) In determining the effectiveness of agency programmes, the investigator must be mindful of what criteria the agency itself uses in measuring performance. (Goldberg 1974.)

2. Outcome Measures and the Process of Care

Donabedian (1966) suggests outcome as a criterion of quality in evaluating medical care, because outcome is usually concrete. However, he warns that many factors other than medical care may influence outcomes. Thus, precaution must be taken to hold all significant factors other than medical care constant if valid conclusions are to be drawn.

Nichols (1976) examines the appropriateness of using clinical outcome measures in the evaluation of the effectiveness of rehabilitation.

The two extremes of clinical and functional outcome measures are death, which is "hard" objective data, and the patient's attitudes and satisfactions, which are "soft" subjective measures. Nichols suggests that many of the problems of assuring the effectiveness of rehabilitation could be resolved if rehabilitation is regarded as primarily a behavioural process with aims which are predominantly functional, social, and economic. In this way, rehabilitation can be separated from the purely clinical aspects of medical treatment in which the aims are primarily pathophysiological. Nichols regards rehabilitation medicine as being particularly concerned with the behavioural aspects of recovery from any illness or injury in response to deformity. However, he does stress that for disabilities which are of a temporary nature, such as fractures, outcome measures based specifically upon the pathological process involved must be used.

Another evaluation approach described by Donabedian is the examination of the process of care. Kessner et al (1973) warn that the strengths and weaknesses of process cannot be identified without knowing outcome, but they add that the outcome alone may be misleading if the patient receives unnecessary diagnostic tests or inappropriate therapy.

3. The Difficulties of Prospective Studies in Health Care

Meade (1977) lists the following main difficulties in the prospective study of the clinical and social effectiveness of rehabilitation models:

- i) Randomized controlled studies are usually inappropriate or unfeasible in rehabilitation.
- ii) Measuring outcome is usually difficult. "Quality of life" and "function" are soft, subjective measures.
- iii) Large numbers of cases are often not available.
- iv) Often, too much information is collected. The researcher engages upon a "fishing expedition" but the relevance of much of the data is uncertain.
- v) "Blindness" in studies is generally not possible as both the patients and the investigators usually know which treatment is being applied.
- vi) There are ethical considerations. Doctors and therapists are often convinced that one treatment is better than the other. They find it difficult to allow their patients to participate in a programme which conflicts with their treatment philosophies.
- vii) Finally, there are other considerations. Meade stresses that rehabilitation trials are in effect questioning several time-honoured

treatments in which therapists have been trained, and which are generally assumed to be effective. This is a potentially anxiety-producing situation although, if realized and managed as such, it can be turned into an inquiring approach to rehabilitation that is essential for increasingly effective management of disabled patients.

4. Examples of Programme Evaluation in Rehabilitation: The Team Approach

One time-honoured approach which is being examined is team care in rehabilitation. Team care in rehabilitation is almost a unanimously endorsed proposition. A review of the literature reveals that most published accounts of team care are prescriptive or descriptive, but there is very little empirical research into its effectiveness. Effectiveness is often assumed on faith. (Halstead 1976).

A few evaluators have studied team care using different design models. Denistan and Rosenstock (1973) agree with Meade that it is often impossible to use a randomized control group. As an example of a quasi-experimental design model, they cite the Michigan Arthritis Control Programme, in which the researchers had partial but not complete control over the situation. The Michigan Arthritis Control study used non-equivalent control groups in which the assignment of treatment and control conditions are not random, but rather the groups are natural collectivities deemed but not proven to be similar. The results of the study showed that comprehensive treatment, involving the occupational therapist, physiotherapist, social worker, and visiting nurse, was more effective than conventional care in the treatment of rheumatoid arthritis. Conventional care was whatever treatment was available in the community.

Katz et al (1962) also used natural clusters of patients to evaluate the effectiveness of comprehensive treatment in the rehabilitation of fractures of the hip in the aged. Outcomes for those patients who were admitted to hospitals with intensive rehabilitation approaches were compared to outcomes for those patients who experienced no additional rehabilitation but were rather discharged home for convalescence. The non-rehabilitated group showed more deterioration in ambulation and more severe deterioration in activities of daily living than the rehabilitated group.

Random controlled experimental design models were used in two studies evaluating the effectiveness of team care. In one study (Katz et al 1968), patients with rheumatoid arthritis were randomly assigned to treatment and

control groups to determine the effectiveness of multidisciplinary care in both the clinic and the home. The controls received the usual treatment available in the community. It was found that those patients receiving comprehensive care in the clinic and at home had fewer deteriorations in activities of daily living, more improvements in economic independence, and more improvements clinically, than those patients receiving conventional care.

However, in one study, team care was not found to be more effective in the treatment of stroke victims (Feldman et al 1962). In a controlled study of an unselected group of stroke patients who were randomly divided into two groups, the group receiving functionally oriented medical care (the control group) did as well as the group who received a formal comprehensive rehabilitation program. The control group actually had less physical impairment on followup one year later than the rehabilitated group. However, the rehabilitated group had slightly better functional capacity. This finding contradicts an earlier study on stroke, which found that formal rehabilitation resulted in greater recovery of muscle function (Benton et al 1951).

What can be learned from these studies? The most important message is that the evaluation of rehabilitation programmes is possible. Research ethics may constrain design models based upon randomness or neglect of treatment, but studies using natural collectivities are definitely possible.

The above studies are not conclusive verdicts on the effectiveness of teamwork, but rather they refer to teamwork in specific cases. These findings cannot be generalized to meniscectomies. Rheumatoid arthritis and stroke are complex pathologies while a torn meniscus usually occurs in only one joint. However, Sommerville (1970) and Ford (1974) believe that early and intensive rehabilitation is as necessary following simple injuries, such as fractures, as in the more involved disabilities. Katz's study (1962) confirmed this for hip fractures in the elderly. The study population in meniscectomy is usually much younger.

5. Clinical Records as a Source of Data

Retrospective studies are dependent upon records. Clinical records are usually considered a valuable source of information for assessing quality of care, but Donabedian (1966) cautions that inaccuracies may arise because of availability, adequacy, veracity, or completeness. Fessel and Van Brunt

(1972) warn that medical records are often of limited use for examining the processes of care rather than outcomes because of the subjectivity of the examiner and inadequacies in recording.

6. The Tracer Concept

Kessner et al (1973) recommend programme evaluation using "tracers". A set of specific health problems can serve as tracers in analyzing health care delivery because the way in which an institution routinely administers care for common ailments indicates the general quality of care and the efficacy of the institution delivering that care. The tracers required are discrete, identifiable health problems.

Tracers are selected according to six criteria:

- i) A tracer should have a definite functional impact. It should be a condition that is likely to be treated and which causes significant functional impairment.
- ii) A tracer should be relatively well defined and easy to diagnose.
- iii) Prevalence should be high enough to permit the collection of adequate data from a limited population sample.
- iv) The natural history of the condition should vary with utilization and effectiveness of medical care. The conditions under study should be sensitive to the quality or quantity (or both) of the services received by the patient.
- v) The techniques of medical management of the condition should be well defined for at least one of the following processes: prevention, diagnosis, treatment or rehabilitation.
- vi) The effects of non-medical factors on the tracer should be understood (for example, social, cultural and economic effects).

As a tracer, meniscectomy fits these criteria.

7. Programme Evaluation in Workers' Compensation

To determine if the results of treatment of problem "low back" patients in the Ontario Workmen's Compensation Board Hospital and Rehabilitation Centre justified the time, effort and expense involved, White (1966) evaluated outcomes for 194 "problem" back patients. "Problem backs" were defined as those cases who were disabled longer than six weeks. The cases were divided into two groups. In Group A, the patient was discharged from the Centre to the treatment of his personal physician, while those patients

in Group B were treated at the Centre for six weeks on a graduated treatment program (unless the patient returned to work earlier than six weeks). The groups were judged comparable according to various demographic characteristics, diagnosis, and severity of symptoms. The measurement of the effectiveness of treatment was based on the assessment of the actual accomplishment at work during the first three months after discharge from the study. The range of accomplishment was from not working at all to working full time at full duties, with various combinations of part-time work and modified work duties in between. The group treated at the Centre had 42.4% satisfactory results in returning to work as compared to only 15.8% satisfactory results in the group discharged to the treatment of the personal physician.

White remarks disappointedly that satisfactory results were obtained in only four of every ten patients treated at the Centre. Prolonging treatment beyond six weeks yielded only nine additional satisfactory results in forty patients. Therefore, although the rate of successful treatment was more than two-and-a-half times higher among those who were treated in the Centre than among those who were referred back to the community, continuing treatment at the Centre longer than six weeks was relatively unrewarding. Indeed, White suggests that the continuation of any type of treatment, the results of which are unsatisfactory, can have a detrimental effect because it may result in pessimism and lower morale on the part of the patient. Milbrandt (1973) concurs that, unless there is good indication, treatment of low back strain at a rehabilitation clinic for longer than six to eight weeks is relatively unrewarding and may even be harmful by destroying morale.

The study conducted by White was part of a larger evaluation of 770 patients. Of the patients treated at the Centre, he found no significant difference in outcomes due to the type of therapy or the intensity of therapy. It was attendance at the Centre itself that was judged to be significant. White thus wonders if physical therapy per se has any beneficial effect.

It is important to note that White studied patients previously identified as problem cases. The rehabilitation system he examined is similar to the one in British Columbia, but the present study is examining all postoperative meniscectomy cases.

Robertson (1977) suggests the need for a special study to obtain useful comparative data about back-injured patients attending the WCB Clinic or other facilities. He notes that back claimants who attended the Clinic appeared to be prolonged time loss cases, and suggests that this may be due

to complicating pathologies, compensable or non-compensable.

Because of the vagueness in the diagnosis of back injuries and because meniscectomies more closely approximate the "tracer" conditions of Kessner et al, the researcher decided to use meniscectomy to obtain comparative data. It is felt that a back study would be more suitable as a prospective study where more accurate classification of pathology could be controlled.

B. MENISCECTOMY STUDIES

To use a tracer in program evaluation, the functional impact of the tracer and the variables which affect its outcome must be understood. A literature review on meniscectomy was conducted so that all relevant variables which can influence outcomes would be identified and incorporated into the study.

1. Return to Work

Table 2.1 shows the average number of weeks that investigators have found to be the time at which the postmeniscectomy patient usually returns to work. The averages range from four-and-a-half to twelve weeks; however most of the studies indicate return to work times of under eight weeks postoperative.

Table 2.1 Average Number of Weeks at Which the Postmeniscectomy Patient Returns to Work, as Found in the Literature

<u>NAME OF INVESTIGATOR</u>	<u>AVERAGE NUMBER OF WEEKS RETURN TO WORK</u>	<u>TARGET POPULATION</u>
Wynn Parry et al (1958)	8 or 9 *	Servicemen
Gough (1975)	6.5 to 7.5 **	76% heavy workers
Leonard (1975)	7.5 **	Mixed occupational groups
Seymour (1969)	4.5 ** 6.5 **	Sedentary workers Manual workers
Karumo (1977)	10 **	50% blue collar workers 50% receiving compensation
Helfet (1974, pp.161)	6 *** 6 to 8 ***	Fit athletes The middle-aged
Smillie (1978, pp.173)	12 ***	Coalminers

* Return to work for 74% of the cases studied

** Average return to work for all cases studied

*** Suggested return to work based upon experience

Wynn Parry et al (1958) observed that 8.9 percent of the patients were discharged back to military duty with effusions.* They believe that if the patient has excellent quadriceps** and sound ligaments, and if there is an absence of any evidence of pathology in the knee, the persistence of a mild effusion should not prevent return to work.

Of 120 servicemen which Helfet (1974, pp.161) studied, 85.8 percent were classified as A-1 within an average of nine weeks postmeniscectomy. ("A-1" indicates an ability to do a physical-assault course, a three-mile cross-country run, and a fifteen-mile route march). Smillie (1978, pp.173), however, believes that a degree of physical fitness which will withstand athletic activities or hard labour is rarely possible in less than twelve weeks. His observation on the rate of recovery of coalminers receiving continuity of physiotherapy in both hospital and rehabilitation centre show that the musculature of the injured joint only reaches a stage of development comparable with the normal in approximately the same twelve-week period.

2. Long-Term Effects of Meniscectomy

Many investigators have studied the long-term effects of meniscectomy. The percentage of satisfactory results differ often because the definition of success varies from study to study. A serious problem in most of these studies is that long-term follow-up depends upon response to questionnaires sent out to patients. There is thus much self-selection bias in these studies. Table 2.2 gives a summary of the long-term effects of meniscectomy which have been indicated by various researchers.

* Effusion is defined as the escape of fluid into the knee (commonly referred to as "swelling".)

** The quadriceps is the large muscle on the front of the thigh.

Table 2,2 The Long-Term Effects of Meniscectomy, as Found in the Literature

<u>Name of Investigator</u>	<u>Response Rate*</u>	<u>Number of Knees Studied</u>	<u>Number of Years Postoperative</u>	<u>Method of Examination</u>	
Perey (1962)	50%	33	30	Questionnaire	70% excellent, 15% good in regard to the ability to do hard work and sports
Huckle (1965)	30%	134 70 64	12-20	Clinical Questionnaire	26% normal, 50% satisfactory** 40% normal, 64% satisfactory**
Gear (1967)	27%	50	10 or more	Clinical and questionnaire	36% still had symptoms
Tapper and Hoover (1969)	70%	223 113 100	10-30	Clinical Questionnaire	<u>Both groups overall:</u> 38% normal 30% excellent or good (some symptomatology, no impairment of activity), 19% fair (minimal impairment), 13.3% poor.
Appel (1970)	97%	490	5-45	Clinical	<u>Subjective:</u> 62.3% no complaints, 29.1% mild complaints, 7.5% distinct complaints, 1.1% fairly pronounced complaints. <u>Objective:</u> 80.2% normal or a single minor finding, 19.8% with more than one minor finding, or with one pronounced finding.
Johnson et al (1974)	49%	99	5-37	Clinical	42.5% satisfactory, 57.5% unsatisfactory***
Noble (1975)	92%	140 113 27	1-11	Clinical Questionnaire	<u>Both groups overall:</u> less than 50% painfree, 16% complained of stiffness, 16% instability, 56% joint line tenderness, 20% wasting, joint line tenderness and limitation of movement. 24% normal.
Duffin (1977)	75%	65	1.5+	Clinical and Questionnaire	40% unable to return to sport 82% of 40 cases showed some loss of function (measured by ability to do rotational squat jumps).

* Percent from total sample responding

** Normal symptom-free, or showing mild pain or stiffness but without swelling, locking or giving way

*** Based upon lowest rating assigned to any of ten criteria: activity level, pain on activity, pain with reinjury, effusion, giving way, locking, ability to walk stairs, ability to walk on rough ground, ability to squat, ability to return to sports.

3. The Effects of Meniscectomy on Occupation

Most of the occupations of the cases evaluated by Tapper and Hoover (1969) to determine the long-term effects of meniscectomy, required daily physical exertion. They concluded therefore, that meniscectomy does not preclude a man's engaging in a physical occupation over a long span of time. Want (1978), however, noted from personal observation that the majority of coalminers in the area where he practices are still doing light work in the pits two years after meniscectomy due to an inability to crawl or squat for long periods.

Appel (1970) concluded that the type of occupation after meniscectomy was of no importance for the late result.

4. Degenerative Changes in the Knee Joint

It is generally believed that the presence of any lesion at operation other than a torn meniscus predisposes the joint to a greater likelihood of a poor ultimate outcome (Johnson, et al, 1974). Appel (1970) found that roentgenologic osteoarthritis* prior to operation gave rise to increased frequency of unsatisfactory results in the long run. Charnley, however, (in Johnson, et al, 1974) found no difference in the results for patients with such lesions as minor ligament strain, early arthritis, and chondromalacia** than for those patients having meniscal lesions only. Johnson et al found their data in agreement with Charnley, with the exception of early arthritis.

O'Donoghue (1956) surveyed clinically 350 operative cases diagnosed as intrinsic conditions of the knee. These included other cases in addition to lesions of the meniscus. Sixty-five percent of all cases showed some discernible degree of patellar*** malacia, according to his definition of the pathology. Fifteen percent had very severe involvement with "crabmeat" cartilage, denuded bone, and craters. As the degree of malacia increased, O'Donoghue noted that the quality of the results deteriorated. As episodes of preoperative locking increased, there was found to be an increase in the degree of patellarmalacia. However, one-third of the cases which never locked still showed malacia. O'Donoghue

* Osteoarthritis is defined as degenerative joint disease.

** Chondromalacia is defined as abnormal softening of cartilage.

*** The patella is commonly known as the "kneecap".

noted that there is a great deal of variation in reporting the incidence of chondromalacia patellae during knee arthrotomies* according to the degree of pathology that the surgeon interprets as 'malacia'. However, whatever classification is used, he believes that the percentage is much higher than had been generally accepted.

In a study of 196 cases of medial meniscectomy, Outerbridge (1961) found that 51.5% showed evidence of abnormal articular cartilage of the patella at time of operation. A relationship between the time and the severity of the injury causing the tear of the meniscus and the chondromalacia of the patella was not found.

Worrel (1973) found that 51% of 54 postmeniscectomy knees examined displayed clinical evidence of chondromalacia of the patella as compared to 6.5% of 46 non-operated knees of the same group of patients. (Four patients had undergone meniscectomies on both knees and thus did not have a non-surgical knee available for comparison). Sixteen percent of the knees of a random sample of 50 patients who had never experienced injury or surgery displayed clinical evidence of chondromalacia of the patella. Worrel wonders if the performance of a meniscectomy, or some aspects of postmeniscectomy care, accelerate pre-existing degenerative changes in the cartilage of the patella, or if the meniscectomy initiates these changes.

5. Latency Period

The latency period is the time elapsed between injury and operation. Wynn Parry, et al (1958) reported a higher frequency of osteoarthritis in patients who had experienced a longer latency period. However, the length of time symptoms had been present before operation had no effect on the treatment time. Tapper and Hoover (1969) found no connection between a long latency period and osteoarthritis. The duration of symptoms pre-operatively was found to have no bearing on the overall long-term effects of meniscectomy.

A longer latency period was not found to correlate with worse results in Appel's study (1970). Gear (1967) suggests that the length of history before operation is one of the factors responsible for poor results ten years postoperative. Patients with radiological changes were found to have had an average latency period of 20 months, while those with normal

* An arthrotomy is an incision into a joint.

knees had an average history of only nine months latency.

Johnson, et al (1974) found that the longer the duration of symptoms and the greater the frequencies of reinjury before meniscectomy, the worse the final results.

6. Age at Time of Operation

Appel (1970) and Johnson, et al (1974) determined that age at the time of operation did not influence the long-term results of meniscectomy. In the latter study, patients under 21 years of age had fewer excellent results than those over 21, but the difference was not significant.

Tapper and Hoover (1969) also reported that patients who were 20 years old or less at the time of operation had fewer excellent or good results than those 21 or over. They believe that the explanation for this result lies in the more violent nature of injury in the younger patients and the possibility of continued athletic abuse. (Appel, however, found that trauma as an etiological factor for the rupture of the meniscus, as compared to a rupture caused by a degenerative process, did not influence results.)

7. Medial Versus Lateral Meniscectomy

Johnson, et al (1974) reported better results after medial meniscectomy than lateral. Knees with either medial or lateral meniscectomy had better recovery than those with both menisci removed. Appel (1970) found that the frequency of unsatisfactory results between medially and laterally meniscectomized knees was not significant. Smillie (1978, pp.185) found the long-term results of removal of the lateral meniscus less favourable than the results on the medial side. The results of double meniscectomy were less good than for single meniscectomy. (Smillie, 1978, pp.187).

Wynn Parry, et al (1958) found $1\frac{1}{2}$ times the incidence of radiological osteoarthritis in the short run with lateral cartilage tears (4.4%) as compared to medial cartilage tears (2.9%).

8. Sex Factors

The results of meniscectomy in general are less favourable in women than in men. (Smillie, 1978, pp.187, Tapper and Hoover 1969, Appel 1970, Johnson, et al 1974). Smillie suggests that the poor results may be due to the misdiagnosis of meniscus tear in the case of subluxating patella.

9. The Effects of Total Versus Partial Meniscectomy

There is a growing controversy over the relative effectiveness of partial as compared to total meniscectomy. Smillie (1978, pp.153) advocates complete removal of the meniscus in all cases; however, if there is virtual certainty that only one tear exists, then only the displaced portion of a bucket-handle tear can be removed, leaving the peripheral rim untouched.

Tapper and Hoover (1969) found no difference in the proportion of overall excellent or good result in those patients who had undergone partial meniscectomy as compared with those who had undergone total meniscectomy, except in the case of a bucket-handle tear. In the latter situation, removal of the detached fragment only, leaving the peripheral rim intact, yielded the highest percentage of excellent knees. Leaving the posterior horn intact gave fewer excellent results, and several patients (who Tapper and Hoover eliminated from the study of long-term results) required further surgery to remove the posterior horn.

Johnson, et al (1974) found no observable difference between removing the entire meniscus in 79 cases, or leaving the peripheral rim of a bucket-handle tear in six cases. However, leaving the posterior horn within the knee led to unsatisfactory results in all seven of the knees in which it was done.

When comparing the relative postoperative morbidity of 89 total meniscectomies to 39 partial meniscectomies, McGinty, et al (1977) found four times the incidence of major postoperative complications, such as thrombophlebitis, embolus, or infection, in those who had experienced total meniscectomy. Partial meniscectomy yielded better subjective functional results, and better anatomical results, than total meniscectomy.

Partial meniscectomy may yield better results than complete because it is less damaging to the joint (Jackson 1976). Partial meniscectomy may have a biomechanical advantage because there is less alteration in load-bearing within the knee joint (Norris 1978).

Dandy (1978) advocates partial meniscectomy through a closed technique under arthroscopic control. In his study of 30 patients who had undergone this procedure, the mean time for return to work fitness was only 10.5 days. Jackson, too, advocates this procedure. However, this technique was not encountered in the present study.

10. The Effects of Posterior Incision

Comparing 64 complete meniscectomies performed through a single capsular incision to 15 complete meniscectomies performed through two capsular incisions, Johnson, et al (1974) noted no difference in results.

11. Unnecessary Meniscectomy

An editorial in The Lancet of January 31, 1976, notes that many menisci which are not torn are being removed. Removal may predispose the joint to other problems later. In a clinical and roentgenological examination of 30 patients who had experienced unsatisfactory results following meniscectomy, Laarsen and Wilpulla (1976) found another lesion in four cases. In these four cases, the meniscus had been found to be intact at the time of operation.

Commenting on the increasing occurrence of reconstructive surgery following simple meniscectomy, Houston (1975) believes that in some cases there is obviously more than a simple torn meniscus as the initial pathology, or the initial pathology was other than a torn meniscus.

In his study of 4500 meniscectomies, Smillie (1978, pp.142-143) found 183 cases in which the meniscus was apparently normal in every respect. The largest category of errors, 44 cases, were classified as "unexplained". Another 37 cases were blamed on the "unreliable witness". Under this category were military personnel in World War II, and inmates of jails, "but most of all, claimants for compensation of alleged industrial accidents and industrial disability pensions in the Welfare State".

12. The Effectiveness of Postoperative Rehabilitation in the Treatment of the Meniscectomy Patient

Smillie (1978, pp.173) recommends active physiotherapy in the post-operative management of meniscectomy, but he cautions that progression is the most important feature of successful rehabilitation. He advocates gradually increasing power-building exercises and endurance-building exercises. By the fifth week postoperative, and in the absence of effusion and with a steady increase in muscle volume, weightbearing exercises, physical training and games can be commenced. Helfet (1974) too, while recommending physiotherapy, cautions that overexertion and repeated fatigue result in muscle wasting and recurrent effusion.

Outerbridge (1964) believes that on rare occasions, a patient will respond poorly to physiotherapy after meniscectomy because of the development of chondromalacia of the patella. Five of the 240 patients in his series who had normal or Grade I patellar cartilage at the time of operation developed severe chondromalacia of the patella despite physiotherapy. He suggests that exercises against resistance which allow an increase in the shearing forces of the patella as it rides over the condylar rim of the femur, should be avoided in the early stages, and only introduced later when the knee has made good progress.

Appel (1970) found that postoperative muscular training gave rise to a significantly lower frequency of unsatisfactory results, if the patients who had osteoarthritis at the time of operation were excluded.

However, several authors are questioning the "time-honoured" approach of routine physiotherapy postmeniscectomy. Vidal and Dimeglio (1976) believe that meniscectomy does not justify re-education because the operation is too trivial.

Seymour (1969) undertook a clinical trial to test his impression that meniscectomy patients not treated with physiotherapy postoperatively did as well as those who received physiotherapy. Seventy patients were divided randomly into two groups. The groups were roughly comparable in the proportion of sedentary and manual workers. Effusions were found to be more common, larger, and of longer duration in the group having physiotherapy than in those not treated with physiotherapy. There was virtually no difference in the average range of movement of the two groups, except when measured ten days postoperative when the compression bandage was initially removed. At that time the range of movement was greater in the group receiving physiotherapy. However, with removal of the compression bandage, effusion set in and no difference in the two groups was found. There was no difference between the two groups in the time of return to work, but five patients in the group receiving physiotherapy would have returned to work earlier had they not had to attend treatment sessions. Almost all patients in both groups in Seymour's study were undertaking nearly full activities three months postoperative. Seymour concludes that postoperative physiotherapy in the routine case is of no value. He recommends that the patient do static quadriceps exercises at home a few times a day. The benefit of quadriceps exercises was shown in the initial greater range of motion when the compression bandage was removed from the treated group.

In order to test the effectiveness of intensive physiotherapy in the treatment of postoperative meniscectomy, Karumo (1976) divided 56 patients into two groups. The first group received "standard postoperative physiotherapy". This included quadriceps setting exercises, straight leg raising and crutch walking from the first day postoperative. Active flexion was begun from the second or third day onward. At approximately two weeks or when knee flexion measured 90 degrees, crutches were abandoned. Patients were trained in stairwalking. The second group received the same treatment procedures, but twice daily under the guidance of a physiotherapist. Clinical examinations of the knees of both groups of patients were conducted preoperatively and at the first, second and fourth weeks postoperatively. There were no statistically significant differences in results. However, flexion strength of patients receiving the intensive treatment increased less in four weeks than the flexion strength of the routine therapy group. Knee punctures were required more frequently for the patients receiving intensive therapy to control the effusions. Karumo concluded that intensive physiotherapy in meniscectomy patients does not shorten the rehabilitation period.

13. Implications of the Literature on Meniscectomy for the Present Study

Meniscectomy is one of the most common procedures performed by orthopedic surgeons (Huckel 1965, Johnson et al 1974) but the literature review has shown that its effects upon the knee joint, and the identification of which variables determine these effects, are the subject of controversy.

The present study will examine short-term effects measured by return to work. While the main area of interest is the effect of different approaches to postoperative rehabilitation, the literature has indicated that many variables must be incorporated into the research design. These will be discussed in Chapter III which describes the methodology for the study.

C. A REVIEW OF THE LITERATURE ON THE EFFECTS OF COMPENSATION ON DISABILITY

Compensation is another variable which is likely to affect the return to work time of the meniscectomy patient. For this reason, the literature on the effects of compensation on disability was reviewed.

1. The Distinction Between Impairment and Disability

In order to understand the effects that compensation may have upon disability, it is essential to distinguish physical impairment from disability.

For the purpose of developing a framework for this distinction, Nagi (1965) has differentiated the following phenomena:

i) Active Pathology: This is the disease process at the molecular or cellular level. It involves onset and the simultaneous efforts of the organism to restore itself to the normal process.

ii) Impairments: These are anatomical and/or physiological abnormalities and losses. These occur in the active pathology stage. When active pathology ceases, such impairments may result in residual abnormalities. Examples are weakness or restricted joint motion.

iii) Functional Limitations: These are the limitations which impairments impose upon the individual's ability to perform his usual roles and normal daily activities. These are dependent not only upon the type of impairment but the nature and requirement of roles within social and occupational settings. For example, a stiff knee could be severely limiting to a carpet layer but of little or no consequence to a teacher. Thus, not every impairment results in functional limitations.

iv) Disability: This is a pattern of behaviour which evolves in situations of long-term or continued impairments which are associated with functional limitations. The pattern of behaviour is subject to three types of influence: a) the characteristics of the impairments, the degree of limitation imposed and the potential for rehabilitation; b) the individual's definition of the situation, and his reactions, which sometimes compound the limitations. The individual's definition of the situation and his reactions are also influenced by c) the definition of the situation by others, such as his family, agencies, employers, and their reactions and expectations.

2. The Effects of Compensation on the Recovery Process

The payment of compensation after injury is usually expected to delay the recovery process. (Behan and Hirschfield 1963, Brodsky 1971, Krussen 1958, Tracy 1972, White 1966). Controlled studies of low back injuries (Krussen 1958), surgery for lumbar disc syndrome (Hudgins 1964),

and a mix of physical and psychiatric disabilities (Fowler and Mayfield 1968) have all found that the payment of compensation resulted in less subjective improvement and less success in returning to work. Krussen noted that patients receiving compensation received a greater number of treatments than those with no compensation. In Hudgins' study, compensated patients reported one-third as many excellent results and four times more poor results than non-compensated patients. On psychiatric examination Fowler and Mayfield determined that compensated patients receiving Veteran's Administration Disability Compensation manifested fewer symptoms but had significantly poorer occupational adjustment, and significantly greater desire for increased pensions and other "manipulative" gains.

In a study of the effects of intensive physiotherapy on outcomes after meniscectomy, Karumo (1977) found that while occupation did not affect the duration of sick leave, the type of insurance coverage did. Nine of 30 patients with an occupational-trauma insurance experienced sick leave over 90 days, whereas only two of 23 patients covered by sickness insurance had sick leave as long as this.

3. The Causes of Delayed Recovery

There is little empirical research which explains why the payment of compensation delays recovery. However, various theories based upon assumptions, descriptive case studies, or personal observations have been suggested. These fall into categories blaming the patient, the physician and other health-care professionals, the workers' compensation system, or an interactive process of all these factors.

4. The Workers' Compensation System

The adversary system through which the compensation victim seeks treatment may actually impair the goals of compensation and rehabilitation (Naftulin 1970). The primary concern in workers' compensation is with the adjudication or liability considerations and this orientation generates a "litigious atmosphere". This breeds suspicion on the part of claimants, and uncertainty on whose behalf the agency is operating. These attitudes on the part of the claimant are often generalized to the rehabilitation centres to which they are referred. Under such conditions, it is difficult to establish therapeutic relationships between clinical personnel and the clients. The content of rehabilitation becomes more forensic than clinical

(Nagy 1965, pp.107). If the worker is not recovering, the system becomes more adversary, as it tries to determine if he is really disabled or malingering. More expert opinion is sought and more disagreement often results. (Naftulin 1970).

The patients' primary concern under the compensation system is to emphasize his disability and thus eligibility for benefits. However, he is faced with the conflicting demands of rehabilitation which asks him to consider his capabilities and assets. The system produces conflict of interest in the worker. (Nagi 1965, pp.108). The fear of losing compensation benefits without having recovered to the point of optimal function or permanent, stationary disability provides poor or ambivalent motivation for rehabilitation. (Naftulin 1970).

Gordon et al (1973) stress that present-day attitudes and practices regarding disability payments perpetuate the dependency of compensation patients and interfere with their becoming rehabilitated and developing worthwhile lives for themselves.

5. Psychosocial Causes for Prolonged Recovery

The psychiatric literature is replete with various psychosocial explanations for the delayed recovery of the compensation patient.

The label "traumatic neurosis" has been applied to accident victims. Common explanations for its appearance are: i) that the stressful incident activates a latent idiosyncratic neurotic gain in the patient; ii) that the secondary gain of illness sets in, particularly the dream of monetary compensation, and iii) that the psychosocial characteristics of the victim predispose him toward "traumatic neurosis". (Modlin 1967).

Behan and Hirschfield (1963) believe that compensation patients do not come to physicians to be cured, because total relief of symptoms would represent a loss to the economic and psychosocial solution to their life problems which compensation represents. Workers' Compensation gives this reward not for the sake of injury, but for the loss of earning capacity. Therefore, the injured man fights to prove his incapacity by preserving his symptoms. Every claims officer who interacts with the patient must by inference indicate this necessity to preserve incapacity, because under the law, incapacity is the crucial issue. Whether a patient wishes to recover, or whether he wishes to maintain a legally valuable symptom, can determine many therapeutic courses, particularly in elective surgery.

(Hirschfield and Bevan 1963).

Beals and Hickman (1972) found a consistently positive relationship between the severity of the actual physical disability and the patients' tendency to be evasive and deceitful. They explain that the more severely injured patients are more dependent upon compensation and may therefore be attempting to ensure its continuation through exaggeration of their symptoms and the extent of their disability. The patient may be over-zealous in his efforts to communicate his concerns.

Studies of disability following industrial accidents suggest an "accident process" in which the acceptable physical disability of injury is substituted for unacceptable psychosocial and emotional disabilities. (Behan and Hirschfield 1963, Weinstein 1968). Hirschfield and Behan (1963) propose an active dependency model, in which workers with personality problems and a troubled life situation replace these unrewarded, unacceptable social disabilities with a compensated, acceptable one. In Weinstein's model, medical impairment becomes an acceptable solution to the patient's longstanding conflicts in life, as part of the "illness process". Behan and Hirschfield go so far as to suggest that the accident victim has willed the accident upon himself as a solution to life's problems.

In the active dependency model, the patient is unlikely to give up his disability because of the solution it represents. Hirschfield and Behan believe that the patient actually seeks physicians who will not cure him, and rejects others who offer cure. Compensation law, which makes incapacity the cornerstone of continued financial support, reinforces the patient's inner need to maintain his incapacity. Patients continue unproductive treatment with certain physicians, and refuse aid from others who indicate the capacity to relieve the symptoms. Hirschfield and Bevan believe that the patient is usually aware of what he is doing.

Beals and Hickman (1972) performed a comprehensive evaluation and followup on a group of 180 industrially injured patients and a group of noninjured workers to determine the extent to which psychological, vocational, physical, and other factors influenced return to work. They found significant differences in the psychological postures of back-injured, extremity-injured, and non-injured industrial workers. However, this study can be criticized because the nature of the injury itself would affect the psychological states of the back and extremity-injured patients, and because workers who have not had an injury may not be a valid control.

Beals and Hickman favour the "whole man" concept in rehabilitation in order to assess the many factors influencing the return to work of the injured worker. However, they do not recommend routine psychiatric consultation because: i) it adds another specialist to a list already too long, ii) the division of the patient into the somatic and the psychic relieves everyone but the psychiatrist of the responsibility for understanding the patient, iii) psychiatrists cannot cure everyone, and iv) it threatens the patient.

Some authors question the stress placed upon psychosocial reasons for prolonged disabilities. Hudgins (1964) notes that many variables affect the results of lumbar disc surgery. He criticizes reports which implicate compensation as the cause of poor results because: i) compensation patients may be subject to overdiagnosis and their poor results may be related to a higher incidence of negative findings at surgery, ii) some compensation patients may receive conservative treatment for an unusually long time before operation, and thus prolonged root compression can adversely affect the results of surgery, iii) the compensation patient has often been injured doing manual labour, and may be unable to resume heavy work despite an otherwise successful operation; thus, if surgical results are classified by an ability to return to work, the compensation patient would show poorer results than patients with sedentary occupations.

Naftulin (1970) strongly criticizes proponents of the "psychologically motivated" work-incurred injury, because such theories result in a medical and legal attitude too frequently accepted, and poorly documented. He believes that the physician who seeks psychological motivations to explain industrial injuries often does the patient a disservice. He criticizes Weinstein's theory of physical impairment substituting for emotional impairment of the worker, as a "significant contribution to the medical literature" which risks receiving more causal significance than its state of validation deserves.

Adequate outcome studies are required to predict in which pre-existing personality type problems are likely to appear. Existing research is mostly descriptive. There have not been controlled double-blind outcome studies on the psychological effects of compensations. These are necessary before such generalizations can be made. (Naftulin 1970).

6. Malingering

Malingering refers to people's behaviour when illness or disability is deliberately feigned in order to gain some advantage. (Parker 1972).

In spite of the compensation patient's tendency toward deception, Beals and Hickman (1972) found malingering to be rare. They discount as a significant factor in the symptoms of the industrially injured a conscious effort to defraud by describing symptoms which are not truly present. Rather, the patient shows an exaggeration of symptoms and the effects of the disability, and an overzealousness in his efforts to communicate these concerns.

Krussen (1958) also believes that, with rare exception, compensation patients are not malingering, but rather they seem to be suffering a "compensation neurosis". Mossman (1973) suggests that this "so-called compensation neurosis" is not at a conscious level. The malingerer is uncommon in his experience.

Using arthroscopy to diagnose problems after meniscectomy, Dandy (1978) found that although seven cases were considered hysterics or malingerers before arthroscopy, in five of these an abnormality was found, "with obvious benefit to the patient".

Szasz (1974, pp.60-61) writes that the diagnosis of malingering is more likely to be made in the Soviet Union, where doctors are servants of the State, than in North America, where doctors are the servants of the individual. Malingering is thus considered more of a social condemnation than a diagnosis.

7. The Effects of Labelling

The "patient" label is often demeaning to the worker who may have difficulty accepting his passivity. The "claimant" label may be even more demeaning. The worker perceives it as a necessity to justify his injury rather than to recover from it. Labels such as "claimant" may undermine the worker's self-esteem, resulting in conflicts centered around his feeling of passivity and dependency. (Naftulin 1970).

Naftulin described the effects of labelling as follows:

"The disabled becomes both patient and claimant.... In addition, the ambiguity is compounded when the medical treatment program becomes identifiable with the claim."

8. Secondary Gain

Secondary gain from compensation is generally considered financial. However, other gains have been suggested. The industrial accident may be a means to escape to a "retirement" status. Brodsky (1971) recommends that physicians and rehabilitation workers realize that occupational illness is a retirement channel for workers with low-skilled jobs. Agencies respond by accepting their symptoms and treating the compensation patient as ill persons rather than as people in the process of changing jobs and lifestyles.

Lump-sum settlement, rather than weekly benefits, is favoured by many professionals in the field of rehabilitation because it may motivate the worker to rehabilitate himself, and to return to the old job or a new one. The continuance of weekly payments is often an obstacle to rehabilitation because there is no incentive to return to work. (Curran 1970).

Because of the attitudes engendered by the image of the "freeloader", the effect of secondary gain often produces hostility and therapeutic nihilism. Every symptom has many determinants and secondary gain as it relates to compensation, is but one of them. (Martin 1974).

9. Secondary Losses

Criticizing the concept of secondary gain as the rationalization of everyone working with the compensation case, Martin (1974) suggests considering secondary losses. The compensation patient suffers the loss of respect from those in the helping roles, and the loss of community approval. He endures the social stigma and guilt inherent in the role of being chronically disabled. The physician too loses in this process. Lack of response on the part of the patient lowers the physician's self-perception as healer, friend, and counsellor. These uncertainties produce feelings of hostility and cynicism toward the patient. Martin believes that physicians resort to rationalization about the patients' untreatability in order to comfort themselves.

10. Physician/Patient Dynamics

Compensation has its effects on physician behaviour. In workers' compensation, the doctor-patient relationship is subordinate to the adversary process whereby the patient is fighting to establish eligibility for benefits which include the right to remain disabled. (Mossman 1973).

Unlike the treatment conditions of most patients, the injured worker is treated in a complex arena of conflicting agencies. The effectiveness of diagnosis and treatment is most often negated by complications in the doctor-patient relationship. Economic and legal factors can poison this relationship. (Enelow 1968).

The doctor-patient relationship is traditionally a two-person compact. The insurance carrier in workers' compensation complicates this relationship. (Enelow 1968). The doctor perceives himself as friend, healer, and counsellor. The compensation patient sees an enemy, and sets out to fool the doctor. The physician, uncertain of his status, becomes hostile and cynical toward the patient. This results in a circle of hostility plus counter-angry reaction. (Behan and Hirschfield 1963). The patient views the physician not as his own, but as the insurance carrier's. (Naftulin 1970),

Behan and Hirschfield add "guilt" to explain physician/patient dynamics. The patient feels guilt because he caused the accident. He unconsciously goads the doctor into afflicting more abuse upon him. The doctor reacts with more uncertainty and hostility. He too feels guilty and there is no chance of rapport between physician and patient.

The physician's professional education has taught him to suppress feelings of hostility toward a patient. He overcompensates by ordering extra tests, more medication and more physiotherapy. This results in deleterious multiple somatic treatment. (Behan and Hirschfield 1963).

The patient is referred to numerous specialists for repeat examinations. The burgeoning chart, the chronicity of disability, the prestige of the previous examiners, and the patient's futility diminishes the specialist's enthusiasm. The patient senses this. He is asked questions which suggest that he might be malingering or "psychiatric". This adds to the patient's hostility. (Naftulin 1970).

The accident process has been found to affect physicians' attitudes. Frustrated doctors fall into non-therapeutic attitudes when faced by these angry, hostile patients. Research on the effect of third parties on the accident process and the physician's natural reaction to it are indicated. (Editorial in JAMA, October 1963). The best-qualified physicians, defined as those board-certified in their specialties, have been found to avoid handling workers' compensation because they allege a certain odium attached to that kind of practice (Carrol 1969). Physicians' attitudes toward monetary compensation seems to be unchanged since the late nineteenth century.

The idea that the patient is benefitting from his illness creates the feeling that the patient does not deserve the consideration accorded "really sick people". Rather, these patients elicit "contemptuous, abrupt, and curt" manners from physicians. (Martin 1974).

Because prolonged therapy is financially rewarding for the physician, Behan and Hirschfield wonder if physicians as well as patients unconsciously gain from chronic illness.

The challenge to the physician is to treat the industrial disease properly, but not to overtreat. (Mossman 1973).

11. A Situational Explanation for Prolonged Disability

Unfortunately, the experiences and behaviour of injured people are considered psychiatric problems, and described in the conventional limits of a disease model. They might be more readily understood as situational problems, influenced not only by the immediate and remote stress of the injury, but also by the social and legal consequences of the accident. The recognition that a few people will simulate accident or incapacity for their own profit has tended to obscure the unpleasant experience undergone by a great many others who would welcome relief before reward. (Cole 1970).

APPLICATION OF THE LITERATURE TO THE PRESENT STUDY

The programme evaluation literature has described the goal model. Chapter III, Study Methodology, explains how return to work as an outcome measure is well-suited to this model. Those variables which may affect the outcome of meniscectomy have been identified through the literature, and Chapter III describes the methods by which these are incorporated into the design of the study. The literature concerning the effects of compensation on recovery is applied in the Discussion of Study Findings in Chapter VI.

CHAPTER III

STUDY METHODOLOGY

In order to determine the effectiveness of rehabilitation, outcomes measured in return to work time for three groups of postoperative meniscectomy patients were compared. Those patients treated at the WCB Clinic were compared to WCB patients treated in the community, in order to determine how the rehabilitative setting affected return to work time. Outcomes of both groups were then compared to outcomes of those WCB patients who did not receive formal physical therapy in order to determine the general effectiveness of postoperative rehabilitation.

Return to work as the criterion of evaluation fits the goal attainment model for programme evaluation. In an introduction for medical staff from the WCB Administration Building visiting the Clinic in April 1979, Dr. L.H. Bartlett, Medical Director of the Clinic since January 1979, described its goals as follows: "The purpose of the program is to speed the worker's recovery and return to work." Thus, the choice of return to work as a measure of goal attainment fulfils the criteria suggested by Schulberg et al (1964) and Goldberg (1974). Return to work as a goal is measurable, practical and relevant and it can be a criterion of the WCB in measuring performance.

Threats to validity due to the effects of receiving compensation were eliminated by including only compensation patients in the study. Confounding variables of age, sex, occupation, income, degenerative changes, medial or lateral excision of the meniscus, history, latency, preoperative rehabilitation, complete or partial meniscectomy and presence of posterior incision, were controlled as described in the following sections.

A. POPULATION AND SAMPLE

In 1976 and 1977, the WCB paid medical aid for 1,029 meniscectomies; 454 of these were from the Lower Mainland. These 454 cases form the sample for this study.

Patients from outside the Lower Mainland were excluded because if these patients are referred to the WCB Clinic, there exists the added psychological difficulty of life away from family in the WCB residence. The inclusion of resident patients would thus threaten the validity of the study. Patients from Sechelt, Gibsons and Squamish, although classified by

the WCB as Lower Mainland, were also excluded because they usually live in residence if referred to the Clinic.

Those patients with histories of major previous orthopedic problems with complicating pathologies of the same leg were excluded from the comparisons. However, patients with radiological or surgically visualized evidence of osteoarthritis of the knee were included in the study. This group was categorized according to severity, as will be described further on in this chapter.

It would have been preferable to exclude all cases with any minor history of knee injury. However, this would have caused the numbers to dwindle too low. The incidence of minor histories and the methods of control for their effects upon return to work will be described later in this chapter.

Those patients who underwent other surgical procedures at the time of operation, except for those of a very minor nature, (such as reefing of the capsule, scraping of the panus, or removal of a cyst of the synovium) were excluded from the study. In addition, any case with a major postoperative complication, such as thrombophlebitis, was also excluded. Minor postoperative complications, such as superficial wound infections, upper respiratory tract infections and the such, were included in the study for three reasons. First, they can be part of a usual course of postoperative recovery. Second, the incidence of these was very much greater in Clinic patients because of better reporting. Exclusion of these cases would have thus resulted in a very small sample of Clinic patients. Third, exclusion of cases of minor postoperative complications would have resulted in very few total cases remaining to be studied.

Any case which underwent further surgery at a later date, (such as patellectomy or removal of a remnant of the meniscus) was removed from the study. In addition, one patient who was strongly advised to undergo a Slocum procedure postoperatively but who refused, was also excluded.

One case developed ulnar nerve palsy at the time of operation. However, neither the patient nor the physician was too concerned about the palsy, and since it did not delay return to work, this case was included.

Many of the torn meniscus cases were originally listed by the WCB as "multiple" problems because of various other injuries to the body at the time of accident. Cases where the other injuries remained a problem were excluded from the study. If the other problem rapidly cleared and only the knee remained a concern, then these cases were included.

The number of women in this study was so small that it was decided to exclude them rather than include another variable, which might confound the results.

Also excluded were cases which were actually removal of a remnant or removal of the opposite meniscus following initial meniscectomy performed in the period from 1973 to 1975.

Some of the meniscectomies had been performed either in 1974 or 1975, but because of administrative delays, medical aid was not paid until 1976. All surgical procedures performed after September 1, 1975, were included in this study. However, the few cases performed in either 1974 or earlier in 1975 were excluded because the researcher wished to examine outcomes within a similar time frame in order to eliminate threats to validity due to historical events such as labour strikes which might affect motivation to return to work.

Cases in which the claim was accepted only after the patient had returned to work were also excluded. It was felt that return to work incentive for these patients differed significantly since they were not receiving financial support in the postoperative period. In another instance, the patient was also awaiting a settlement with the Insurance Corporation of British Columbia. Again this may have provided a different financial motivation than other patients were receiving, and it was decided to exclude this case.

In one case the patient, the physician, and the WCB all agreed that the patient was ready to return to work. However, the patient was a Provincial Government employee, and confusion about return to work policy for industrially-injured employees in the Provincial service resulted in the patient not returning to work. The attending physician labelled this a "bureaucratic block" to return to work, and this case was removed from the study.

One patient was found to be working throughout much of his period of time loss. This was pursued as a case of fraud, and the patient was excluded from the study.

Two cases were billed erroneously as meniscectomies, but rather were other arthrotomies and therefore excluded. In another case the patient underwent repeat meniscectomies on the same knee within a two-day period and he too was excluded.

Finally, one case in which the surgeon admitted that the meniscus was normal at the time of operation, and that the initial problem was probably

not a torn meniscus, was removed from the study.

Exclusion of those cases which were in a situation which might confound return to work resulted in a final sample of 285 cases. Table 3.1 lists all cases excluded from the study.

B. DESIGN

The study examined records (a "retrospective" study) and made comparisons among groups whose assignment was non-random.

Validity is least threatened by a prospective experimental randomized control group design in which postoperative meniscectomy patients would be randomly assigned to the WCB Clinic, a selected community facility, or to no physical therapy at all. However, this is not feasible because the WCB allows both the surgeon and the patient the freedom of choice of treatment. In addition, a longitudinal study would have been more expensive. It would take time to build up a study population.

The study was designed to achieve its objectives by the following techniques:

1. Approach to Rehabilitation

The number of days before return to work of WCB Clinic patients was compared to the number of days before return to work of the WCB community-treated patients. Return to work for these two groups were then compared to the results for those WCB patients who received no postoperative meniscectomy rehabilitation. These comparisons determined overall short-term outcome of the rehabilitation process.

2. Time Intensity

Time intensity is one of the characteristics of process which distinguishes the Clinic from most community facilities. However, there are some cases which are treated daily in the community. Thus outcomes for community patients treated time intensively (defined as treatment 4 to 5 times per week) were compared to outcomes for community patients treated 2 or 3 times per week. Comparisons of outcomes of intensive treatment only for community patients allows for an examination of one component of Clinic treatment, that is intensity, in a non-Clinic setting.

Table 3.1 Cases Excluded From the WCB Meniscectomy Study

<u>Category</u>		<u>Numbers of Cases</u>
I	Women	29
II	Squamish, Sechelt or Gibsons Victoria	17 2
III	Removal remnant from previous meniscectomy	3
	Removal of opposite meniscus from previous meniscectomy	3
IV	Surgery prior to September 1, 1975	7
V	Cases who underwent meniscectomy plus:	
	- shaving of patella, condyles, exostoses, osteophytes or joint debridement	17
	- ligamentous transfers, reconstructions, or repairs	14
	- repair ruptured posterior capsule	1
	- hand surgery for other claims	<u>2</u>
		34
VI	Postoperative complications related to surgery - thrombophlebitis	6
VII	Complications delaying return to work, but not related to claim	
	- stomach problems and kidney infection	1
	- excision osteoid osteoma, trochanteric region	1
	- osteosarcoma, femur	1
	- Crohn's disease	1
	- inguinal hernia repair	1
	- a systemic disease, not yet diagnosed (differential diagnosis post-viral myositis)	1
	- myocardial infarction	1
	- alcoholism	1
	- ankylosing spondylitis plus peripheral joint inflammation	<u>1</u>
		9
VIII	Previous history, same knee	
	- long history of bilateral chondromalacia	1
	- old torn medial collateral ligament	1
	- old fracture of patella plus chondromalacia	1
	- patellectomy or partial patellectomy	2
	- pes anserinus transfer, same knee	1
	- multiple soccer injuries with persistent problems	<u>1</u>
		7

(continued on next page...)

Table 3.1 (continued)

	<u>Category</u>	<u>Numbers of Cases</u>	
IX	Other history		
	- history of gout, persisting through claim	1	
	- opposite knee medial meniscectomy with persistent problems	1	
	- back injury, after knee injury but previous to surgery which persisted postoperatively and delayed return to work	<u>1</u>	
			3
X	Other pathologies		
	- torn anterior cruciate	9	
	- torn posterior cruciate	1	
	- fracture of patella	1	
	- multiple injuries	<u>6</u>	
			17
XI	Administrative causes for exclusion		
	- claim accepted after patient returned to work	4	
	- file unavailable because at boards of review	1	
	- "bureaucratic block" to return to work	1	
	- fraud	1	
	- ICBC case, awaiting settlement	<u>1</u>	
			8
XII	Further surgery required after initial meniscectomy		
	- removal remnant	1	
	- removal other meniscus	2	
	- patellar shaving	1	
	- patellectomy	2	
	- high tibial osteotomy	2	
	- lateral meniscectomy, pes plasty, and advancement and tightening of medial ligament	<u>1</u>	
			9
XIII	Same claim number listed in duplicate because of further operation		6
XIV	Files at area offices		4
XV	Miscellaneous		
	- patient refuses Slocum procedure	1	
	- meniscus normal at surgery and not the cause of problems	1	
	- other surgical procedures, no meniscectomy	2	
	- patient underwent bilateral meniscectomies on the same knee within two days	<u>1</u>	
			5
	TOTAL:		169

3. Explanatory Factors Additional to Postoperative Rehabilitation

Built into the analysis of return to work time are the various confounding variables of age, latency period, degrees of degenerative changes, medial or lateral excision of the meniscus, preoperative rehabilitation, total or partial meniscectomy, income, occupation, presence of posterior incision, and previous history. The significance of the factors when analysed by the multivariate approach determined their relative contribution for return to work time.

4. Cost and Benefits

Cost/benefits within the different approaches were determined by costing treatment in the different facilities. Besides direct payment costs, the hidden costs to the organization and the patient were considered.

In the period under study, the charges for treatment changed. Rather than costing each treatment at its actual charges, the number of treatments for each patient was calculated, all cases were aggregated and then the charges for treatment at the end of 1977 were applied. This method does not give the exact cost that the WCB paid to rehabilitate this group of patients; however, it does show the relative expense of the different approaches.

The design model is conceptualized in Figure 3.1.

It is possible to fit a comparison of the effects of a unidisciplinary and multidisciplinary approach within the Clinic into this model, because not all Clinic patients were treated by all the disciplines. However, there is no validity to this comparison because the longer a patient is treated at the Clinic, the more likely he is to encounter all the disciplines. The inability to separate the team component from other aspects of WCB Clinic treatment remains a limitation of the study.

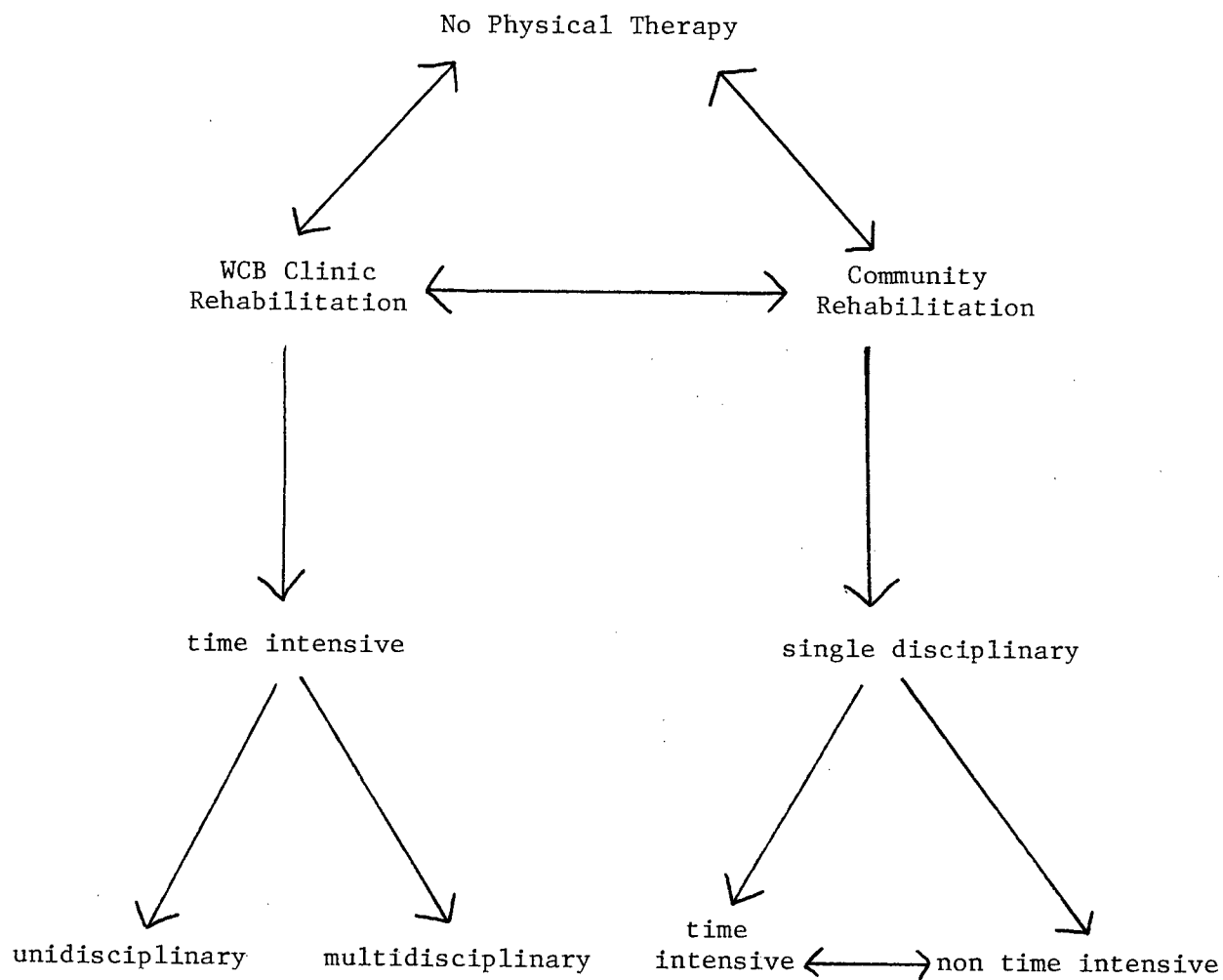
C. INSTRUMENTATION AND DATA COLLECTION

All data was obtained from the records of the WCB. This study was not an evaluation of record keeping. However, available data is an indication of the completeness of the record. A description of availability will be found in the Appendix.

All recording and coding was done by the researcher. Certain areas presented measurement or categorization problems. These were resolved as follows:

Figure 3.1

Design Model
for the Evaluation of Rehabilitation Outcomes
of WCB Meniscectomy Cases



Key \longleftrightarrow comparison
 \longrightarrow components

1. Return to Work

Return to work was measured by calendar days rather than time loss days.* The first postoperative day, that is the first day after surgery, was counted as Day #1. Measuring the number of days return to work was difficult in seven cases because the patient attempted to return to work, was unable to cope, and went back on another period of wage loss. It was decided that if the patient worked for 30 days or more, the first return to work would be recorded as the return to work time. However, if he returned to work for less than 30 days, then the initial period of time loss, the days working, and the final period of time loss would be counted as the total time loss between operation and successful return to work. The 30-day figure is somewhat arbitrary, but aside from excluding these cases, it was felt that it was a reasonable method of handling them. Because the study attempted to indicate if any method of rehabilitating the Compensation patient is more effective in aiding return to work, it was felt that a 30-day period of work would be considered a successful re-entry into the work force. Table 3.2 explains the return to work decisions on these seven patients. In addition, this table includes an eighth patient who returned to work half-time. In this case the initial return to work half-time is recorded as the return to work. Table 3.2 also indicates whether these cases were Clinic, community, or non-treated patients to show what bias this method of measuring return to work might have on the outcome of this study. Because in most cases the patient returned to work for 30 days or longer, and the split is fairly even between community and Clinic patients, it is suggested that the validity of this study was not threatened by this approach.

2. Locale of Rehabilitation

In 23 instances the patient's initial postoperative rehabilitation was begun in one locale before referral to another. Usually this occurred because the attending physician waited until the patient was able to travel long distances before referring him to the Clinic. In other cases there was no rehabilitation for a long period, or the patient was treated

* Because calendar days are used, it is possible that return to work in the individual case is delayed two days due to a non-work day, such as a weekend or holiday. This can affect outcome of the study slightly; however it is assumed that all groups are affected equally.

Table 3.2 Decisions on Multiple Return to Work

Case Number	Type of Postoperative Therapy	Number of Days Postoperative Initial Return to Work	Plus Number of Days at Work	Plus Number of Days Before Second Return to Work	Equals Total Number of Days Before Final Return to Work	Number of Days Return to Work Measured for This Study
1.	No physical therapy	31	10	19	60	60
2.	Clinic	242	32	65	339	242
3.	Community	42	30	18	90	42
4.	Clinic	116	43	89	248	116
5.	Clinic	130	34	16	180	130
6.	Community	60	45	116	221	60
7.	Community	89	23	75	187	187
8.	Clinic	155	29 (1/2 time)		184	155

unsuccessfully for an extended period of time in the community before being referred to the Clinic. Labelling a patient as a Clinic patient who had actually undergone 12 weeks of no therapy before being referred to the Clinic for four weeks of therapy would be inaccurate, because the 16 weeks before return to work actually indicates a failure of the no-post-operative rehabilitation approach to get the patient back to work. The literature predominantly suggests the eight-week mark as the average time of return to work after meniscectomy. Therefore it was decided to classify the locale of rehabilitation according to where the patient was at eight weeks. Table 3.3 gives the rehabilitation histories of the 23 cases which were thus reclassified.

"No physical therapy" signifies no formal approach to postoperative rehabilitation. However, it is realized that many of these cases were prescribed home exercises by their attending physicians, to be done at home unsupervised.

3. Measurement of Degenerative Changes

The system employed to classify osteoarthritis was a modified version of the system of Kellgren and Lawrence (1957) for the radiological assessment of osteoarthritis. The system employed was as follows:

- i) None: A definite absence of x-ray changes of osteoarthritis.
- ii) Minimal: Osteoarthritis definitely present, but of minimal severity.
- iii) Moderate: Osteoarthritis present, and of moderate severity.
- iv) Severe: Osteoarthritis present, and severe.

Kellgren and Lawrence also include a category of doubtful between none and minimal. Although this is suitable prospectively, a retrospective examination of records indicated that this category was unnecessary because based upon the physician's statements, cases could rather be classified as none or minimal.

An assessment of the degree of degenerative changes was derived by examining x-ray reports, arthrography reports and operative reports when available. Based upon the physician's description of findings, each report was then classified as "none", "minimal", "moderate", or "severe", depending upon the terminology which the physician used, or their equivalents - such as "a little" for "minimal". In five cases the physician

Table 3.3 Classification of Type of Postoperative Rehabilitation
of Patients With Multiple Locomotor Rehabilitation

<u>Number of Cases</u>	<u>Rehabilitation History</u>	<u>Final Rehabilitation Classification</u>
3	Began Clinic therapy after more than 8 weeks of no postoperative rehabilitation	No Physical Therapy
4	Began Community therapy after more than 8 weeks of no post- operative rehabilitation	No Physical Therapy
9	Rehabilitated in Community for more than 8 weeks before being referred to Clinic	Community
2	Treated in the Community for less than or equal to 2 weeks, then referred to Clinic	Clinic
4	Treated in the Community for more than 2 weeks but less than or equal to 4 weeks, then referred to Clinic	Clinic
1	Treated in the Community for more than 4 weeks but less than or equal to 6 weeks before being referred to the Clinic	Clinic

did not use the terms "minimal", "moderate", "severe", or their equivalents but rather described the findings more generally. The researcher classified these as follows: In three cases where the findings were described as "some roughening or some osteoarthrosis", the cases were classified as "minimal". One report described "degenerative changes of the fragments of a multifid patella". This was graded as minimal, in the absence of any other findings. In another case the operative report mentioned "medial joint degeneration", with no other explanation. However, an x-ray report four months previous to operation found the "medial joint space narrowed in comparison with the lateral, suggesting minor cartilage damage. There was a small osteophytic spur projecting from the inferior margin of the posterior patella. Mineralization is somewhat decreased, suggesting disuse osteoporosis". This case was classified as minimal.

Findings of degenerative changes in the present study have been interpreted by many radiologists and many surgeons. It is realized that description of osteoarthritis is very subjective. Lawrence and Kellgren found great intraobserver differences in their study of radiological assessment of osteoarthritis. This is a weakness of retrospective study. Wherever possible the x-ray reports of the WCB radiologists were used, because these were the most detailed and because fewer numbers of doctors were involved.

In the absence of any mention of the state of the joint, it was graded as normal. It is realized that an absence of the mention of degenerative changes does not necessarily mean that the joint was normal. However, possessing no other information, the researcher was forced to classify no mention as no degenerative findings.

An exhaustive examination of chondromalacia of the patella was not within the scope of this study. However, chondromalacia of the patella has been implicated as a factor in the results of meniscectomy (Outerbridge 1963).

The diagnostic criteria for the label chondromalacia vary, and again classification depends upon the subjective interpretation of the physician. Outerbridge (1961) classifies chondromalacia as follows:

- Grade 1 - softening and swelling of the cartilage.
- Grade 2 - fragmentation and fissuring in an area half an inch or less in diameter.
- Grade 3 - the same as Grade 2 but an area more than half an inch in diameter is involved.

Grade 4 - there is erosion of cartilage down to the bone.

This classification system was used in this study with some modification. Grade 1 was labelled "minimal", Grade 2 and 3 were combined into a category labelled "moderate", and Grade 4 was labelled "severe".

When the physician described the chondromalacia as "minimal", "moderate", or "severe", that label was applied. However, in cases where the condition was described but not graded, the researcher used Outerbridge's classification to label the cases. Thus, a description of "softening of the patella" was labelled as "minimal" chondromalacia. If the area of erosion was described as "some" or "small", it was labelled as "moderate", but more advanced involvement was labelled "severe".

Descriptions of chondromalacia of the patella, femoral or tibial condyles were initially recorded separately. Because chondromalacia is a form of joint degeneration, these findings were then aggregated with the categorization of osteoarthritis for each patient, to develop an overall categorization of operative degenerative changes. The most severe categorization was the one used. Thus a hypothetical patient in whom no osteoarthritis is mentioned but who has minimal chondromalacia of the tibial condyle and severe chondromalacia of the patella, would be labelled as a patient with severe degenerative changes.

Classification of degenerative changes from x-ray, arthrogram, arthroscopy or surgery were then aggregated in order to derive the final classification of degenerative changes for each case. The surgical findings superseded all other classifications, unless the x-ray report had mentioned degeneration, but the surgeon had failed to describe the state of the knee at operation. Arthrograms are considered the most difficult to interpret accurately and therefore the surgical findings and x-ray reports superseded them. In most cases, arthroscopic findings were written concurrently with the surgical report.

4. Preoperative Rehabilitation

Preoperative rehabilitation was measured by indicating any encounter with physical medicine preoperatively. Cases where the patient underwent treatment at both the Clinic or in the community were indicated as treatment in both centres. The length of preoperative rehabilitation was not indicated. However, if the preoperative treatment ended more than one year prior to operation, this was indicated as "remote".

D. LIMITATIONS OF THE STUDY

1. Threats to Internal Validity

The basic concern of this study is to determine if the type of treatment affected return to work. However, other factors aside from treatment may affect outcome. These threaten the "internal validity" of the study. For example, there could be no control for the different approaches or skills of the many surgeons involved. All attempts at equivalence were made through multivariate analysis of the confounding variables relating to the study population (such as age or degenerative changes), but the factor of referral patterns of different surgeons could not be controlled. However, the numbers were sufficiently large that many approaches and skills must have existed within the three groups of referring doctors. Because of the regression effect, extremes of skill regress toward the mean. Finally, there was no reason to assume that the skill of a physician is likely to govern his referral pattern.

Similarly one institution, the WCB Clinic, was compared to many community facilities (hospital outpatient departments and private clinics). The study could not control for the skills of each locale, and it was recognized that techniques of treatment differed somewhat in each. However, it was not possible to study a limited number of community facilities, because the sample population would have been too small and may not have been representative.

Another threat to validity which has been discussed previously in this chapter is that degenerative changes have been interpreted by many physicians. This threatens validity because of problems of misclassification.

2. The Effects of Occupation and Income

Occupation and income are factors threatening internal validity because certain socio-economic groups may be referred more to one locale than another. Occupation also threatens validity because return to work may be easier for certain jobs, particularly more sedentary type of work. However, fitting occupation into the model in a retrospective study proved difficult for the following reasons. Although certain occupations, such as a logger or accountant, have obvious physical requirements, other jobs were difficult to classify retrospectively. For example, the duties of a store clerk may or may not require climbing ladders or squatting. In

addition, although certain occupations are physically demanding it was not always known retrospectively if the patient was returning to a modified job with light duties, or to full duties. Indeed it was not always known if the patient truly returned to his old job, any other job, or simply had his wage loss terminated. It was thus decided to show the occupational breakdown for the three groups of patients by "sedentary" or "non-sedentary" in order to see if there were significant differences between the groups.

Income is a factor in return to work because incomes above the maximum weekly time loss rate suffer more wage loss on compensation than those below this level. These losses may be an incentive to return to work. This approach to income loss is based on the value-laden assumption that a \$700 per month loss of income is more of an incentive to return to work than a \$300 a month loss of income. However, it is possible that the \$300 per month loss has more of an impact on a particular worker's financial health than a \$700 per month loss has on another whose financial position is more solid. It is also realized that the higher income earner may have private insurance subsidizing this loss. Unfortunately, lack of knowledge of this factor is a limitation of this study. Many of the high weekly wage earners are seasonal workers, and thus measuring income losses does not indicate if they truly would have been working through this period.

Income was measured not as wage earned but rather as the amount of known loss the patient was experiencing on compensation. It thus included a consideration of possible cuts in compensation after the initial 13-week period on full compensation which WCB claimants receive.

3. Latency

The latency period, (that period between initial injury and removal of the meniscus) may influence the outcome of meniscectomy. However, latency was not fitted into the initial multivariate equation for three reasons. The first is that the significance of latency in recovery may be related to its effects on the development of degenerative processes within the knee. Because this is accounted for in the measurement of joint degeneration, it was felt that it was not necessary to include latency in the initial equation. In addition, latency is a difficult factor to clearly assess. The patient often cannot tell when onset began. For example, one of the recognized methods of injuring a meniscus is twisting while in full squat and while the meniscus is caught between the condyles of the femur and tibia.

Such an injury can often occur in a rug layer, for example, or anyone working in this position, and the tear may occur insidiously without his being aware of it. The onset, not being dramatic, may be overlooked.* Finally, it is possible that the Compensation patient does not perceive it as being in his interest to report previous knee injuries in which the meniscus might have been torn. For this reason, the latency period, as measured by the date of onset of the work injury, may be inaccurate. However, latency was fit into further multivariate equations in order to determine if, within the above-mentioned limitations, it appeared to have any effect upon return to work.

4. Previous History

The study attempted to include a consideration of previous history of knee injuries. However, again it is possible that the Compensation patient does not perceive it as being in his interest to report previous knee injuries. In instances where there was previous knee surgery, the scars would indicate such occurrences. However, previous sprains or strains are dependent upon a patient's memory, or the memory of the attending physician. For these reasons the initial model of multivariate analysis does not include previous history. However, further equations which do differentiate between those patients who had previous histories and those who did not are included.

5. Threats to External Validity

The population studied was a total sampling of cases from the Lower Mainland who underwent meniscectomy in 1976 and 1977. Although total sampling eliminates biases internal to the study, this method of sampling does not eliminate biases that result from attempts to generalize these findings to all cases treated at the Clinic or elsewhere. First the findings of this study remain valid for meniscectomy cases from the Lower Mainland in 1976 and 1977, but it is not known if they can be generalized to other years. In addition, the sample of meniscectomy patients is used in this study as a tracer for the total WCB population undergoing rehabilitation at the Clinic or elsewhere. However, as will be discussed

* For the contents of this section, discussion with Dr. Outerbridge is valued.

in the final chapter, findings for meniscectomy are not necessarily generalizable to other conditions.

E. ANALYSIS

The method of analysis was a multifactor analysis of variance, that is: Return to work is a function of α (type of postoperative rehabilitation) + β (degenerative changes) + δ (preoperative rehabilitation) + Δ (medial, lateral or bilateral excision) + ϵ (age).

Data was computer analyzed using the Statistical Package for the Social Sciences (SPSS). Most of the variables are categorical rather than continuous. Analysis of variance with categorical variables can only be done with five independent variables using SPSS. It was decided to firstly determine the significance of the type of postoperative rehabilitation, degenerative changes, preoperative rehabilitation, medial, lateral or bilateral excision, and age, because these were highly relevant, and aside from degenerative changes, were the most reliable measurements. However, other models which eliminated those variables found not to be significant and which included latency, income loss, previous history, were then added. This model thus was: Return to work is the function of α (latency) and β (income loss) and δ (whatever was found to be significant from the first model). The models which thus developed are described in Chapter V - "Findings of the Study - Part 2".

A model which also included the complete or partial excision of the meniscus was also planned. However, for reasons which are described in Chapter IV "Findings of the Study - Part 1", this model could not be applied.

Because very few cases were found to have sedentary occupations, occupation was not taken as a major explanatory variable. In addition, logic suggest that persons involved in sedentary occupations would return to work sooner than persons whose jobs were more physically demanding. Thus, all analyses of variance were calculated twice; first, with all cases included, then with cases of sedentary occupations removed to determine if this resulted in significant changes in F scores.

Because of the number of variables examined and the inability to control the number of cases within each category, empty cells occurred in the analyses of variance. Accordingly, no two-way or higher order inter-

actions between independent variables could be determined.

Chi squared tests of significance were used extensively to show the differences in the populations of the Clinic, community or non-treatment group. Although multivariate analysis handles the effects of the differences on return to work, it is interesting to determine if in fact the populations of the three groups are essentially similar or different. Differences in population may indicate on what basis patients' treatment is selected. Significance was measured at the $p = .05$ level.

FINDINGS OF THE STUDY

The findings of this study are presented in the following two chapters. Chapter IV describes the characteristics of the study population. Chapter V analyzes the effects of these characteristics on the number of days return to work, with the primary study characteristics being the type of post-operative rehabilitation. As well, effectiveness in terms of the cost and benefits of the different rehabilitation approaches is given in Chapter V.

CHAPTER IV
FINDINGS OF THE STUDY - PART I:
COMPARISON OF STUDY POPULATIONS

The findings of this study are reported in two categories. The first is the breakdown of the study populations by the various factors which can affect outcome. The second is an examination of the relative effects on return to work of these different factors. Although analysis of variance includes the differences in study populations it is felt that showing these differences in this chapter may provide more information to the reader. Chapter V presents the analysis of return to work as well as the costs and benefits of the different approaches.

1. Type of Postoperative Rehabilitation

Table 4.1 shows the numbers of WCB meniscectomy cases receiving Clinic therapy, community rehabilitation, or no postoperative physical therapy, according to the classification system described in the previous chapter.

Table 4.1 Number of WCB Meniscectomy Patients by Type of Postoperative Rehabilitation: 1976 and 1977

<u>Location of Treatment</u>	<u>Number of Cases</u>	<u>% of Total Cases</u>
WCB Clinic	85	29.8
Community:		
Hospital Outpatient Department	61	21.4
Private Clinic	46	16.1
Community Therapy indicated but no record of location	3	1.1
Subtotal:	110	38.6
No Physical Therapy	90	31.6
TOTAL:	285	100.0

2. Age

The age of each patient was recorded according to a 10-year classification system. Figure 4.1 shows the age distribution of the cases by the type of postoperative rehabilitation. Examination of Figure 4.1 shows that the age breakdown for the three types of rehabilitation was fairly comparable. The differences are not statistically significant. 29.9% of the study population was below age 30. 60% of the study population was found to be below age 40.

3. Income

Income loss was measured for each case. Losses were recorded in \$200 per month increments (beginning with losses of \$100 per month) as shown in Figure 4.2. Independent operators were classified in a separate category, because their losses may differ from those who are not self-employed. Figure 4.2 shows the number of cases in each income loss category by type of postoperative rehabilitation.

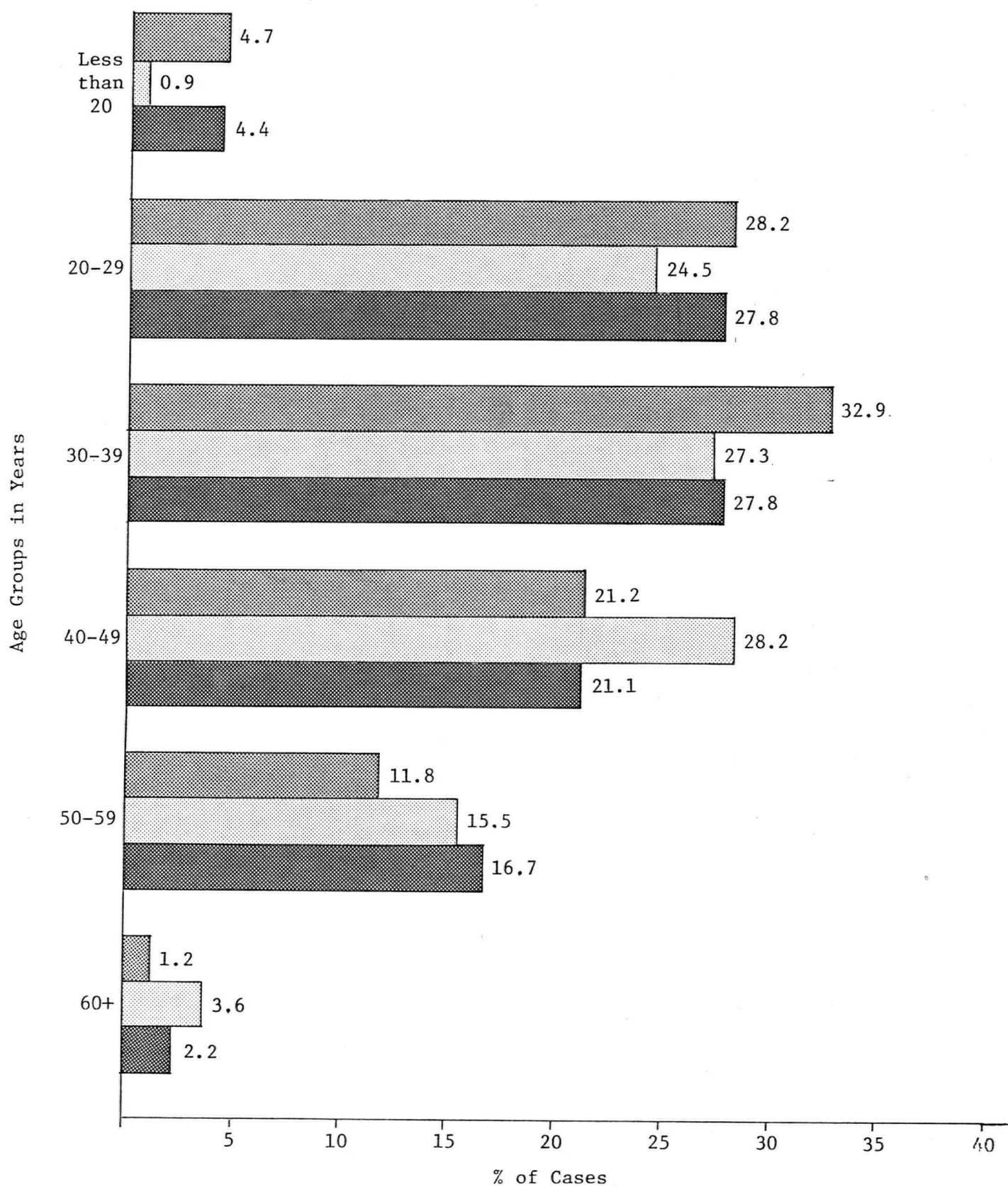
An examination of Figure 4.2 shows that within certain categories of income loss there are some differences in the postoperative rehabilitation populations. For example, 38.9% of the non-treated group lost no income on compensation, but only 28.2% of the Clinic patients were experiencing no loss. 12.7% of community-treated patients experienced losses of greater than \$500 per month but less than \$700 per month on compensation, as compared to only 6.7% of non-treated patients. However, aggregating all categories above a loss of \$500 per month, it is found that 20.1% of the Clinic cases, 19.9% of the community cases, but only 13.2% of the non-treated cases, were losing more than \$500 per month. However, the differences are not statistically significant.

4. Degenerative Changes in the Knee Joint

Degenerative changes in the knee were categorized as none, minimal, moderate or severe. The distribution of degenerative changes according to the type of postoperative therapy is shown in Figure 4.3.

Figure 4.3 reveals that there are differences in the degree of degenerative changes in the populations of the Clinic, community and non-treated groups. 29.4% of the Clinic population had evidence of minimal degenerative changes in the knee, as compared to 20.0% of the community group, and 14.4% of the non-treated patients. There is approximately twice

Figure 4.1 Age Distribution of Postoperative Rehabilitation Populations,
WCB Meniscectomy Cases: 1976 & 1977



Key WCB Clinic, n = 85

Community, n = 110

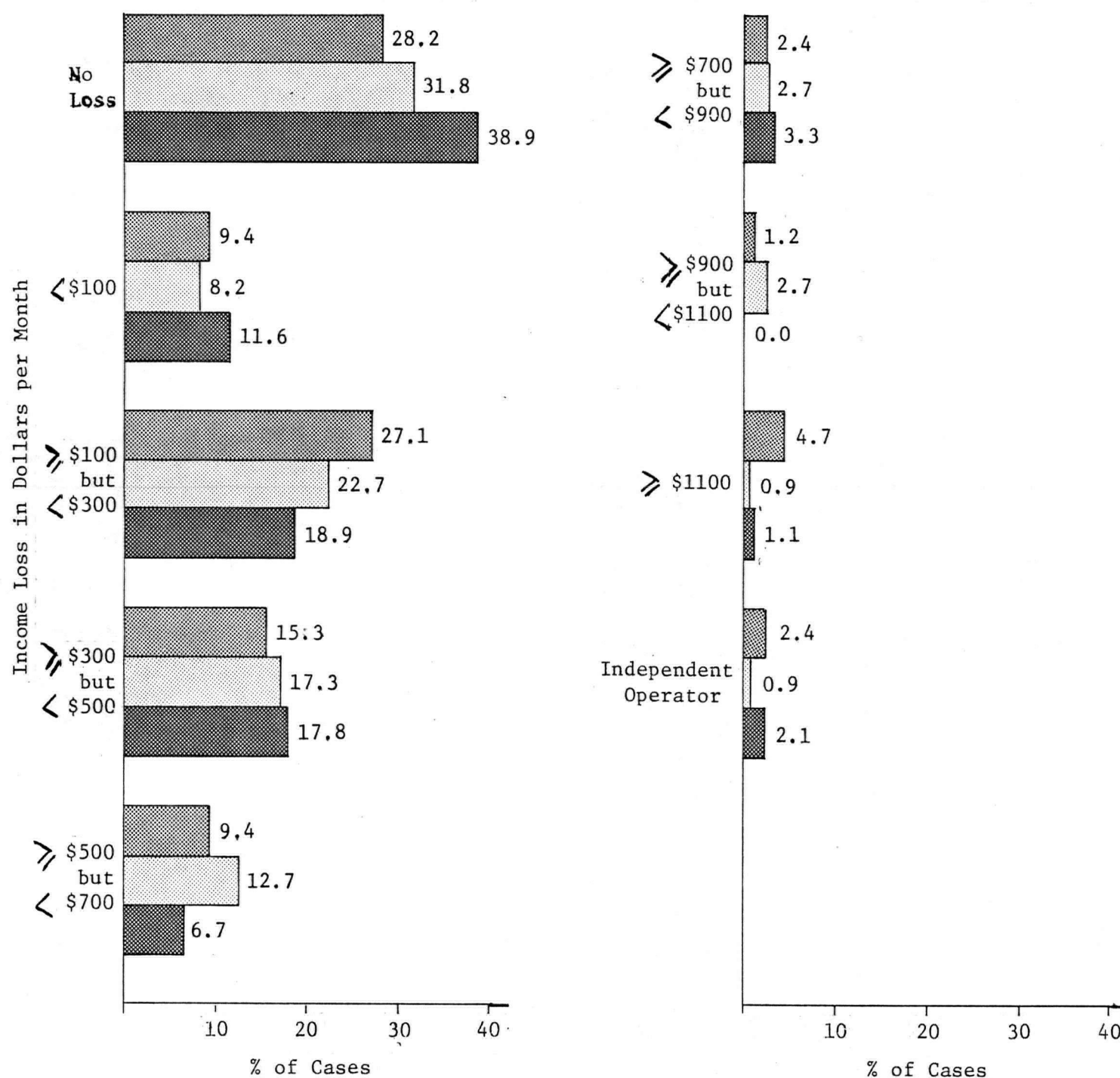
No Physical Therapy, n = 90

Total population 285

$\chi^2 = 7.18341$ with 10 degrees of freedom

p = 0.7080

Figure 4.2 Income Loss Distribution of Postoperative Rehabilitation Populations, WCB Meniscectomy Cases: 1976 & 1977



Key WCB Clinic

Community

No Physical Therapy

Population = 85 cases

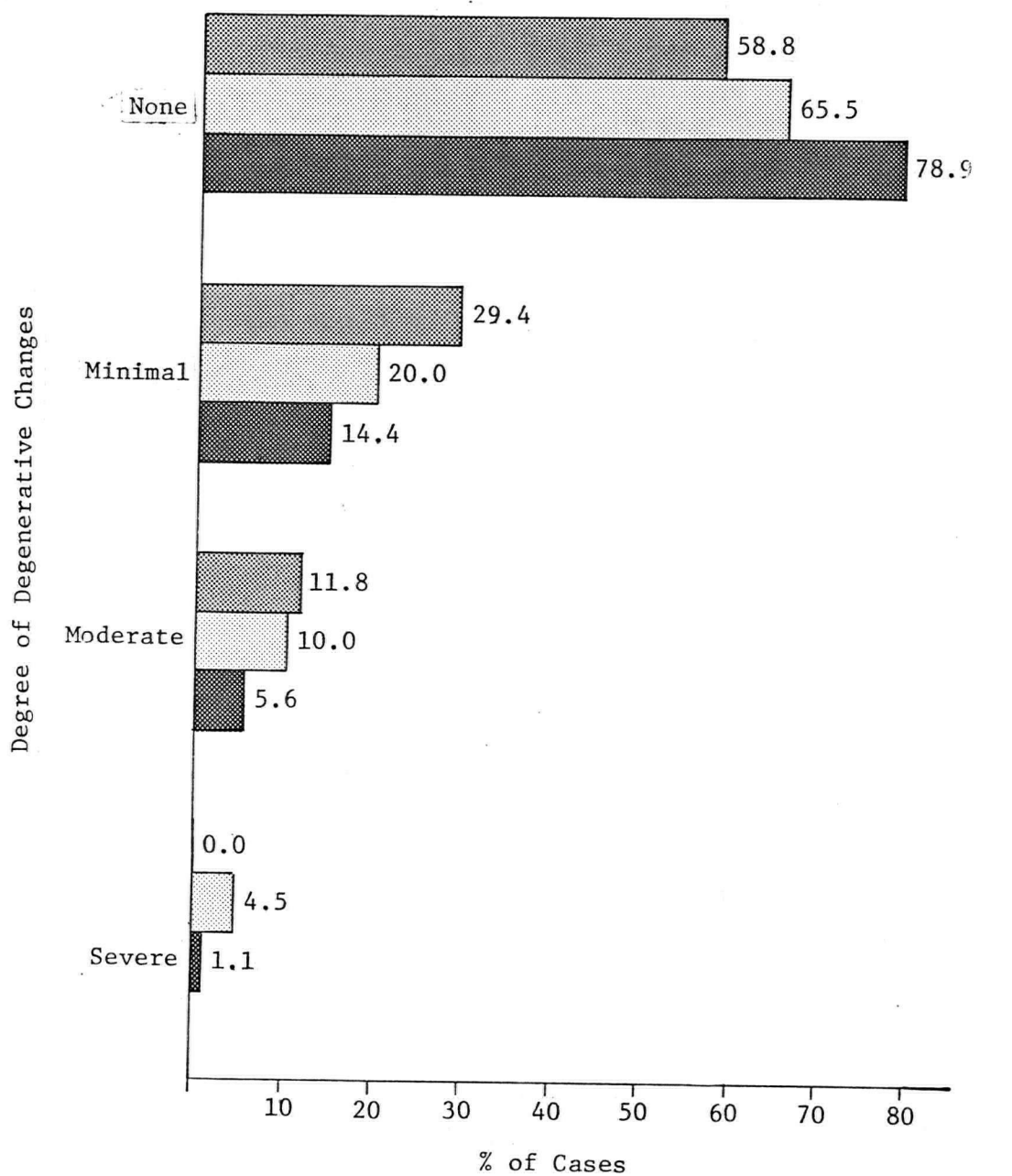
Population = 110 cases

Population = 90 cases

$\chi^2 = 12.8$ with 16 degrees of freedom

p = 0.69

Figure 4.3 Distribution of Postoperative Rehabilitation Populations by Degree of Degenerative Changes, WCB Meniscectomy Cases: 1976 & 1977



Key	WCB Clinic	Population = 85 cases
	Community	Population = 110 cases
	No Physical Therapy	Population = 90 cases

$\chi^2 = 14.8$ with 6 degrees of freedom

$p = 0.02$

the incidence of moderate changes in the Clinic and community groups (11.8% and 10.0% respectively) as compared to the non-treated group (5.6%). There were no severe changes in the Clinic sample, but 4.5% of the community sample and 1.1% of the non-treated sample were found to have severe changes. However, the numbers in this category are small. These differences are significant at the $p = 0.05$ level.

5. Preoperative Rehabilitation

Eighty-nine patients underwent some form of preoperative rehabilitation. Table 4.2 shows the number of cases treated at the various centres preoperatively. In three cases the attending physician mentioned preoperative rehabilitation but no record or bill for services could be found. It is assumed that this occurred in the community, because records from the Clinic would have been on file. It is possible that the therapy refers to home exercise. However, the manner in which it was discussed suggests a more formal approach to preoperative rehabilitation. Also included in Table 4.2 is one case who experienced knee manipulation from a chiropractor preoperatively.

It can be noted that most of the movement from preoperative to postoperative therapy is from therapy to no therapy or vice versa. The majority of the patients who began preoperative treatment at the Clinic remained at the Clinic postoperatively if they underwent postoperative treatment at all. Only five of 37 cases treated preoperatively at the Clinic were referred to the community postoperatively. Similarly, none of the 39 patients treated preoperatively in the community was referred postoperatively to the Clinic.

In order to determine the total number of cases undergoing rehabilitation preoperatively, the categories of Clinic, Community, Clinic and Community, and those for whom treatment was indicated but not recorded, were aggregated. The cases who underwent therapy more than one year before operation and the one case manipulated by the chiropractor were aggregated together with those who experienced no rehabilitation prior to operation. The chiropractic treatment was so classified because the therapy consisted of one session of manipulation only. Figure 4.4 shows the distribution of the experience of preoperative rehabilitation by type of postoperative rehabilitation.

An average of 70.5% of the cases experienced no formal

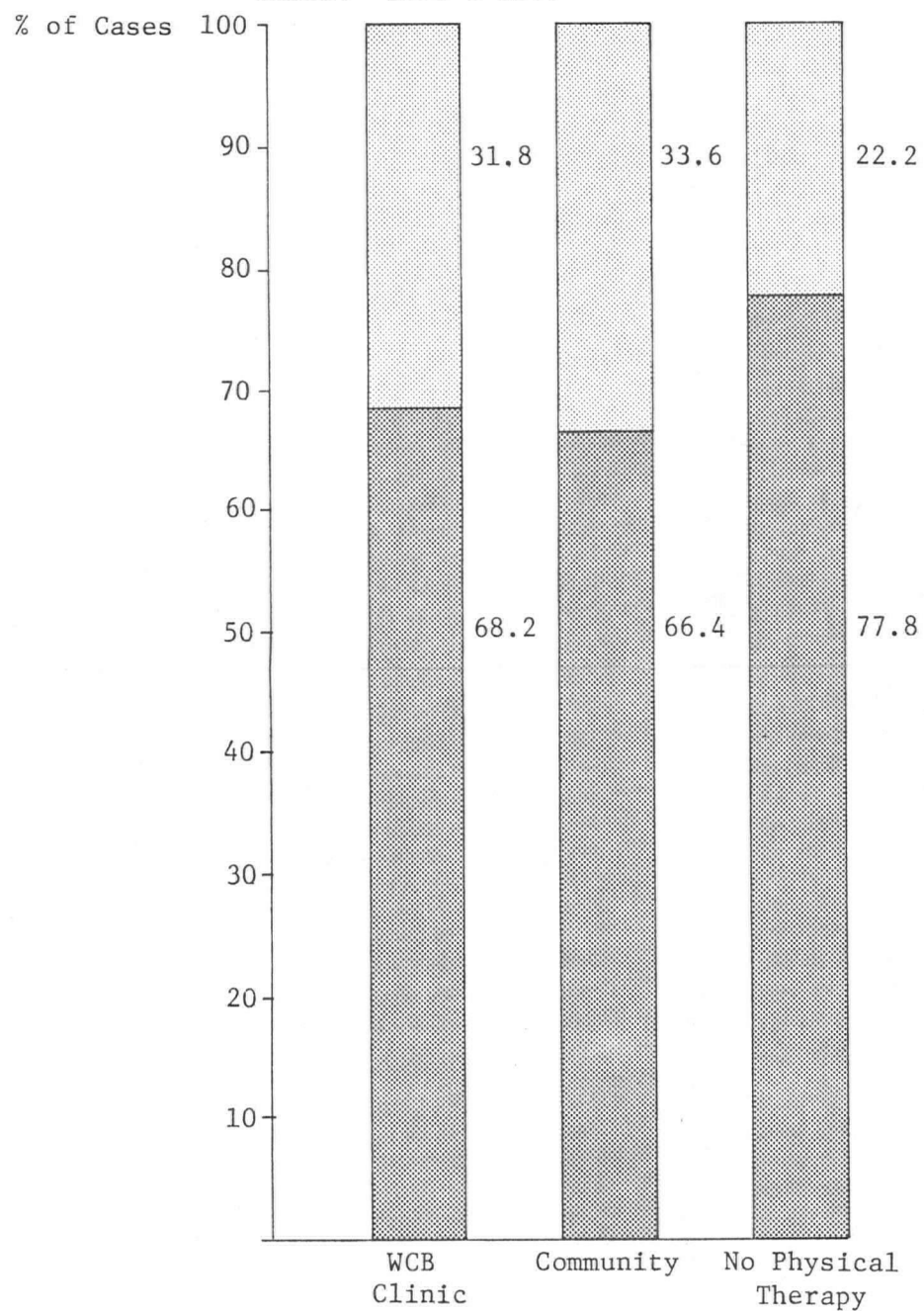
Table 4.2 Type of Preoperative Rehabilitation by Type of Postoperative Rehabilitation Experienced by WCB, Meniscectomy Cases: 1976 & 1977

Type of Preoperative Rehabilitation	Type of Postoperative Treatment						Total for all Preoperative Groups	
	WCB Clinic		Community		No Physical Therapy			
	Number of Cases	%**	Number of Cases	%	Number of Cases	%	Number of Cases	%
No Physical Therapy	58	68.2	70	63.6	68	75.6	196	68.8
WCB Clinic	25	29.4	5	4.6	7	7.8	37	13.0
Community	0	0.0	28	25.5	11	12.2	39	13.7
Clinic and Community	2	2.4	2	1.8	1	1.1	5	1.7
Community (remote)*	0	0.0	1	0.9	0	0.0	1	0.4
Clinic (remote)*	0	0.0	2	1.8	1	1.1	3	1.0
No record but pre-operative rehabilitation is mentioned	0	0.0	2	1.8	1	1.1	3	1.0
Chiropractor	0	0.0	0	0.0	1	1.1	1	0.4
TOTAL	85	100.0	110	100.0	90	100.0	285	100.0


* Remote indicates treatment occurred more than one year prior to operation.


** Indicates percentage of type of preoperative rehabilitation group within postoperative rehabilitation group.

Figure 4.4 Distribution of Preoperative Rehabilitation Within Types of Postoperative Rehabilitation Groups, WCB Meniscectomy Cases: 1976 & 1977



TYPE OF POSTOPERATIVE REHABILITATION

Key  Preoperative rehabilitation

 No preoperative rehabilitation

χ^2 = 3.408 with 2 degrees of freedom

p = 0.18

rehabilitation prior to operation. The difference in the experiences of preoperative rehabilitation for the postoperative rehabilitation groups is slightly different for the non-rehabilitation group as compared to the Clinic and community groups, but the two latter groups are fairly similar. The difference is not statistically significant.

6. Latency

The period of time from injury to removal of the meniscus ranged from the same day of injury to eight years. Figure 4.5 shows the cross-tabulation of latency by type of postoperative rehabilitation.

The three postoperative rehabilitation groups show only a 2% difference in the number of cases whose latency period was within the first three months (range from 43.5% to 45.5%). However, there is a difference in the figures for the first six months. 67% of the Clinic cases, 73.6% of the Community cases, and 78.8% of the non-treated cases had their menisci removed within the first six months after injury. The differences are not statistically significant.

7. Leg

There were slightly more left leg injuries than right leg injuries. Of the 285 cases, 135 were right leg injuries and 150 were left leg injuries. Because the sidedness is not a factor which affects outcome, the cross-tabulation for the three types of postoperative rehabilitation groups is not given.

8. Medial, Lateral or Bilateral Meniscectomy

The incidence of medial, lateral, and bilateral meniscectomy is shown in Figure 4.6.

The percentages of the three postoperative rehabilitation groups who underwent medial, lateral or bilateral meniscectomy is very similar. The differences are not statistically significant.

There is a wide variation in the ratio of lateral to medial meniscectomies in the literature. Appel (1970) reported a ratio of lateral to medial of 1:4.43. Wyn, Parry et al (1958) reported a ratio of 1:2.2, and Tapper and Hoover (1969) reported a ratio of 1:5.1. The ratio of lateral to medial in this study is 1:6.6. It is important to remember that complicated cases were excluded from this study. Inclusion may have changed

Figure 4.5 Latency Distribution of Postoperative Rehabilitation Populations, WCB Meniscectomy Cases: 1976 & 1977

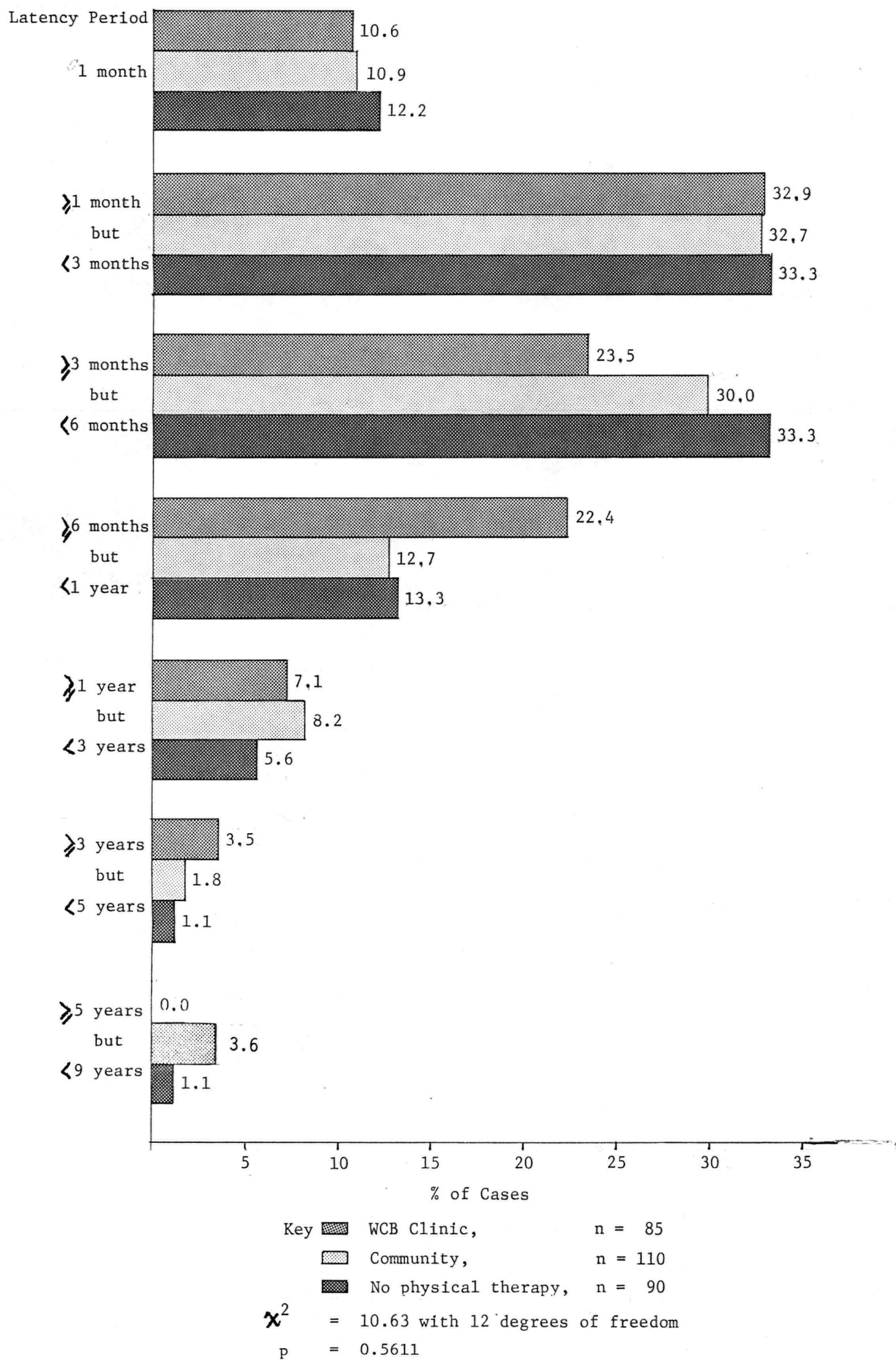
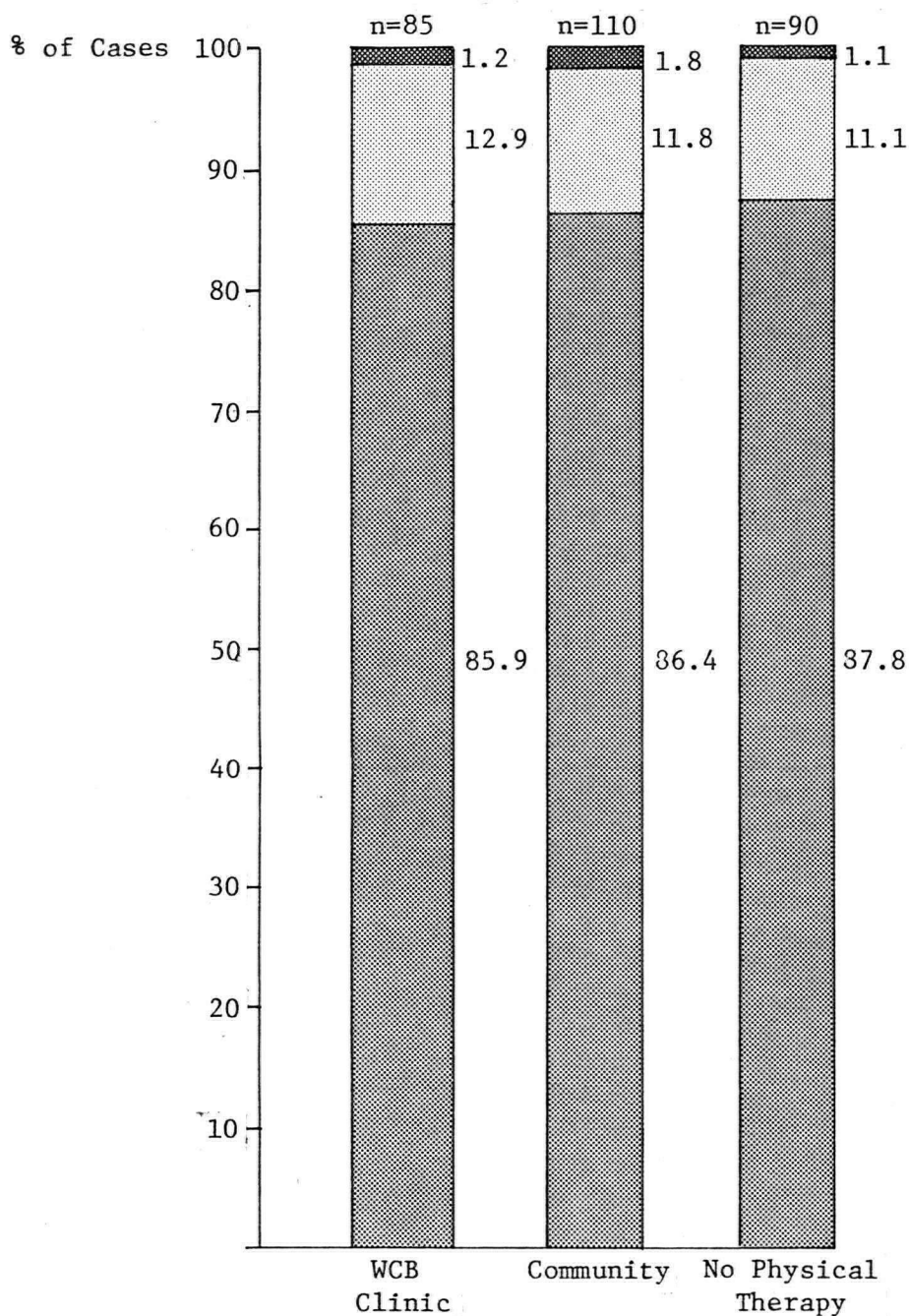





Figure 4.6 Distribution of Population of Postoperative Rehabilitation Groups by Type of Meniscus Removed, WCB Meniscectomy Cases: 1976 & 1977



Type of Postoperative Rehabilitation

Key  Bilateral meniscectomy
 Lateral meniscectomy
 Medial meniscectomy

χ^2 = 0.365 with 4 degrees of freedom
 p = 0.99

this ratio.

1

9. Complete or Partial Meniscectomy

Determining whether a complete or partial meniscectomy had been performed was difficult in 152 cases, or 53% of the total sample. Although the surgeon did not use the term complete or partial, in 65% of these cases the descriptions were extensive and it was possible to label the cases as "probable" complete or partial meniscectomy. However, in 57 operative reports the surgeon simply wrote that a meniscectomy was performed "in the usual fashion", or some equivalent statement, and there was no way of determining the extent from the records. In 25 cases there was no operative report or hospital discharge summary from which to gauge the extent of removal.

Table 4.3 shows the numbers of complete or partial meniscectomies for the total population. Because much of the information is missing, there was no attempt to cross-tabulate the extent of removal of the meniscus by postoperative rehabilitation or to include it in the multi-variate analysis.

Table 4.3 Numbers and Percentages of WCB Meniscectomy Cases Who Underwent Complete or Partial Meniscectomy: 1976 & 1977

<u>Extent of Excision</u>	<u>Number of Cases</u>	<u>Percentage of Total</u>
Complete	107	37.5
Partial	26	9.1
Probably complete	68	23.8
Probably partial	3	1.1
Report not clear	57	20.1
No operative report or discharge summary	24	8.4
	<hr/> 285	<hr/> 100.0

10. Previous History of Injury of Same Knee

Previous history of knee injury on the same leg was recorded as found in the records. It is realized that the accuracy of previous history is dependent upon the patient's memory and the doctor's diligence in reporting.

Thus, although 83.2% of the cases report no previous history, this figure may possibly be high. However, previous history is important insofar as it contributes to degenerative changes within the knee, and this is recorded separately. Table 4.4 shows the number of cases with previous injuries to the knee. Figure 4.7 combines these numbers to show percentages of cases with history of previous meniscectomy or other history. The percentages of cases with previous histories is higher in the Clinic than in the community or non-treated group. This may be due to better reporting. The difference is not statistically significant.

11. Occupation

Occupation was classified as sedentary or non-sedentary. Sedentary positions were considered to be those of clerks, managers, salesmen, typesetters, or other similar occupations. Only 21 people were found to have sedentary positions - 8 Clinic patients (9.4% of the Clinic population), 3 community patients (2.7% of the community population), and 10 non-treated patients (11.1% of the non-treated population). $\chi^2 = 5.838$ with two degrees of freedom. $p = 0.054$, which is statistically significant.

12. Posterior Incision

The presence of a second posterior incision could not be determined without an operative report. Thus, for the 255 cases who had operative reports, Figure 4.8 shows the percentages of cases within the study population who had posterior incisions.

There was three times the incidence of posterior incisions in the community than in the Clinic, and five times the incidence in the community than in the non-treated group. The difference is statistically significant.

13. Physician Referral Patterns

The 285 cases studied were distributed among 52 surgeons. The range of cases per surgeon was from one case to 23 cases. Table 4.5 shows the breakdown of rehabilitation referrals of each surgeon by his location in the Lower Mainland. (In 1976 and 1977 the WCB Clinic was located in Vancouver.)

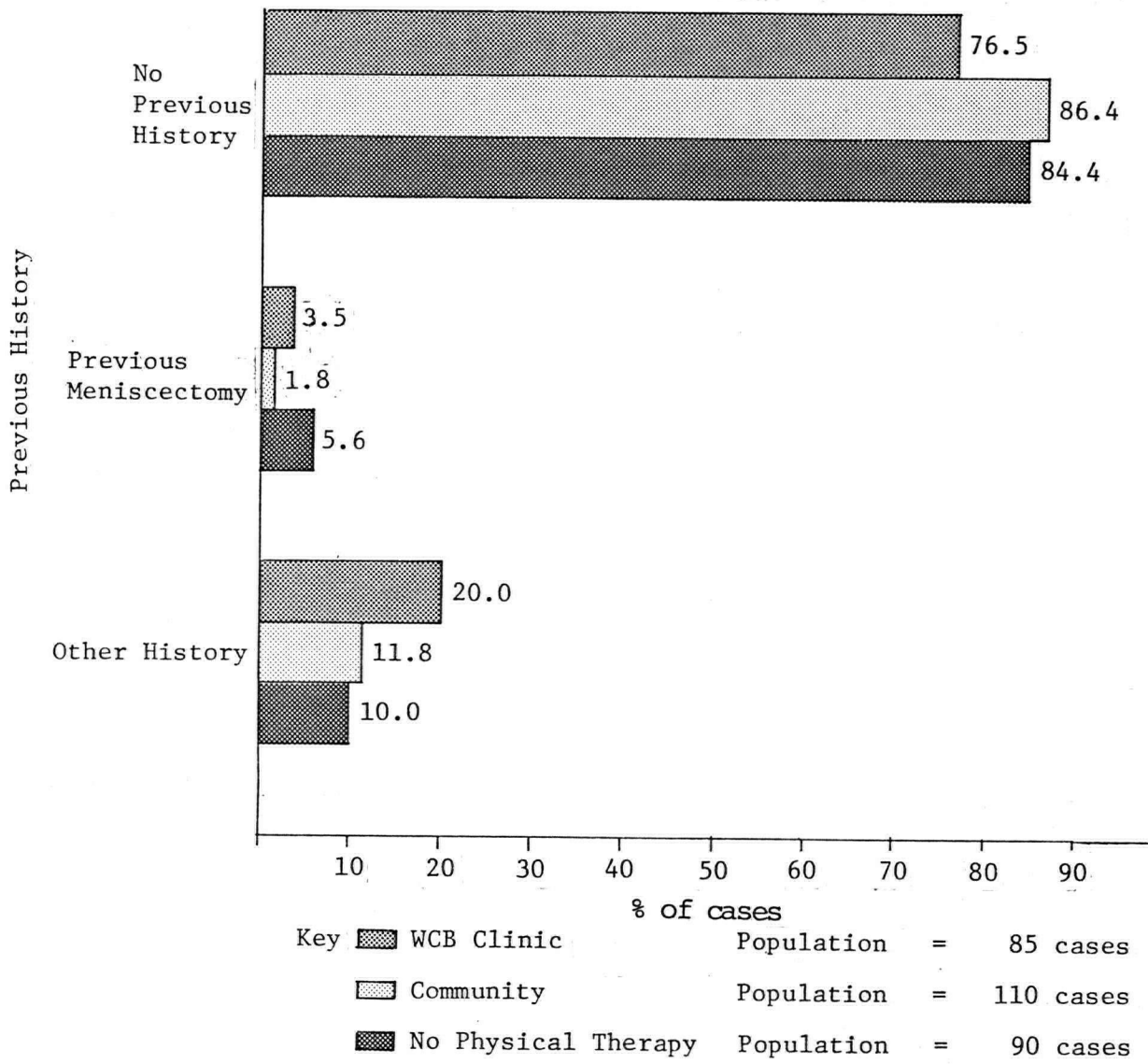
Because of the small number of cases which many surgeons handled, it is difficult to determine the reasons behind referral. The overall impression is that most physicians appear fairly consistent in their

Table 4.4 Previous History of Injury to the Same Leg by Type of Postoperative Rehabilitation Experienced by WCB Meniscectomy Cases: 1976 & 1977

	WCB Clinic		Community		No Physical Therapy	
	Number of Cases	%*	Number of Cases	%	Number of Cases	%
No previous history	65	76.5	95	86.4	76	84.5
Previous removal of other meniscus	3	3.5	2	1.8	4	4.5
Previous removal of same meniscus	0	0.0	0	0.0	1	1.1
Recent sprain or strain of knee	3	3.5	3	2.7	3	3.3
Remote sprains or strains of knee	8	9.4	6	5.5	2	2.2
Previous arthrotomy	1	1.2	0	0.0	0	0.0
Remote meniscal tear, not removed	3	3.5	1	0.9	1	1.1
Old fracture with no remaining problems	0	0.0	1	0.9	1	1.1
Old tear medial collateral ligament with no remaining problems	1	1.2	0	0.0	0	0.0
Miscellaneous:	1	1.2	2	1.8	2	2.2
i) Cartilage damage of the knee						
ii) Crush injury of the knee						
iii) Prepatellar bursitis						
iv) Tendon transplant and ligamentous repair of ankle						
TOTALS:	85	100.0	110	100.0	90	100.0

* Percent of category of previous history within type of postoperative rehabilitation.

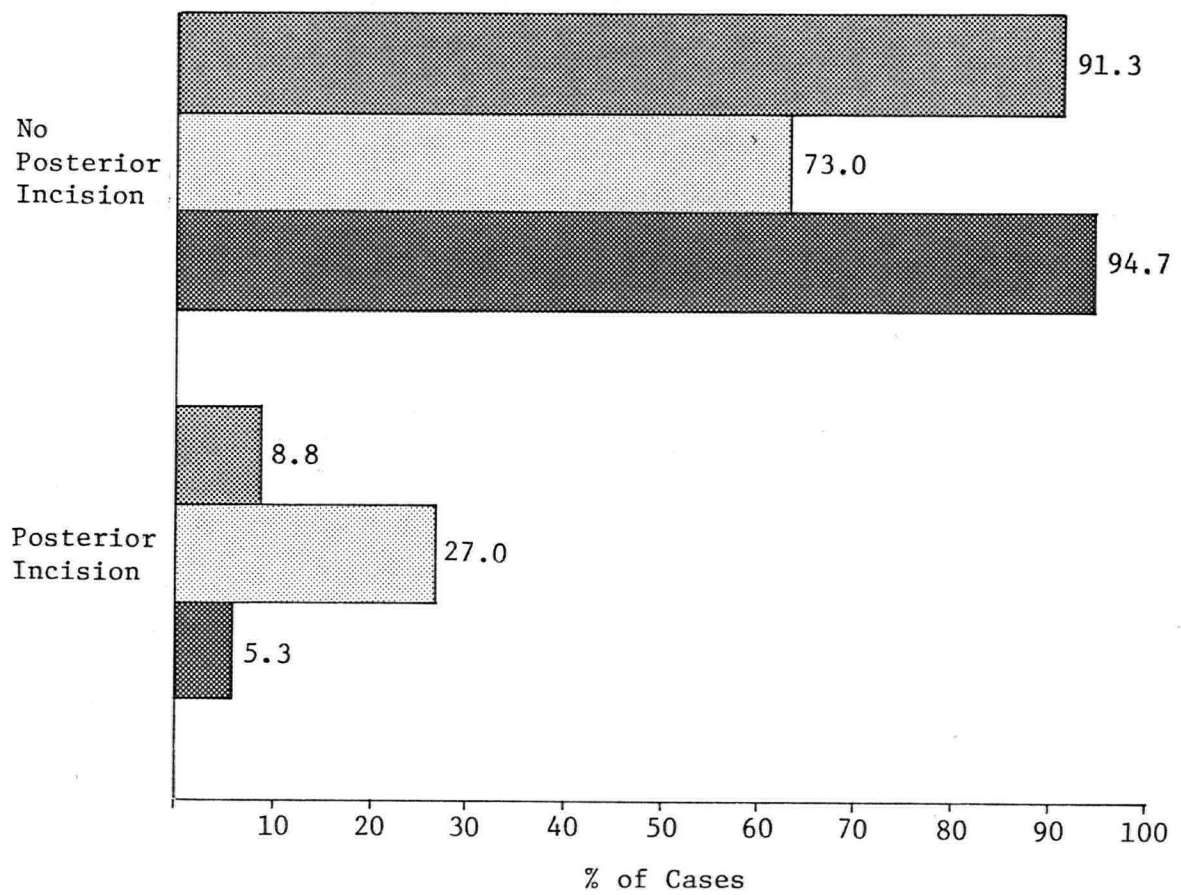
Figure 4.7 Distribution of Postoperative Rehabilitation Populations by Previous History of the Same Leg, WCB Meniscectomy Cases: 1976 & 1977






$$\chi^2 = 6.23 \text{ with 4 degrees of freedom}$$

$$p = 0.1826$$

Figure 4.8 Distribution of Study Population by Presence of Posterior Incisions, WCB Meniscectomy Cases: 1976 & 1977



Key  Clinic n = 75
 Community n = 80
 No Physical Therapy n = 100
Total = 255

$\chi^2 = 19.34$ with 2 degrees of freedom
p = 0.0001

Table 4.5 Postoperative Rehabilitation Referral Patterns of Surgeons for
Postoperative WCB Meniscectomy Cases: 1976 & 1977

<u>Location of Surgeon</u>	<u>Physician Number</u>	<u>WCB Clinic</u>	<u>Community</u>	<u>No Physical Therapy</u>	<u>Total</u>
I. Vancouver	1	1	0	1	2
	2	1	0	0	1
	3	1	0	0	1
	4	2	0	0	2
	5	1	0	9	10
	6	1	0	2	3
	7	2	1	0	3
	8	1	1	0	2
	9	2	2	6	10
	10	1	0	0	1
	11	0	0	4	4
	12	0	0	6	6
	13	1	0	0	1
	14	1	0	7	8
	15	8	0	0	8
	16	3	0	1	4
	17	6	0	0	6
	18	4	2	0	6
	19	0	1	0	1
	20	1	0	1	2
	21	3	0	1	4
	22	0	1	4	5
	23	5	2	1	8
	24	1	0	4	5
	25	0	0	2	2
Subtotal		46	10	49	105
II. Burnaby	26	6	2	0	8
	27	17	4	0	21
	28	1	1	0	2
Subtotal		24	7	0	31

(continued on next page)

Table 4.5 (continued)

<u>Location of Surgeon</u>	<u>Physician Number</u>	<u>WCB Clinic</u>	<u>Community</u>	<u>No Physical Therapy</u>	<u>Total</u>
III. Richmond	29	2	0	1	3
	30	0	0	1	1
Subtotal		2	0	2	4
IV. North Vancouver	31	6	1	0	7
	32	1	1	0	2
	33	2	7	2	11
	34	1	2	1	4
	35	1	1	0	2
Subtotal		11	12	3	26
V. Surrey	36	0	9	2	11
	37	0	16	0	16
New Westminster	38	0	3	3	6
	39	0	7	16	23
	40	0	2	2	4
	41	0	1	0	1
	42	0	1	4	5
	43	0	3	0	3
	44	0	2	0	2
	45	2	10	1	13
	46	0	1	0	1
Delta	47	0	4	0	4
	48	0	6	1	7
Chilliwack	49	0	7	1	8
	50	0	1	0	1
Maple Ridge	51	0	8	5	13
Subtotal		2	81	35	118
Vancouver Island*	52	0	0	1	1
TOTALS:		85	110	90	285

* One Lower Mainland patient preferred a Vancouver Island surgeon. However, the postoperative course and followup occurred in the Lower Mainland.

referral patterns. Surgeons outside Vancouver, North Vancouver or Burnaby tend not to refer patients to the WCB Clinic but prefer community referral if postoperative rehabilitation is ordered. The "no postoperative rehabilitation" approach appears to be more common among Vancouver surgeons than others.

14. Time Intensity of Postoperative Rehabilitation Among Community Patients

Table 4.6 shows the time intensity of rehabilitation which community patients received. The three cases for which community therapy was mentioned but no bill or record of where this therapy occurred could be found, were excluded from this table.

Table 4.6 Time Intensity of Postoperative Rehabilitation for WCB
Meniscectomy Cases Treated in the Community: 1976 & 1977

<u>Time Intensity</u>	<u>Number of Cases</u>	<u>Percentage of Total</u>
Intensive treatment (4 or 5 times per week)	37	34.5
Non-intensive treatment (1 to 3 times per week)	68	63.6
Initial intensive period, followed by non-intensive treatment	2	1.9
	<hr/> 107 <hr/>	<hr/> 100.0 <hr/>

SUMMARY

The three postoperative rehabilitation groups differ significantly in three characteristics: the frequency of degenerative changes in the knee, occupation, and the presence of a posterior incision. A greater percentage of WCB Clinic patients were found to have degenerative changes of the knee than the other populations. The lowest incidence of knee degeneration was found in the non-treatment group. However, there were no cases of patients with severe degeneration in the WCB Clinic group.

While the percentages of cases with sedentary occupations is slightly higher in the non-treated group than in the WCB Clinic, there were very few sedentary cases in the Community. The incidence of posterior incisions was much greater in the Community than in the other populations.

The effects of these variables, as well as the effects of other variables whose distributions were not found to differ significantly, are controlled through multivariate analysis of the variance in the number of days return to work.

Surgeons were found to differ in their rehabilitation referral patterns. However, no attempt will be made to control for these effects of the referring physician, due to the great number of physicians involved, and due to the fact that individual physicians were found to be fairly consistent in their referral patterns. Thus, the effects of the surgeon are confounded by the type of postoperative rehabilitation.

The following chapter presents the analysis of variance in the number of days return to work of the postoperative meniscectomy cases, as well as the costs and benefits of the different approaches.

CHAPTER V
FINDINGS OF THE STUDY - PART II:
ANALYSIS OF RETURN TO WORK

A. OVERVIEW

Return to work was recorded as the number of calendar days from operation to return to work. Table 5.1 shows the mean, median, ranges and standard deviations of the number of days before return to work for the WCB Clinic, Community and No Physical Therapy populations of this study. For the 285 cases, return to work varied from 7 days to 643 days post-operative with a mean of 90.6 days and a median of 77.8 days.

Table 5.1 Number of Days Before Return to Work by Type of Postoperative Rehabilitation Group, WCB Meniscectomy Cases: 1976 & 1977

<u>Rehabilitation Population</u>	<u>Number of Days Return to Work</u>			<u>Range of Return to Work</u>	
	<u>Mean</u>	<u>Median</u>	<u>Standard Deviation</u>	<u>Minimum</u>	<u>Maximum</u>
WCB Clinic	116.7	102.7	80.9	22	643
Community	89.4	74.5	53.5	14	410
No Physical Therapy	67.5	60.0	33.5	7	246
Total Population	90.6	77.8	61.3	7	643

The mean and median days return to work was the lowest for the non-treated group and the highest for the Clinic group. Figure 5.1 shows the comparison of the relative frequencies of return to work time for the three groups. Return to work is measured in weeks on this graph to allow for aggregation. Figure 5.2 shows the same comparison measured in cumulative frequencies.

98.6% of all cases returned to work by 246 days (36 weeks.) However, four cases returned to work later than this. For these outliers return to work was measured as 305, 362, 410 and 643 days respectively. Because these

Figure 5.1 Comparison of Return to Work Postmeniscectomy of WCB Clinic, Community and No Physical Therapy Patients: 1976 & 1977

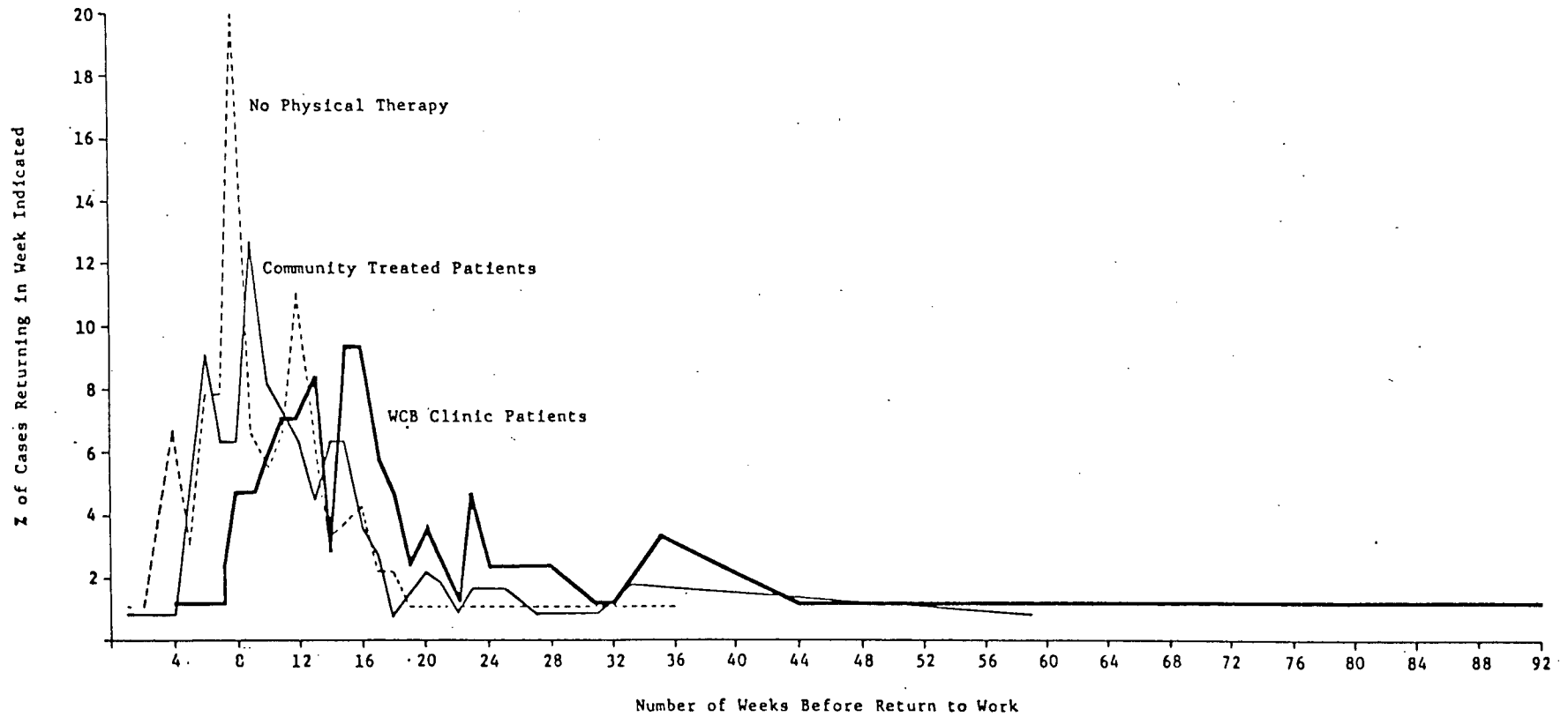
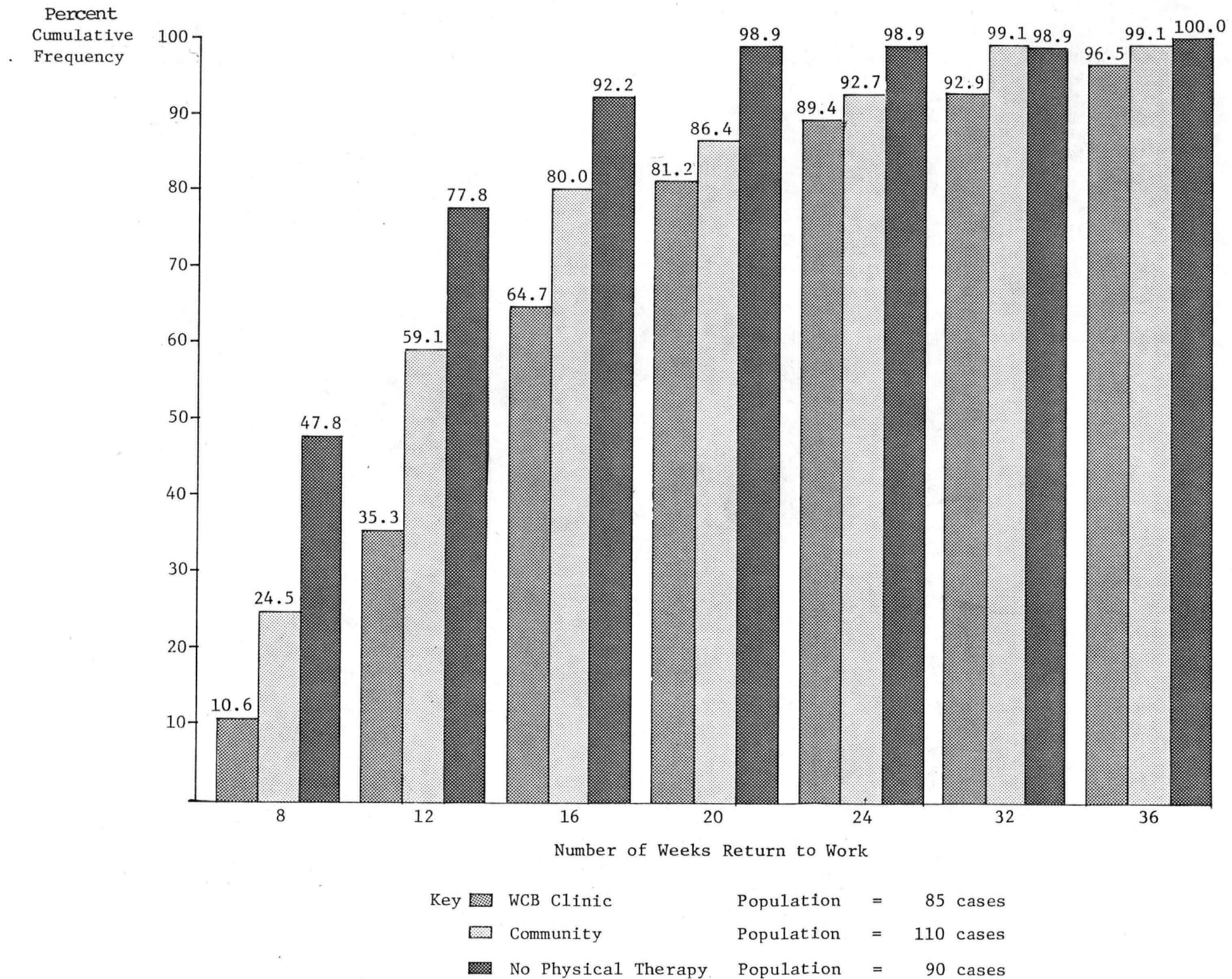


Figure 5.2 Comparison of Cumulative Frequencies for Return to Work Post Meniscectomy of WCB Clinic, Community and No Physical Therapy Patients, WCB Meniscectomy Cases: 1976 & 1977



cases are extreme, they were removed from all further analysis of return to work.

It is interesting to note that three of the outliers were WCB Clinic patients and one, the case which remained off work 410 days, was a Community patient. Two of the outliers, the ones measuring 362 and 410 days, are the two cases of medial meniscectomy who also underwent lateral arthrotomies to investigate the other meniscus. Because this is a sample of only two cases, no conclusions can be drawn.

Removing the outliers from the comparison of return to work changes the statistics of return to work. Table 5.2 shows that with cases over 300 days RTW removed from the analysis, the mean return to work for the WCB Clinic, Community and Non-Treated Rehabilitation populations are 105.0, 86.4 and 67.5 days respectively. These means (minus the outliers) are the basis for the remainder of the analysis. Removing the outliers resulted in 281 cases remaining to be analyzed: 82 WCB Clinic cases, 109 Community cases and 90 Non-treated cases.

Table 5.2 Adjusted* Summary of Measures of Return to Work by Type of Postoperative Rehabilitation, WCB Meniscectomy Cases: 1976 & 1977

<u>Rehabilitation Population</u>	<u>Range of Return to Work</u>				
	<u>Mean</u>	<u>Median</u>	<u>Standard Deviation</u>	<u>Minimum</u>	<u>Maximum</u>
WCB Clinic	105.0	101.0	45.3	22	243
Community	86.4	74.3	43.9	14	221
No Physical Therapy	67.5	60.0	33.5	7	246
Total Population	85.8	77.2	43.7	7	246

* Excludes cases above 300 Days Return to Work

B. FACTORS AFFECTING RETURN TO WORK

1. The Effects of the Type of Postoperative Rehabilitation, Experience of Preoperative Rehabilitation, Age, Meniscus Excised, and Degenerative Changes on Return to Work Times

The effects of the type of postoperative rehabilitation, experience of preoperative rehabilitation, age, meniscus excised and degenerative changes of the knee on return to work time are shown in Table 5.3. For the purpose of this analysis, age groups were analyzed in three categories (less than 30 years of age, 30 to 49 years of age, and 50 years and above). As well, preoperative rehabilitation was analyzed in two categories - those who received preoperative rehabilitation and those who did not. The only factors which were found to be significant were the type of postoperative rehabilitation the patient received, and whether or not he experienced preoperative physical therapy. Neither age, degree of degenerative changes of the knee, nor the meniscus excised were found to be significant.

However, a surprising finding is that preoperative rehabilitation resulted in a longer return to work time for those patients who experienced it as compared to those who did not. Thus, the analysis of variance was recalculated, but in this instance preoperative rehabilitation was analyzed in four categories: no preoperative treatment, WCB Clinic treatment, Community treatment, and both WCB Clinic and Community treatment. The independent variable of the meniscus excised was removed from the analysis because the effects of medial, lateral, or bilateral meniscectomy were found to be very insignificant ($p = 0.86$). Table 5.4 shows that with this method the type of preoperative and postoperative rehabilitation are found to significantly affect return to work for all cases and for non-sedentary cases only. The effects of age and degree of degenerative changes remain insignificant. The Multiple Classification Analysis found in Table 5.4 reveals that patients receiving no preoperative rehabilitation did consistently better than those who experienced preoperative rehabilitation, even when adjusting for other factors. For all cases those rehabilitated preoperatively at the WCB Clinic returned to work at a later date than those rehabilitated preoperatively in the Community, although adjusting the deviation to allow for the effects of the other variables reduces the difference. However, for non-sedentary cases only, although the unadjusted mean return to work time is greater for patients preoperatively treated in the WCB Clinic as compared to the Community, adjustment reverses this comparison to favour the Clinic slightly. Patients preoperatively

Table 5.3 Variations in the Number of Days Return to Work Due to Type of Postoperative Rehabilitation, Experience of Preoperative Rehabilitation, Age, Meniscus Excised and Degenerative Changes of the Knee, WCB Meniscectomy Cases: 1976 & 1977

<u>Source of Variation</u>	<u>F Score</u>	<u>Significance of F</u>
1. Type of Postoperative Rehabilitation	15.142	0.000
2. Experience of Preoperative Rehabilitation	7.558	0.006
3. Age	1.432	0.241
4. Meniscus excised	0.150	0.861
5. Degenerative changes	1.601	0.190

MULTIPLE CLASSIFICATION ANALYSIS

Number of Cases = 281

Grand Mean = 85.79 days

<u>Variable and Category</u>	<u>Number of Cases</u>	<u>Unadjusted Deviation</u>	<u>Eta</u>	<u>Adjusted Deviation</u>	<u>Beta</u>
I. <u>Type of Postoperative Rehabilitation</u>					
WCB Clinic	82	19.17		18.49	
Community	109	0.65		- 0.23	
None	90	-18.26		-16.57	
			0.34		0.31
II. <u>Experience of Pre-operative Rehabilitation</u>					
None	199	- 5.23		- 4.32	
Received Preoperative Rehabilitation	82	12.70		10.48	
			0.19		0.15
III. <u>Age</u>					
Less than 30 years	85	- 8.00		- 6.56	
30 to 49 years	148	4.04		2.80	
50 years plus	48	1.71		2.90	
			0.12		0.10
IV. <u>Meniscus Excised</u>					
Medial	243	0.64		0.52	
Lateral	34	3.64		- 3.16	
Bilateral	4	- 7.79		- 4.91	
			0.04		0.03
V. <u>Degenerative Changes of the Knee</u>					
None	191	- 4.80		- 1.96	
Minimal	58	16.24		10.19	
Moderate	26	0.59		- 6.47	
Severe	6	- 6.96		- 7.97	
			0.19		0.12
Multiple R Squared					0.169

Table 5.4 Variations in the Number of Days Return to Work Due to the Type of Postoperative Rehabilitation
Type of Preoperative Rehabilitation, Age, and Degree of Degenerative Changes of the Knee,
WCB Meniscectomy Cases: 1976 & 1977

ALL CASES						NON-SEDENTARY CASES ONLY					
Source of Variation		F Score	Significance of F			F Score		Significance of F			
I.	Type of Postoperative Rehabilitation	14.243	0.000			13.028		0.000			
II.	Type of Preoperative Rehabilitation	6.074	0.001			3.139		0.026			
III.	Age	1.461	0.234			0.749		0.588			
IV.	Degenerative Changes	1.550	0.202			1.637		0.181			
MULTIPLE CLASSIFICATION ANALYSIS											
Number of Cases =		281				260					
Grand Mean =		85.79 days				87.23 days					
Variable and Category		Number of Cases	Mean No. of Days Un-Adjusted Deviation	Eta	Mean No. of Days Adjusted Deviation	Beta	Number of Cases	Mean No. of Days Un-Adjusted Deviation	Eta	Mean No. of Days Adjusted Deviation	Beta
I. Type of Postoperative Rehabilitation											
	WCB Clinic	82	19.17		18.13		74	17.56		18.18	
	Community	109	0.65		- 0.06		106	0.46		- 0.97	
	None	90	-18.26		-16.44		80	-16.86		-15.53	
				0.34		0.31			0.32		0.31
II. Type of Preoperative Rehabilitation											
	None	199	- 5.23		- 4.35		185	- 3.87		- 3.09	
	WCB Clinic	36	19.96		9.30		33	13.55		3.11	
	Community	42	0.64		5.76		39	2.23		7.04	
	WCB Clinic and Community	4	73.96		72.39		3	60.77		65.00	
				0.28		0.23			0.21		0.197
III. Age											
	Less than 30 years	85	- 8.00		6.52		77	- 7.62		- 6.08	
	30 to 49 years	148	4.04		2.49		137	3.63		2.41	
	50 years or older	48	1.71		3.87		46	1.96		3.01	
				0.12		0.10			0.12		0.09
IV. Degenerative Changes											
	None	191	- 4.80		- 2.08		171	- 4.98		- 2.33	
	Minimal	58	16.24		10.00		57	16.20		10.69	
	Moderate	26	0.59		- 5.57		26	- 0.85		- 6.49	
	Severe	6	- 6.96		- 6.49		6	- 8.40		- 7.14	
				0.19		0.12			0.21		0.14
Multiple R Squared						0.199					
						0.171					

treated in both the Clinic and the Community (only four cases) returned to work on the average much later than any other cases.

To investigate possible interactions between the type of preoperative and postoperative rehabilitation, a breakdown analysis of their combined effect on return to work was performed. The results are shown in Table 5.5. It can be seen that patients who experienced neither preoperative nor postoperative rehabilitation returned to work the quickest, with a mean of 63 days. The longest return to work time was experienced by the one case rehabilitated preoperatively in both the Clinic and the Community, but who received no postoperative rehabilitation, and the next longest return to work by the one case who was treated preoperatively in both the Clinic and the Community, but treated postoperatively in only the Clinic. Because these represent only two cases, it cannot be determined if this was due to the effects of the combined areas of treatment, or if these were identified preoperatively as problem cases which then required treatment in both locales. Excluding the cases preoperatively treated in both the Clinic and the Community, the highest means for return to work within each of the three types of postoperative rehabilitation groups was for the subgroup preoperatively treated in the WCB Clinic. Excluding sedentary cases, as shown in Table 5.6, results in only minor changes in these findings. Patients in the non-treated and Community rehabilitated postoperative groups continue to do worse if preoperatively treated in the WCB Clinic, albeit the numbers are small. There is virtually no difference in the results for Clinic patients who were preoperatively treated in the Clinic as compared to those who were not preoperatively treated at all. (No Clinic patient was preoperatively treated in the Community.)

The degree of degenerative changes was not found to be significant, but the multiple classification analysis in Table 5.4 reveals an unusual pattern. Patients with minimal degenerative changes took the longest to return to work, but patients with severe changes, albeit only six cases, returned to work the quickest. Adjusting the deviation to allow for other effects resulted in patients with moderate and severe degenerative changes returning to work sooner than those with no degenerative changes. However, this can perhaps be explained by the fact that there were no patients with severe degenerative changes treated in the Clinic.

Because there was a higher incidence of minimal degenerative changes in WCB Clinic patients and because those with minimal changes did worse than the others, it was decided as a final check to recalculate the analysis

Table 5.5 Mean Number of Days Return to Work by Type of Preoperative and Postoperative Rehabilitation, WCB Meniscectomy Cases: 1976 & 1977

		Preoperative Rehabilitation				
		None	WCB Clinic	Community	Clinic & Community	Total
Postoperative Rehabilitation	None	n* = 70	n = 7	n = 12	n = 1	n = 90
		$\bar{x}^{**} = 63.0$	$\bar{x} = 77.3$	$\bar{x} = 73.6$	$\bar{x} = 246.0$	$\bar{x} = 67.5$
	WCB Clinic	n = 57	n = 24	n = 0	n = 1	n = 82
		$\bar{x} = 100.9$	$\bar{x} = 110.9$		$\bar{x} = 195.0$	$\bar{x} = 105.0$
	Community	n = 72	n = 5	n = 30	n = 2	n = 109
		$\bar{x} = 81.6$	$\bar{x} = 121.0$	$\bar{x} = 91.6$	$\bar{x} = 99.0$	$\bar{x} = 86.4$
Total		n = 199	n = 36	n = 42	n = 4	n = 281
		$\bar{x} = 80.6$	$\bar{x} = 105.5$	$\bar{x} = 86.4$	$\bar{x} = 159.8$	$\bar{x} = 85.8$

*n = number of cases

** \bar{x} = mean number of days return to work

Table 5.6 Mean Number of Days Return to Work by Type of Preoperative Rehabilitation and Postoperative Rehabilitation, Non-Sedentary Cases Only, WCB Meniscectomy Cases: 1976 & 1977

		Preoperative Rehabilitation				
		None	WCB Clinic	Community	Clinic & Community	Total
Postoperative Rehabilitation	None	n* = 63	n = 7	n = 9	n = 1	n = 80
		$\bar{x}^{**} = 65.10$	$\bar{x} = 77.29$	$\bar{x} = 82.44$	$\bar{x} = 246.0$	$\bar{x} = 70.38$
	WCB Clinic	n = 53	n = 21	n = 0	n = 0	n = 74
		$\bar{x} = 105.19$	$\bar{x} = 103.81$			$\bar{x} = 104.80$
Postoperative Rehabilitation	Community	n = 69	n = 5	n = 30	n = 2	n = 106
		$\bar{x} = 83.28$	$\bar{x} = 121.00$	$\bar{x} = 91.57$	$\bar{x} = 99.0$	$\bar{x} = 87.70$
	Total	n = 185	n = 33	n = 39	n = 3	n = 260
		$\bar{x} = 83.36$	$\bar{x} = 100.79$	$\bar{x} = 89.46$	$\bar{x} = 148.0$	$\bar{x} = 87.23$

* n = number of cases

** \bar{x} = mean number of days return to work

of variance, eliminating all cases of degenerative changes and all sedentary occupations. This resulted in 171 cases remaining to be analyzed. Both the effects of postoperative and preoperative rehabilitation remained significant, while age remained insignificant. For these non-sedentary cases and cases of no degenerative changes of the knee, the mean return to work time in WCB Clinic cases was 101.72 days, for Community cases 83.69 days and non-treated cases 67.26 days. The details of this analysis of variance are found in Table 5.7.

2. The Effects of Income, Latency and Previous History of the Knee

The analysis of variance in the number of days return to work was recalculated, adding the factors of income, latency period and previous history of the knee to the two variables previously determined to be significant (type of postoperative rehabilitation and type of preoperative rehabilitation). None of the new variables studied was found to be significant, whether all cases or sedentary cases only were analyzed. Table 5.8 shows these results and Table 5.9 the results of the same analysis for non-sedentary cases with no degenerative changes of the knee.

Although the latency period was not found to be significant, it is interesting to note that whether adjusted or not adjusted for other effects, those with a latency period of less than one month returned to work the earliest, and those with a latency period of one year returned to work at a later date than the other cases. However, those with latency periods of between six months and one year returned to work earlier than those with latency periods between three and six months. Thus it is difficult to determine a pattern. Income loss was not found to be significant in any of the analyses, nor could a logical pattern be determined.

3. The Effect of Posterior Incision

For the 252 cases for which operative reports were available, the effect of posterior incision upon return to work was found not to be significant. Table 5.10 shows the results of this analysis of variance for the non-sedentary subset of these cases. Although not statistically significant, the presence of a posterior incision resulted in a higher mean return to work for the population which experienced it, albeit the numbers of cases are relatively small. (Only 15% of all cases and 20% of non-sedentary cases received posterior incisions.) Analyzing the variance for those cases

Table 5.7 Variations in the Number of Days Return to Work Due to Type of Postoperative Rehabilitation, Type of Preoperative Rehabilitation and age, for WCB Meniscectomy Cases with Non-sedentary Occupations and No Degenerative Changes of the Knee: 1976 & 1977

<u>Source of Variation</u>	<u>F Score</u>	<u>Significance of F</u>
1. Type of Postoperative Rehabilitation	11.441	0.000
2. Type of Preoperative Rehabilitation	8.350	0.000
3. Age	1.522	0.221

MULTIPLE CLASSIFICATION ANALYSIS

Number of Cases = 171

Grand Mean = 82.26

<u>Variable and Category</u>	<u>Number of Cases</u>	<u>Number of Days Un-adjusted Deviation</u>	<u>Eta</u>	<u>Number of Days Adjusted Deviation</u>	<u>Beta</u>
I. <u>Type of Postoperative Rehabilitation</u>					
WCB Clinic	42	19.46		21.17	
Community	68	1.43		- 0.09	
None	61	-15.00		-14.47	
			0.34		0.35
II. <u>Type of Preoperative Rehabilitation</u>					
None	128	- 5.60		- 5.34	
WCB Clinic	17	21.15		10.09	
Community	24	6.87		12.64	
Clinic and Community	2	96.24		104.18	
			0.34		0.34
III. <u>Age</u>					
Less than 30 years	68	- 4.42		- 5.61	
30 to 49 years	91	4.30		4.30	
50 years plus	12	- 7.59		- 0.84	
			0.12		0.12
Multiple R Squared					0.249

Table 5.8 Variations in the Number of Days Return to Work by Type of Postoperative Rehabilitation, Type of Preoperative Rehabilitation, Previous History of the Knee, Latency Period and Income Loss, WCB Meniscectomy Cases: 1976 & 1977

ALL CASES						NON-SEDENTARY CASES ONLY					
Source of Variation		F Score	Significance of F			F Score	Significance of F				
I. Type of Postoperative Rehabilitation		15.396	0.000			14.456	0.000				
II. Type of Preoperative Rehabilitation		5.145	0.002			2.774	0.042				
III. Previous History		0.854	0.427			0.402	0.669				
IV. Latency Period		1.344	0.254			1.839	0.122				
V. Income Loss		0.367	0.87			0.729	0.602				
MULTIPLE CLASSIFICATION ANALYSIS											
Number of Cases		281				260					
Grand Mean		85.79 days				87.23 days					
		Number of Cases	Mean No. of Days Un-Adjusted Deviation	Eta	Mean No. of Days Un-Adjusted Deviation	Beta	Number of Cases	Mean No. of Days Un-Adjusted Deviation	Eta	Mean No. of Days Un-Adjusted Deviation	
I. Type of Postoperative Rehabilitation											
WCB Clinic		82	19.17		19.25		74	17.56		19.58	
Community		109	0.65		0.32		106	0.46		- 1.14	
None		90	-18.26		-17.16		80	-16.86		-16.61	
				0.34		0.33			0.32		
II. Type of Preoperative Rehabilitation											
None		199	- 5.23		- 4.04		185	- 3.87		- 2.99	
WCB Clinic		36	19.96		9.86		33	13.55		4.16	
Community		42	0.64		4.09		39	2.23		6.18	
WCB Clinic and Community		4	73.96		69.35		3	60.77		58.30	
				0.28		0.22			0.21		
III. Previous History											
No previous history		232	0.46		1.26		217	- 0.04		0.89	
Previous meniscectomy		10	1.21		2.34		10	- 0.23		0.49	
Other history		39	- 3.07		- 8.08		30	0.31		- 5.97	
				0.03		0.07			0.00		
IV. Latency Period											
Less than 1 month		31	-12.14		- 6.88		28	-10.02		- 6.80	
1 month 3 months		93	- 2.24		- 1.82		87	- 2.07		- 2.69	
3 months 6 months		82	1.39		2.40		79	0.66		2.67	
6 months 1 year		44	- 1.84		- 5.23		37	- 4.94		- 6.89	
1 year		31	17.79		13.42		29	20.39		16.17	
				0.17		0.13			0.19		
V. Income Loss Per Month											
No loss		94	- 5.76		- 2.54		83	- 4.05		- 1.23	
\$100		25	- 3.03		- 2.11		24	- 2.61		- 2.20	
\$100 but \$300		64	6.73		3.91		63	5.56		2.97	
\$300 but \$500		47	3.47		4.25		43	5.81		5.65	
\$500		46	1.19		- 3.33		43	- 5.30		- 7.80	
Independent Operator		5	- 6.19		- 1.17		4	6.77		14.94	
				0.12		0.08			0.12		
Multiple R Squared						0.199				0.179	

Table 5.9 Variations in the Number of Days Return to Work Due to Type of Postoperative Rehabilitation, Type of Preoperative Rehabilitation, Previous History of the Knee, Latency Period and Income of WCB Meniscectomy Cases with Non-sedentary Occupations and No Degenerative Changes of the Knee: 1976 & 1977

<u>Source of Variation</u>	<u>F Score</u>	<u>Significance of F</u>
I. Type of Postoperative Rehabilitation	9.758	0.000
II. Type of Preoperative Rehabilitation	6.454	0.000
III. Previous History of the Knee	0.023	0.978
IV. Latency Period	0.239	0.916
V. Income	0.856	0.512

MULTIPLE CLASSIFICATION ANALYSIS

Number of Cases = 171

Grand Mean = 82.26 days

<u>Variable and Category</u>	<u>Number of Cases</u>	<u>Number of Days Un-adjusted Deviation</u>	<u>Eta</u>	<u>Number of Days Adjusted Deviation</u>	<u>Beta</u>
<u>I. Type of Postoperative Rehabilitation</u>					
WCB Clinic	42	19.46		19.64	
Community	68	1.43		0.88	
None	61	-15.00		-14.51	
			0.34		0.33
<u>II. Type of Preoperative Rehabilitation</u>					
None	128	- 5.60		- 4.82	
WCB Clinic	17	21.15		11.81	
Community	24	6.87		8.92	
WCB Clinic and Community	2	96.24		100.82	
			0.34		0.33
<u>III. Previous History of the Knee</u>					
None	143	- 0.78		- 0.26	
Previous Meniscectomy	6	0.91		0.61	
Other History	22	4.83		1.53	
			0.05		0.02
<u>IV. Latency Period</u>					
Less than 1 month	22	- 6.89		- 2.86	
1 month 3 months	54	- 2.55		- 1.92	
3 months 6 months	53	- 0.86		1.10	
6 months 1 year	20	- 1.56		- 1.45	
1 year	22	16.65		6.25	
			0.17		0.07
<u>V. Income Loss Per Month</u>					
None	55	- 5.51		- 3.01	
\$100	16	0.93		5.48	
\$100 but \$300	40	7.17		1.48	
\$300 but \$500	30	7.48		8.03	
\$500	28	- 8.11		- 8.99	
Independent Operator	2	2.24		14.54	
			0.17		0.15
Multiple R Squared					0.252

which are non-sedentary and who had no degenerative knee changes causes the presence of a posterior incision to approach significance ($p = 0.095$). These results are shown in Table 5.11. Those with posterior incisions returned to work a mean of 14.32 days later than those who did not undergo posterior incisions. Although these results are interesting, it must be noted again that the numbers are small.

4. The Effects of Intensity of Postoperative Rehabilitation

An analysis of variance in return to work for Community patients treated at different levels of intensity was conducted with the only other independent variable found to be significant, preoperative rehabilitation. The three cases of Community-treated patients for whom no record of the number of treatments received could be found were eliminated from this comparison. Table 5.12 gives the analysis of variance and multiple classification analysis for this comparison.

The intensity of postoperative treatment was not found to be significant when all cases were considered and excluding the three sedentary cases changed the results insignificantly. This analysis is not shown.

5. The Effects of Occupation

Throughout the previous analyses, the effects of occupation were controlled by eliminating sedentary occupations from all except the initial analysis of variance. As a final check of the effects of occupation upon return to work, analysis of variance was calculated incorporating occupation. This analysis indicated that occupation was a significant factor affecting return to work. Table 5.13 shows this analysis for all cases, and for cases with no degenerative changes of the knee.

Sedentary cases returned to work an average of 19.33 days earlier than non-sedentary cases. Adjusting for the effects of preoperative rehabilitation and postoperative rehabilitation increases this difference to 21.75 days. However, although the mean number of days return to work for sedentary occupations was 67.9 days, and the median only 54 days, five of the 21 cases with sedentary occupations returned to work at 90 days or later. The range of return to work for persons with sedentary occupations was from 7 to 243 days.

Table 5.11 Variations in the Number of Days Return to Work Due to the Type of Postoperative Rehabilitation, Type of Preoperative Rehabilitation and Presence of Posterior Incision for Those WCB Meniscectomy Cases with Non-sedentary Occupations and No Degenerative Changes of the Knee: 1976 & 1977

<u>Source of Variation</u>	<u>F Score</u>	<u>Significance of F</u>
I. Type of Postoperative Rehabilitation	8.148	0.000
II. Type of Preoperative Rehabilitation	7.371	0.000
III. Presence of Posterior Incision	2.819	0.095

MULTIPLE CLASSIFICATION ANALYSIS

Number of Cases = 150

Grand Mean = 83.60

<u>Variable and Category</u>	<u>Number of Cases</u>	<u>Number of Days Un-adjusted Deviation</u>	<u>Eta</u>	<u>Number of Days Adjusted Deviation</u>	<u>Beta</u>
I. <u>Type of Postoperative Rehabilitation</u>					
WCB Clinic	40	17.82		19.72	
Community	60	- 0.37		- 3.07	
None	50	-13.82		-12.09	
			0.31		0.31
II. <u>Type of Preoperative Rehabilitation</u>					
None	110	- 5.74		- 5.83	
WCB Clinic	16	22.40		14.44	
Community	22	3.76		9.79	
WCB Clinic and Community	2	94.90		97.42	
			0.36		0.34
III. <u>Presence of Posterior Incision</u>					
No Posterior Incision	126	- 2.29		- 2.38	
Yes Posterior Incision	24	12.03		12.49	
			0.13		0.14
Multiple R Squared					0.232

Table 5.12 Variations in the Number of Days Return to Work Due to the Effects of Preoperative Rehabilitation and the Intensity of Postoperative Rehabilitation, for WCB Meniscectomy Cases Receiving Postoperative Rehabilitation in the Community: 1976 & 1977

<u>Source of Variation</u>	<u>F Score</u>	<u>Significance of F</u>
I. Preoperative Rehabilitation	1.528	0.212
II. Intensity of Postoperative Rehabilitation	0.068	0.934

MULTIPLE CLASSIFICATION ANALYSIS

Number of Cases = 106

Grand Mean = 86.99 days

<u>Variable and Category</u>	<u>Number of Cases</u>	<u>Number of Days Un-adjusted Deviation</u>	<u>Eta</u>	<u>Number of Days Un-adjusted Deviation</u>	<u>Beta</u>
I. <u>Type of Preoperative Rehabilitation</u>					
None	70	- 5.33		- 5.31	
WCB Clinic	5	34.01		33.72	
Community	29	6.18		6.21	
WCB Clinic and Community	2	12.01		11.49	
			0.21		0.21
II. <u>Intensity of Postoperative Rehabilitation</u>					
Time intensive (4 or 5 treatments per week)	36	2.51		1.66	
Non-intensive (1 to 3 treatments per week)	68	- 1.09		- 0.63	
Began time-intensive then tapered off	2	- 7.99		- 8.44	
			0.05		0.04
Multiple R Squared					0.046

Table 5.13 Variations in the Number of Days Return to Work Due to the Type of Postoperative Rehabilitation, Type of Preoperative Rehabilitation and Occupation, WCB Meniscectomy Cases: 1976 & 1977

ALL CASES					CASES WITH NO DEGENERATIVE CHANGES				
<u>Source of Variation</u>	<u>F Score</u>	<u>Significance of F</u>			<u>F Score</u>	<u>Significance of F</u>			
I. Type of Preoperative Rehabilitation	15.360	0.000			12.878	0.000			
II. Type of Postoperative Rehabilitation	7.095	0.000			12.634	0.000			
III. Occupation	5.635	0.018			4.183	0.042			

MULTIPLE CLASSIFICATION ANALYSIS											
Number of Cases =	281					191					
Grand Mean =	85.79 days					80.99 days					
	<u>Number of Cases</u>	<u>Mean No.of Days Un- adjusted Deviation</u>	<u>Eta</u>	<u>Mean No. of Days Adjusted Deviation</u>	<u>Beta</u>	<u>Number of Cases</u>	<u>Mean No.of Days Un- adjusted Deviation</u>	<u>Eta</u>	<u>Mean No. of Days Adjusted Deviation</u>	<u>Beta</u>	
I. <u>Type of Postoperative Rehabilitation</u>											
WCB Clinic	82	19.17		18.84		49	23.13		20.65		
Community	109	0.65		- 0.75		71	0.93		0.73		
None	90	-18.26		-16.26		71	-16.90		-14.98		
			0.34		0.31			0.37		0.33	
II. <u>Type of Preoperative Rehabilitation</u>											
None	199	- 5.23		- 4.73		141	- 7.24		- 6.87		
WCB Clinic	36	19.96		10.85		20	30.96		20.23		
Community	42	0.64		5.75		27	3.45		9.23		
WCB Clinic and Community	4	73.96		77.50		3	103.01		104.92		
			0.28		0.25			0.42		0.39	
III. <u>Occupation</u>											
Non-sedentary	260	1.44		1.63		171	1.26		1.85		
Sedentary	21	-17.89		-20.12		20	-10.79		-15.84		
			0.12		0.13			0.09		0.13	
Multiple R Squared					0.188					0.292	

C. COSTS AND BENEFITS OF THE TYPES OF POSTOPERATIVE REHABILITATION

Direct payment costs were calculated using the 1977 fee schedule. The per diem rate for the WCB Clinic was \$20 a day. Hospital Outpatient Departments were paid \$6.50 per treatment session and private clinics received \$10.50 for the first treatment and \$7.40 per subsequent treatments. Table 5.14 shows the total number of treatments in each area for patients in the different rehabilitation categories. It is essential to remember that several patients underwent treatment in more than one area. (Patients were categorized according to the eight-week classification system explained in Chapter III, Study Methodology.) This results in treatment costs even within the classification of the non-treated rehabilitation group. Once more the outliers, those cases with return to work above 300 days, are excluded from this costing comparison. The three Community-treated patients for whom no record of the number of treatments could be found are also excluded.

Based on the 1977 fee schedule, the average cost of rehabilitating a Clinic patient was \$876.86. The average cost of rehabilitating a Community-treated patient was \$175.48, while the cost of returning the non-treated patient to work was \$32.12. Thus it cost almost five times more to treat a patient in the Clinic than in the Community, and 5½ times as much to treat him in the Community than to risk not treating him at all for the first eight weeks.

The per diem cost in the Clinic in 1977 was approximately two to three times as much as that in Community outpatient departments or in private clinics. Because WCB Clinic patients returned to work at a later date than Community patients, and because of the often more intensive treatment they received, the difference rises to five times the cost. It must also be noted that the eight Community patients (7.5% of total Community patients) who also received continuation of treatment at the WCB Clinic, represent 31.3% of the total Community costs. In addition, as the mean return to work time has indicated, wage loss benefits were paid for a longer period of time to WCB Clinic patients than to Community or non-treated patients. These were not calculated but they are a dollar cost to the organization.

It must be remembered that the \$20 per day which the WCB "pays" the Clinic for treatments is a "paper cost". It does not represent a dollar outflow to the organization as do payments to Community facilities. The

Table 5.14 Number of Treatments Per Rehabilitation Category, and Costs, WCB Meniscectomy Cases: 1976 & 1977

Rehabilitation Category	Total Number of Cases	Number of Cases Within Rehabilitation Category in Treatment Area	Range of Treatments Minimum Maximum	Mean Number of Treatments	Total Number of Treatments	Costs Per Treatment	Total Costs	Average Costs Per Case
I <u>WCB Clinic</u>	82							
WCB Clinic		82	2 118	43.5	3,570	\$20.00	\$71,400.00	
Outpatient Department		3	6 17	10.3	31	6.50	201.50	
Private Clinic		4	4 17	9.8	39	4@ 10.50 35@ 7.40	301.00	
							\$71,902.50	\$876.86
II <u>Community</u>	106							
WCB Clinic		8	13 87	36.4	291	\$20.00	5,820.00	
Outpatient Department		61	1 63	16.1	984	6.50	6,396.00	
Private Clinic		45	1 85	18.1	844	45@ 10.50 99@ 7.40	6,385.00	
							\$18,601.10	\$175.48
III <u>No Physical Therapy</u>	90							
Never treated		83						
WCB Clinic		3	19 62	44.0	132	\$20.00	\$ 2,640.00	
Outpatient Department		2	2 7	8.0	16	6.50	104.00	
Private Clinic		2	2 4	9.5	19	2@ 10.50 17@ 7.40	146.80	
							\$ 2,890.80	\$ 32.12

The \$20 covers not only the treatment of the patient, but also the operating costs of the Clinic (such as heat and electricity), the maintenance of a large support staff and the treatment of more involved and thus more expensive injuries such as amputations.

What is the benefit to the organization of treating patients in the Clinic? There is better reporting and thus the organization has more information about its clients. In addition, it is possible that the treatment of less involved injuries at the Clinic subsidizes the treatment of the more expensive injuries such as amputations. Finally, the Clinic possesses the potential for innovation in treatment and a coordinated approach to the rehabilitation of the industrially-injured worker.

SUMMARY

The number of days return to work was found to differ for the three postoperative rehabilitation populations. With the four outliers over 246 days removed from the analysis, the mean return to work time for Clinic-treated patients was found to be 105.0 days, for Community-treated patients 86.4 days and for non-treated patients 67.5 days. Through multivariate analysis of their effects on return to work, the type of postoperative rehabilitation and occupation were found to significantly affect return to work. The locale of preoperative rehabilitation was also found to be significant, with patients preoperatively rehabilitated in the WCB Clinic returning to work later than the other groups of patients. This finding is confounded by the fact that patients preoperatively treated at the Clinic tend to be the same cases postoperatively treated there; however, it was found that within each postoperative rehabilitation group, the subgroup treated at the Clinic (or at the Clinic and the Community together) returned to work the latest.

The effects of the age of the patient, degenerative changes of the knee, income, latency period, previous history of the knee, intensity of treatment and medial, lateral, or bilateral excision were not found to significantly affect return to work. For those non-sedentary cases with no degenerative arthritis, the presence of a posterior incision was found to approach significance; however, the number of cases with posterior incisions was small.

For Community-treated patients only, the effect of intensive therapy was not found to be significant.

The average dollar costs for treating a patient at the WCB Clinic was found to be almost five times greater than the costs of treating the patient in the Community and $5\frac{1}{2}$ times as much to treat him in the Community than to risk not treating him at all for the first eight weeks post-operative. There are the additional costs of the extra period on wage loss benefits for the Clinic patient. However, the treatment of the less involved injury such as meniscectomy at the Clinic may subsidize the treatment of more involved injuries and this may be a benefit to the organization.

This study has shown that treatment at the Clinic may be a factor in delaying return to work. The following chapter will examine this finding and develop some of the potential reasons behind the delayed return to work of the WCB meniscectomy patient treated at the WCB Clinic.

CHAPTER VI

DISCUSSION OF STUDY FINDINGS

The approach to the rehabilitation of the postoperative WCB meniscectomy patient has been found to affect significantly return to work. WCB meniscectomy patients who received postoperative physical treatment at the WCB Clinic returned to work an average of 27.3 days later than the WCB meniscectomy patient treated in the community. These community-treated patients returned to work an average of 21.9 days later than the WCB patient who received no postoperative physical therapy. Removing four men who returned to work after 300 days from these comparisons reduces these figures to 18.6 days and 18.9 days respectively, but the differences remain statistically significant. The impact of the different treatment times on costs is substantial.

The suggestion that treatment at the WCB Clinic is a factor delaying return to work is strengthened by the additional finding that preoperative treatment at the Clinic also appears to be a factor delaying return to work. Within each category of postoperative rehabilitation, the subgroups treated preoperatively at the Clinic were found to have the longest return to work time. Are there elements in the approach to treatment at the Clinic which result in any encounter with the Clinic adversely affecting return to work? Why does the no-rehabilitation approach result in the earliest return to work?

A framework for the analysis of the causes of delayed return to work at the Clinic or in the community relative to the no-treatment approach is given in Section A of this chapter. However, there are other approaches to the study findings which fall outside this framework. These involve the merits of return to work as the only outcome measure, possible long-term effects of treatment, study biases, and questions about the ability to generalize the findings. Attention to these considerations is given in Section B. Requirements for further research are discussed in the final section of this chapter.

A. A BEHAVIOURAL FRAMEWORK FOR RETURN TO WORK

Return to work is the behaviour which the rehabilitation process and the Workers' Compensation Board has as one of its goals. Such behaviour on the part of the patient is influenced by his self-image and this in turn

is affected by the definitions he receives from others. These definitions are inherent in the labels which are applied to him. The two labels which the work-injured person receives from the WCB are the labels "disabled" and "claimant". He is a claimant because he is claiming compensation and disabled because in order to receive wage loss benefits he must be assessed as unable to work.

1. The Label "Disabled"

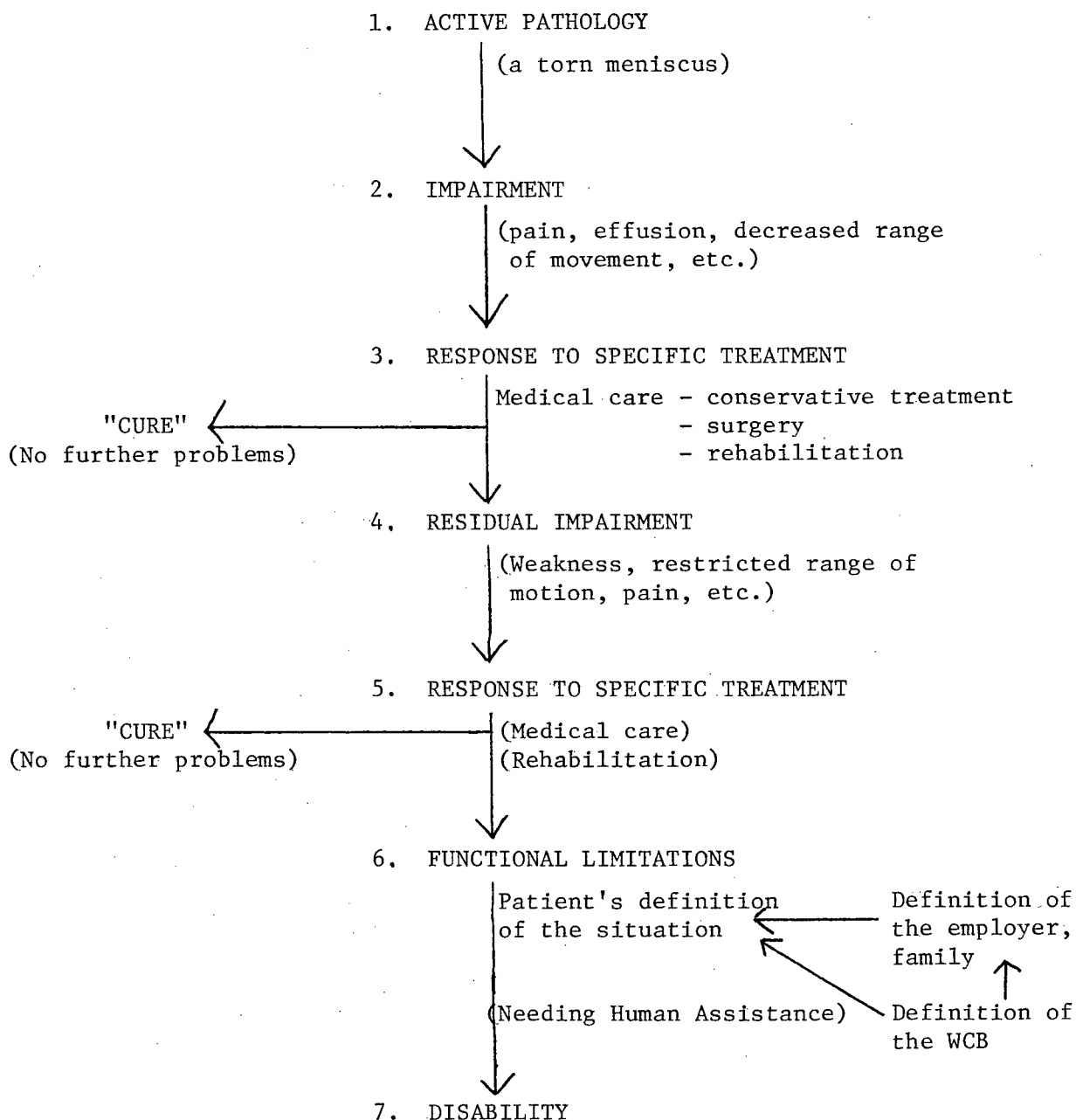
Disability is not a purely medical condition. Depending upon the specific situational demands, impairment, which is defined as any anatomic or functional abnormality or loss, may or may not disable the patient. Disability exists when situational characteristics exclude the injured patient, preventing him from pursuing gainful employment, family or social life, and when that patient is unable to find inclusion in any other suitable substitute situation. Impairment is a function of the person but disability is a function of the social situation (Reusch and Brodsky, 1968).

Figure 6.1 is a model of the pathway to disability adapted from Koshel and Granger (1978) to fit meniscectomy. In Figure 6.1 the situational definitions of the patient, his employer, family and the Workers' Compensation Board all affect functional limitations to produce disability. In the case of the WCB these definitions are not always subtle. The WCB reinforces the patient's self-perception of disability with each letter it sends him as a phrase such as "as long as you are disabled" is almost always included.

Sometimes the inferences are more subtle. A multidisciplinary, time-intensive approach to rehabilitation is commonly used in centres which treat major impairments such as amputations, neurological injuries or rheumatoid arthritis. However, when a patient with a meniscectomy or a patient with any simple single-joint injury encounters a clinic which offers him the possibility of therapies in four different departments daily, the message he may be receiving is that his injury must have much gravity to warrant such attention. What was a minor problem may become a serious affair due to over-emphasis.

Before the patient returns to work he may be offered a half-day or full-day work trial in the Industrial Department. Here, the subtle comparison may be to a sheltered workshop which to the patient may also convey the message "disability". Functionally limited persons in this environment may become disabled persons and doubt their ability to work.

Figure 6.1 Modelling the Pathway to Disability
(Adapted from Koshel & Granger, 1978)



2. The Label "Claimant"

The label "claimant" may suggest to the injured worker that he is in an adversary position to the agency which is receiving his claim, in this case the Workers' Compensation Board. As an adversary, he may view neither the WCB nor its physicians or rehabilitation personnel in an "agency role", that is, pursuing his welfare as a patient. Rather, he may view them with skepticism or distrust. Similarly, if WCB personnel regard the patient as a claimant, distrust and hostility develop on both sides. This resulting "litigious atmosphere" does not promote return to work as the patient perceives return to work as the interest of the WCB but not as his own interest. Ideally, return to work should be the goal of both the patient and the Workers' Compensation Board, but in a litigious atmosphere opposite goals may develop.

Under compensation, the primary concern of the "claimant" is to emphasize his disability. Otherwise, if he is "able", benefits may be terminated. This conflicts with the goals of rehabilitation which emphasize ability. The patient treated at the Clinic probably feels the conflict the greatest because he is under daily scrutiny as a "claimant". The community-treated patient probably does not associate his treatment as much with the compensation system, and the conflict is thus less acute. The non-treated patient has the least encounter with the health-care system or the WCB and thus he may experience the conflict the least.

3. Centralization

Centralization of the treatment of the industrially-injured patient may result in the intensification of this litigious atmosphere. While the WCB has better information due to centralization, the mixing of the new, non-hostile patient with WCB cases who may have already been defined as problems, and who most keenly feel and perpetuate this litigious atmosphere, may sow the seeds of skepticism in the new patient. Daily, in close encounter with each other, compensation patients may share and strengthen their grudges against the organization. Rehabilitation patients can be supportive of each other, but this support in the Clinic may result in a "we versus them" attitude. The litigious atmosphere thus builds and recovery may be delayed.

4. Patients' Expectations

The compensation patient may expect that as long as he is "disabled from work" he need not return to work. The patient may consider himself disabled as long as he possesses any signs of impairment. A multi-disciplinary, time-intensive approach to rehabilitation may heighten his expectations of ultimate cure and thus return to work is delayed.

From personal experience as a physiotherapist at the Clinic, the researcher has observed that compensation patients often become very passive about the course of treatment, partly due to their fears of alienating the organization and partly due to their belief that the ultimate responsibility for their life situation rests with the WCB. Feelings of passivity result in a loss of initiative and a resulting dependency upon the organization. The patient is not made an active participant in planning his treatment or his ultimate return to work. Rather, he abrogates all responsibility to the WCB, including responsibility for the decision to return to work.

5. The Role of Physicians and Rehabilitation Personnel

The physician and rehabilitation personnel treating WCB patients may have ambiguous feelings which result in delaying return to work. One aspect of the ambiguity is the hostility and suspicion arising from treating a "claimant". This may result in caution about treatment and the over-extending of the benefit of doubt to suppress these feelings of hostility and to recover their professional role as the patient's agent. These conflicts are felt most keenly at the Clinic where the personnel is in the direct employ of the WCB. To cope with these dual loyalties, rehabilitation personnel may blame either the agency for which they work or the patient. As return to work should be the goal of both the WCB and the patient, blaming either may delay return to work.

To recover his or her feelings as the patient's agent, the physician may become over-cautious in suggesting treatment. Rather, he or she suggests extending treatment another two weeks or beginning a half-day program or more occupational therapy, delaying return to work.

Community-treated patients too are claimants, but rehabilitation is removed from the agency against whom they are claiming. Treatment is not associated with the compensation system and the conflict is thus less acute. Community physicians and rehabilitation personnel may be regarded as the

patient's agents or adversaries depending upon the attitude they display toward him and the WCB. These attitudes may manifest themselves very complexly. For example, it may be conveyed to the patient that the physician is the patient's agent and that the WCB is the adversary of both of them. The patient may then trust the physician, mistrust the WCB, but believe the physician's advice on return to work. However, community physicians may not have return to work as one of their goals. As long as the patient is content and receiving his wage loss benefits, the physician may not see the need to press return to work. Similarly, because the patient is a compensation patient, any complaints on his part or any delayed recovery may result in the community physician and rehabilitation personnel treating him as a "claimant", and thus there is the possibility for the development of a litigious atmosphere in the community.

The non-treated patient receives the least feedback from the health-care system and thus is the least affected by the behaviour of health professionals within the system.

6. Difficulties With the Behavioural Framework

The behavioural framework for the analysis of the effects of three approaches to the rehabilitation of the WCB patient is confounded by alternative approaches to the study findings which include the merit of return to work as the only outcome measure, possible long-term effects of treatment, and study biases. There are questions about the generalizability of a framework developed from a study of meniscectomy. These difficulties are discussed in the following section of this chapter.

B. CONSIDERATIONS OF STUDY FINDINGS WHICH FALL OUTSIDE THE BEHAVIOURAL FRAMEWORK

1. Return to Work as the Only Criterion of Outcome

Return to work was chosen as the only criterion of outcome of this study because it was measureable retrospectively and because it was well suited to the goal-attainment model for program evaluation. However, return to work is a behavioural aspect of recovery. Pathophysiological considerations of functional or clinical outcomes were not included in this study. It is possible that those patients who returned to work at a later date had a better clinical outcome than those who returned to work earlier.

Pathophysiological recovery may have progressed in various ways. The three rehabilitation groups compared may have had similar pathophysiological responses, however, patients who received no rehabilitation may have returned to work earlier with more effusion and more functional limitations than those in the community. Patients in the Clinic may have waited until most or all signs and symptoms subsided before returning to work. Conversely, it is possible that the pathophysiological recovery was affected by the treatment area. Patients who underwent intensive treatment may have exacerbated effusions and therefore recovered later than those who received less intensive therapy. Karumo (1976) and Seymour (1973) found positive correlations between physiotherapy and effusions after meniscectomy. However, after reading all the case histories of the patients in the present study, the impression is that the pathophysiological responses after meniscectomy were similar for the three groups. There did seem to be more effusions, falls, back injuries and such in the Clinic group, however, this may have been due to better reporting. The attending physicians' clinical notes on the state of the knee did appear reasonably similar across the groups, although no attempt was made to verify this. The decision to return to work appeared to be fairly attitudinal on the part of both physician and patient.

The following physicians' reports on three cases are taken from the files. These illustrate the subjective responses of physicians to the presenting signs and symptoms of the patient's knee.

Case No. 1 - Patient Who Received No Postoperative Physical Therapy:-
42 days Postoperative, Report of the Attending Physician

Patient still complains of dull, aching pain in his knee particularly when he runs up stairs or uses his bicycle. His work involves a lot of stair climbing and we have explained to him that he will probably experience some ache in the knee for some period of time but that this is not going to damage the knee and in fact strengthening it through this sort of exercise is a good thing. We therefore suggest that he would be ready to work in ten days.

Case No. 2 - Patient Who Received No Postoperative Rehabilitation:-
80 days Postoperative, Report of the Attending Physician

Clinical review finds the knee functioning really pretty well. There is a little bit of synovitis reaction and the pes anserinus tendon is a little bit puffy and he can feel it skid a little bit as it excurses along the joint line during flexion and extension. Quadriceps is in good control, the patella is smooth. Incisional scar is healing nicely. I think there is enough rehabilitation in

this knee for a trial at work and he will go back on this basis in four days. I won't bother him with continuing visits unless he develops some problems and he knows he is welcome to bring it for my scrutiny.

Case No. 3 - Clinic Patient:- 70 days Postoperative, Report of the Clinic Physician

Continued excellent improvement. There are no pains in the knee, no effusion and he can now lift 15 lbs. He can flex to 125°, can hop and squat without any problem. Manipulation of the patella produces no pain and he has good integrity of all ligaments. The only disturbing feature is continued high degree of wasting on the left thigh and calf. The left thigh is 2 cms. less than the right one handsbreadth above the superior pole of the patella and the left calf is 1 cm. less in maximum circumference than the right. He tells me when he returns to work he will only be expected to walk around and not operate machines. If this is the case I feel he will be fit enough to return to work by the next consultation.

Review: Two weeks. In the meantime he is to continue with his Grade II R.T. and O.T. programs and he may have a cautious trial in the foot-powered lathe adjusted by the Occupational Therapist. He may be downgraded at their discretion at the first sign of any increased symptomology.

Same Patient as Above:- 84 days Postoperative, Report of the Clinic Physician

This patient has been doing very well and he is now lifting 20 lbs. isometrically in Room 36. The knee is cool and dry and he can flex it from full extension to 125°. He can jog and hop without discomfort. He has good stability of all ligaments. Impression: He is almost fit enough to return to work but I would like him to do a full-day program for a few weeks before doing so, though he may return to me earlier if he feels he can handle his job at an earlier stage. Review: Two weeks.

This is not to suggest that these reactions to the signs and symptoms of the knee are generalizable to all Clinic physicians or to all physicians who do not order postoperative therapy. However, it does suggest that a major aspect of return to work is attitudinal, and not a reflection only of the pathophysiological state of the knee. The literature review has indicated that a high percentage of post-meniscectomy knees maintain some symptoms and signs years after surgery. The decision to return to work with symptomology thus must be attitudinal.

2. Long-Term Results

This was a short-term study of the effects of meniscectomy on return

to work. There was no long-term followup. It is possible that the state of the patient's knee 20 years postoperative may vary with the approach to rehabilitation. Conceivably, early return to work may have adverse long-term effects, although it must be remembered that none of the groups in the study had earlier times of return to work than suggested in the literature. (See Table 2.1, page 11.) It is also possible that intensive therapy produces adverse long-term effects or conversely intensive therapy may produce positive long-term effects. Appel (1970) found that if patients who had osteoarthritis at the time of operation were excluded, postoperative muscular training gave rise to a significantly lower frequency of unsatisfactory results in the long run. Appel does not describe the intensity of the muscular training.

3. Study Biases

Throughout this thesis, an attempt has been made to stress its limitations. It has all the pitfalls of retrospective studies, such as inaccuracies of recording. The data was collected from files which had not been intended for this use, thus much interpretation was required to collect and codify the data in a meaningful way for analysis.

In a retrospective examination, assignment to groups is non-random. Selection of treatment facility was found to be based upon the physician's treatment philosophy. Certain physicians refer more often to the Clinic, others to community facilities while some do not routinely order physical therapy. These findings conform with those of Ward et al (1978) who found that the rate of referral of new outpatients seen by 18 orthopedic surgeons, to physiotherapy ranged widely; the differing characteristics of the patients did not account for these variations.

Some physicians in the present study did appear to vary their referrals. Whether this was due to the condition of the knee, accessibility, or change in treatment philosophy cannot be known.

It can be suggested that physicians refer their worst cases to the Clinic and indeed the Clinic population showed more evidence of osteoarthritis than the other groups. However, there were cases of severe osteoarthritis elsewhere but there were none found at the Clinic. The higher incidence of osteoarthritis at the Clinic may be partly explained by a number of factors. The classification of severity was dependent upon clinical records. A physician's description of osteoarthritis is very subjective. Thus, physicians who referred to the Clinic may define osteo-

arthritis more strictly than others. Clinic patients tended to receive their x-rays at the Clinic and the reports of these were always on file and often more detailed than reports from the community. An absence of any mention of the state of the knee at operation was interpreted as a normal knee; however, it is possible that there was osteoarthritis and this may have affected the incidence of osteoarthritis.

The retrospective classification of degenerative changes of the knee remains a weakness of the study. Aside from the problem that physicians differ on the labelling of changes, much subjective interpretation was required to limit the classification system to four categories.

A reviewer recently criticized the labelling of the patient referred to in the operative and x-ray report on page 42 as a case of "minimal" degenerative changes. He suggests that a mention of "medial joint degeneration" in the operative report, and an x-ray finding of "a joint already narrowed" should be considered as being "moderate" if not even "severe". The "narrowing" suggests sufficient wearing or erosion of weightbearing cartilage which must be considerable to visually narrow the space on x-ray. This case was labelled as "minimal" partly because the x-ray report referred to "minor cartilage damage", similar to other reports studied. In the subsequent four months, further damage to the joint could occur. Without a descriptive operative report, labelling the case remained a problem.

Classification is a pitfall of retrospective studies. Because of the discomfort with the classification system for degenerative arthritis, all cases of degenerative arthritis were eliminated from the final analyses performed. Unfortunately, no mention of degenerative arthritis does not necessarily indicate that the joint was sound unless the surgeon made reference to the state of the joint.

If resources had been available, it would have been preferable to review all x-rays with a radiologist. However, the operative reports would have remained inaccurate. Unfortunately, this weakness can be eliminated only by a prospective study with careful visualization of the knee during the operative procedure by one examiner, or a few who have standardized methods of examination.

4. Generalizability of the Study Findings

Can the behavioural framework of analysis of the causes of delayed recovery post-meniscectomy be applied to other disorders aside from meniscectomy? Further investigation is required to determine if the

findings of the study are specific to the period studied, to meniscectomy only, or to all disorders. Ideally, a prospective examination of another condition should be initiated. Prospective examination would allow for more control. Another morbid condition would indicate the generalizability of the findings.

In the specific example of the compensation patient post-meniscectomy, physical therapy may be unnecessary or even delay return to work. It is not suggested that this finding can be generalized to other knee conditions or to the non-compensation patient, without further investigation of the value of physical therapy.

C. REQUIREMENTS FOR FURTHER RESEARCH

1. The Need for a Medical Information System

That the WCB is eager to sponsor research projects has been made evident by the excellent support that it has given this project. This thesis has shown that through a retrospective study of WCB files, outcome evaluation is possible. Whether or not the WCB concurs with the conclusions of this study, the information which it has provided in reference to morbidity data, demographic data and referral patterns information, all have contributed to the Board's knowledge about itself, knowledge which it has in its possession but for which a simple retrieval mechanism does not exist.

The WCB is a major source of medical information. It constantly receives information of high potential for the study of morbidity, evaluation of medical care and occupational health research. Unfortunately, this information is contained in individual claim files. There is presently no system which codifies and computerizes this information. Data for this study was gathered by hand through an examination of all meniscectomy claim files from a certain period. It was a slow, expensive, painstaking process and is a deterrent to research. The WCB does have a computerized information system for payments but it does not have a Medical Information System.

In internal WCB reports, Dr. C. Robertson, former Medical Officer, has documented the need for a Medical Information System. This study is an example of the type of research which could be done if such a system were available. The Board would possess a medical data bank invaluable to itself for self-evaluation and to the health-care system as a whole. Such a system could function for medical audit and could contribute to the setting

of standards of care or criteria for management.

Dr. Robertson has documented the research possibilities which a proper Medical Information System could contribute. The Board would be able to study time loss by diagnosis. It could do outcome evaluation and study the effectiveness of physiotherapy according to its time, initiation and duration. It could do comparative studies of conservative versus surgical treatment. It could initiate prospective studies. Accident prevention could receive morbidity data which demonstrates the health problems experienced in industry.

Without such a system the Board can continue to sponsor studies such as this one. However, the WCB is missing the wealth of information it has in its possession but cannot retrieve. The quality of the studies and the numbers of studies would all improve with a well-thought-out medical and management information system.

2. The Need for Rehabilitation Research

This study has found that for the WCB meniscectomy patient, no postoperative physical therapy was the most effective in returning the patient to work. Can this finding be generalized to non-compensable cases? There is a need for much more program evaluation within rehabilitation. Many rehabilitation procedures have in the past been accepted on faith. Documentation is now required to prove or disprove effectiveness.

3. The Need for Compensation Research

Compensation is a growing element in society yet it is not understood. The compensation patient and the WCB have been much maligned to the detriment of themselves and the health professionals serving them. There is a need for vigorous research to determine the effect of compensation on recovery. It must be determined what elements within compensation produce these effects. The compensation system is under attack from many segments of society, yet presently, without research, it does not have the self-knowledge to defend itself effectively.

CONCLUSIONS

The behavioural framework for the analysis of the effects of rehabilitation of the WCB meniscectomy patient is a complex, interactive process between the patient, the physician, rehabilitation personnel and the WCB. There is no one element within the process which can be isolated as primarily responsible for delayed return to work of the Clinic patient. Confounding the behavioural framework are alternate approaches to delayed return to work which include the merit of return to work as the only outcome measure, possible long-term effects, the generalizability of meniscectomy to other conditions, and selection biases.

The object of this thesis has been to examine the WCB system of rehabilitation. Although it has been concluded that the approach at the WCB Clinic delays return to work, it is not suggested or believed that this thesis is a definitive statement of cause or effect. Rather, it must be taken as a preliminary investigation into the efficiency and effectiveness of the WCB model of rehabilitation.

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APPENDIX

Tables of

Diagnostic Examinations with

Availability of Reports

Table I Number of WCB Meniscectomy Cases Who Experienced Preoperative X-ray Examination, and Availability of Reports, 1976 & 1977

	<u>Number of Cases</u>
Patient underwent x-ray, report on file	212
Patient underwent x-ray, no report on file, but findings mentioned in physician's report	34
Patient underwent x-ray, no report on file and findings not mentioned	7
No x-ray	<u>32</u>
Total Cases	285

Table II Number of WCB Meniscectomy Cases Who Experienced Preoperative Arthrographic Examination, and Availability of Reports, 1976 & 1977

	<u>Number of Cases</u>
Patient underwent arthrographic examination, report on file	114
Patient underwent arthrographic examination, no report on file	26
Patient did not undergo arthrographic examination	145
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Total Cases	285

Table III Number of WCB Meniscectomy Cases Who Underwent Preoperative Arthroscopic Examination, 1976 & 1977

	<u>Number of Cases</u>
Patient underwent arthroscopy, report on file	23
Patient underwent arthroscopy, no report on file	2
Patient did not undergo arthroscopy	260
	<hr/>
Total Cases	285

Table IV Number of Claim Files Which Contained Operative Reports,
WCB Meniscectomy Cases: 1976 & 1977

	<u>Number of Files</u>
Operative report on file	255
Operative report not on file, but pathology report available	2
Operative report not on file, but hospital discharge summary available	6
Operative report not on file, no pathology report or discharge summary available	22
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Total Files	285