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Subjective Quality of Life in Total Knee Replacement Secondary to Osteoarthritis

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SUBJECTIVE QUALITY OF LIFE IN TOTAL KNEE REPLACEMENT SECONDARY TO OSTEOARTHRITIS

by

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Bachelor of Science in Physical Therapy
University of North Dakota, 1999

An Independent Study
Submitted to the Graduate Faculty of the
Department of Physical Therapy
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in partial fulfillment of the requirements
for the degree of
Master of Physical Therapy

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2000
This Independent Study, submitted by Jim Cenova in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

(Faculty Preceptor)

(Graduate School Advisor)

(Chairperson, Physical Therapy)
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Title Subjective Quality of Life in Total Knee Replacement Secondary to Osteoarthritis

Department Physical Therapy

Degree Master of Physical Therapy

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ABSTRACT

Osteoarthritis is the most common referring diagnosis for total knee replacement surgery. It is estimated that one-third of community-living persons between the ages of 63 and 94 have osteoarthritis of the knee. It is further estimated that fully 40% of these people experience pain. Many of these people look for relief in total knee replacement surgery. Total knee replacement surgeries are a costly procedure commonly performed. There were approximately 210,000 primary knee replacements performed in 1994. This resulted in an estimated cost of $5 billion.

The purpose of this paper is to examine quality of life and its association with total knee replacement surgery. It is expected that quality of life will improve. However, is the increase in quality of life justified by the expense? This literature review will provide information to the health care provider as well as the consumer. Better decisions regarding health care dollar expenditure can be made given this quality of life information. This baseline quality of life information can be combined with the patient's goals to determine appropriate intervention. If the quality of life will not be greatly improved, surgical intervention could be postponed. On the other hand, if patient's goals and baseline quality of life illustrate opportunity for improvement, surgery may be indicated. The most efficacious interventions must provide the greatest benefit to the patient while at the same time limiting the associated costs.
CHAPTER I
INTRODUCTION

Osteoarthritis is the most common referring diagnosis for total knee replacement surgery. It is estimated that one-third of community-living persons between the ages of 63 and 94 have osteoarthritis of the knee\textsuperscript{1}. It is estimated that 40% of these people experience pain. Many of these people look for relief in total knee replacement surgery.

Total knee replacement surgery is a costly procedure which is commonly performed. There were approximately 210,000 primary knee replacements performed in 1994\textsuperscript{1}. This resulted in an estimated cost of $5 billion. It is, therefore, imperative that financial responsibility be exercised. Financial responsibility cannot be exercised if outcomes of interventions are not measured.

The purpose of this paper is to examine subjective quality of life questionnaires in the literature. This will be beneficial to providers of healthcare, consumers of healthcare, and reimbursement parties. Decisions about interventions can be made with much more accuracy and confidence if issues of current quality of life have been explored. Potential gains from intervention can be identified.

Subjective quality of life change associated with total knee replacement is extremely important. Because this procedure is very costly and the numbers are staggering, efficacy of its palliative and functional change need to be demonstrated; these are best demonstrated through subjective quality of life questionnaires\textsuperscript{1}. 

\textsuperscript{1}
There are many questionnaires utilized to measure many different topics specific to medicine. This paper will focus on subjective quality of life questionnaires. Given the research that has been published, measuring subjective quality of life change before and after an intervention is the only way to effectively measure change as perceived by the patient.
CHAPTER II
OSTEOARTHRITIS

Osteoarthritis is the most common rheumatic disease. Osteoarthritis is defined as a degenerative joint disease. This disease is characterized by a progressive loss of articular cartilage (the cartilage at the ends of bone that touch each other) and by changes in joint structure and subchondral bone. Osteoarthritis becomes more prevalent with increasing age.

Many causes of osteoarthritis have been identified; among these are occupation, lifestyle, and genetic factors. Obesity may also play a role because of the additional mechanical stresses placed on weight-bearing structures. Additional causes include increased age and previous history of injury to the associated joint. The injury does not necessarily have to be to the articular cartilage; it can be to any portion which would alter the weight bearing biomechanics.

Because the knee is a joint in which, biomechanically, it is in a constant state of weight bearing, it is highly vulnerable to osteoarthritis. It is because of this vulnerability that the knee is one of the most common sites for osteoarthritis. According to Kee et al., the joints most frequently affected are the fingers, the base of the thumb, the neck and lower back, hips, knees, and great toe.

There may often be a predisposing factor for osteoarthritis formation in the knee such as injury to the articular surface, a torn meniscus, ligamentous instability, or pre-existing deformity of the knee. In addition, a great many patients present with
osteoarthritis of unknown etiology. This fact makes osteoarthritis one of the more elusive
diseases to treat.

Clinical manifestations of osteoarthritis may be mild to severe. These include:
1. Enlarged joints
2. Crepitus with movement
3. Pain with function
4. Muscle atrophy
5. Swollen, warm joints
6. Stiffness (which may or may not accompany crepitus).

Common clinical manifestations also include the formation of Heberdeen’s nodes.

Differential diagnoses for osteoarthritis include rheumatoid arthritis (RA),
Systemic Lupus Erythematosus (SLE), scleroderma, and infectious arthritis. Although
all of these diseases can, at times, manifest similarly to classic osteoarthritis, there is
usually one underlying feature that sets it apart.

Rheumatoid arthritis (RA) is very closely related to osteoarthritis. It is, however,
classified as an immune-mediated disorder. This implies a detectable immunoglobulin
factor present in the blood which is not present with osteoarthritis. It is known that
rheumatoid factor (antibody to IgG, IgM, or both) is present in 60 percent to 80 percent
of adults and approximately 20 percent of children with RA.

An additional identifiable difference between osteoarthritis and rheumatoid
arthritis is the pain. Characteristically, osteoarthritis pain is relieved by rest, or this pain
may come on after a period of rest. Rheumatoid arthritis, on the other hand, has pain which is not altered by rest or activity. Although rheumatoid arthritis pain is traditionally worse in the morning, this is not always the case\(^5\). As was stated before, pain from osteoarthritis is generally not time-dependent. It is, however, activity-dependent.

Tests utilized to differentiate osteoarthritis and rheumatoid arthritis include biopsy of the joint\(^5\). In rheumatoid arthritis, the joint capsule will be made up of a thickened synovium (pannus) which is not necessarily present in osteoarthritis. However, in osteoarthritis, there will be severe decay of the articular surface cartilage. This can also be verified by radiography; illustrated in osteoarthritis, there will be a decreased joint space that will not be found with rheumatoid arthritis\(^5\).

Osteoarthritis by definition is limited to joints. Rheumatoid arthritis, however, can affect various organs as well as joints. These clinical manifestations may be verified by the existence of co-morbidities such as pericarditis, scleritis, arteritis, and lymphadenopathy\(^5\).

Systemic Lupus Erythematosus (SLE) can be differentiated from osteoarthritis by its classic butterfly rash. Traditionally, acute cutaneous lupus erythematosus manifests with a butterfly rash which appears on the face\(^2\). The rash, usually symmetrical, is red, mildly scaly, and may be accompanied by purpura. These purpura are defined as hemorrhages into the skin\(^6\).

SLE can also be differentiated from osteoarthritis by its period of remission and exacerbation. Although osteoarthritis sufferers may have “good days” and “bad days,” the apparent difference between the two is not nearly as pronounced as the difference between remissions and exacerbations associated with SLE.
Scleroderma may present with similar symptoms to osteoarthritis. These include tenderness around joints and an increased pain during motion. However, unlike osteoarthritis, scleroderma is an immune-mediated disorder (as are RA and SLE).

Scleroderma has characteristic signs of degeneration and inflammatory changes leading to fibrosis\(^2\). These changes manifest in virtually all of the connective tissue in the body. This includes blood vessels, skin, and the synovium of joint capsules. It is the latter which gives the close assimilation to osteoarthritis.

Clinical manifestations of scleroderma which help to differentiate from osteoarthritis include Raynaud’s phenomenon. Raynaud's phenomenon is described as blanching or cyanosis of fingers or hands on exposure to cold or emotional stress\(^2\). This occurs in approximately 75 percent of patients with scleroderma\(^7\). Skin changes associated with scleroderma include the characteristic thickening of the skin\(^7\) which may spread to the arms, face, and trunk\(^8\). In addition, bilateral swelling may be present in the hands, fingers, and feet.

Infectious arthritis results from hematogenous infection in the joint. This phenomenon of bacteria present in the blood stream is compounded by the highly vascular nature of the synovium. With the limited space associated with the joint capsule, the potential for exponential destruction lies in the possibility of the organism getting trapped in the synovium\(^7\).

Bacteria present in the joint capsule creates quite a conundrum. The unicellular nature of the synovium provides great strength and protection to keep the joint space clear from matter which should not be present. It is in this strength, however, that infectious arthritis has its leverage. Once organisms gain access to the joint space, the
body has a difficult time ridding itself of them; advancing infection causes a breakdown of synovium and cartilage. The most common non-gonococcal bacterium involved in bacterial arthritis is *Staphylococcus aureus*.9

A simple method for differentially diagnosing infectious arthritis from osteoarthritis is a hematologic analysis. Osteoarthritis should present bacteria-free. However, by definition, infectious arthritis will have organisms present.

Signs and symptoms of infectious arthritis differ from osteoarthritis in that infectious arthritis manifests as inflammation. This inflammation is localized to the joint(s) involved and is usually traceable to some type of introduction of organisms such as a recent cut, surgery, or illness. Osteoarthritis is characteristically non-inflammatory.

Crepitus associated with osteoarthritis is attributed to changes in the articular surfaces, whereas crepitus (if present) with infectious arthritis is associated with changes of the synovium. These differences can also be verified by radiography.

The cause of pain associated with osteoarthritis is elusive. In a classic experiment by Wright, Dowson, and Longfield10, the stiffness associated with resting an osteoarthritic joint came from changes in the joint capsule. Symptoms vary widely between patients' physiological or morphological changes and their reported pain levels. The complaint threshold is identified as the amount of pain the patient is able to tolerate before seeking measures to minimize or stop the pain. Factors identified as lowering the complaint threshold include menopause, problems in the patient's personal life such as family or business worries, or bereavement and depression11. As identified previously, pain is the most significant symptom associated with osteoarthritis. Pain which decreases
function is the most significant factor in patient willingness to undergo surgical intervention.
CHAPTER III
TOTAL KNEE REPLACEMENT SURGERY

Approximately 210,000 primary knee replacements were performed in 1994. This resulted in an estimated cost of $5 billion\(^1\). Obviously, due to the magnitude of numbers, costs associated, and the trend of increasing the number of surgical procedures, this issue needs close exploration.

As the population ages, the likelihood of osteoarthritis increases. Because osteoarthritis is the most common referring diagnosis for total knee replacement, these issues are closely tied together.

In a study by Westmoreland et al\(^2\), total knee replacement candidates were grouped according to their age. The “old” group was established as those 85 and older at the time of their surgery. The “young” category was defined as those between the ages of 65 and 84 at the time of their surgery. The time interval chosen by the authors was between 1985 and 1990. By examining Medicare Part A claims, the number of total knee surgeries performed was discovered to be 354,259. Of these 354,259 total knee surgeries, 15,443 were performed on the “old” category. The remaining 338,816 were performed on the “young” category. It was estimated that the rate of total knee replacement surgery for the “young” group was 4 per 1000 per year and was 0.18 per 1000 per year for the “old” group.

Mean total charges were $15,586 for the “old” and $14,359 for the “young” group. Although the postoperative stay was slightly longer (13.4 days compared to 11.9
days) for the “old” versus the “young,” it was the authors’ conclusion that postoperative mortality stayed about the same for both groups. There was only a slight increase in utilization of resources for the “old” group. It is their contention, then, that age should not preclude the “old” from undergoing elective total knee replacement\textsuperscript{12}.

Reported by Caller et al\textsuperscript{13}, the national average total knee replacement surgery cost about $11,000 in 1989. Although these data may seem antiquated, the costs remained stable from 1985-89. This indicates that costs of surgery have not risen, rather, the number of surgeries has drastically increased. This has led to the increased healthcare expenditure associated with total knee replacement surgery. One factor which may influence the cost of total knee replacement surgery is the type performed.

Traditionally, osteotomies have been used to correct deformities or to change the shape of the bone to relieve pain associated with osteoarthritis\textsuperscript{3}. Tibial wedge osteotomies can be performed in place of total knee replacement. However, Port et al\textsuperscript{14} report that even for experienced surgeons, wedge osteotomy may be difficult to perform.

Port et al\textsuperscript{14} go on to propose that this increased difficulty may lead the surgeon to choose a knee replacement, even in young and active patients. Another noteworthy item is rate of revision surgery. Revision surgery for an osteotomy has only one alternative: prosthesis implantation. Therefore, it is the opinion of many, that postponing the inevitable does very little and does not justify the use of wedge osteotomy in very many cases\textsuperscript{15}.

Many different types of arthroplasty exist. For brevity’s sake, only the main ones will be listed here. Apley\textsuperscript{3} defines them as follows:
Excision arthroplasty: sufficient bone is excised to create a gap at which movement can occur.

Partial replacement: only one articular surface (or part of the surface) is replaced by a prosthesis. The prosthesis is kept in position either by acrylic cement or by a cementless fit between implant and bone.

Total replacement: both articular surfaces are replaced by prosthetic implants; for mechanical reasons, the convex component is usually of metal or ceramic and the concave of high-density polyethylene. They are fixed to the host bone either with acrylic cement or by a cement-less press-fit technique.

It is this latter that most time will be spent discussing. Three main types of total knee arthroplasties/replacements have been elucidated in the literature. They are as follows:

A. Unicompartmental: the same side of the tibial plateau and femoral condyle are replaced.

B. Bicompartmental: both femoral condyles and the tibial plateau are replaced.

This, however, is rarely used because of its poor results.

C. Tricompartmental: both femoral condyles, the tibial plateau, and the posterior patella are replaced.

In an article presented by Callahan et al\textsuperscript{16}, a meta-analysis was performed on 46 studies of unicompartmental and 18 bicompartamental prostheses. The total number of patients enrolled was 2,391. For the unicompartmental patients, the complication rate and revision rate was 18.2% and 9.2%, respectively. The rates of complication and revision for the bicompartamental patients was 30% and 7.2%, respectively.
The tricompartmental total knee replacement has illustrated the best results, and is, therefore, the most commonly performed knee joint arthroplasty. The plate used to replace the femoral condyles is a porous in-growth type. The tibial plateau, however, is usually cemented into place using polymethylmethacrylate.

There are three main types of the tricompartmental total knee replacement. They are as follows:

A. Unconstrained: there is minimal restriction of movement.
B. Semi-constrained: there is no restriction of movement once all surfaces have been proven to be stable
C. Fully constrained: only flexion and extension are allowed. This type has a high rate of failure.

The most common type of tricompartmental total knee replacement is the semiconstrained. This has demonstrated the best results and has been better tolerated by patients.

A very real issue associated with any major surgery is complications; total knee replacement surgery is not exempt. In a study by Norton et al\textsuperscript{17}, an average 30 day death rate following total knee replacement showed a 0.63% risk. The researchers also found that overall for acute general hospitals, more surgery was associated with a lower complication rate in total knee replacement surgery. As volume increased, complications decreased at a similar rate.

Dittus et al\textsuperscript{18} also examined complications associated with total knee replacement surgery. Over a six-year period they gathered data from 338,376 knee replacement recipients. Of these, 2,147 died. This gave them a death rate of 0.63%. Further analysis
showed that of the 0.63% who died, 35.2% died during the first week after surgery. This decreased for weeks two and three, then led to an even more impressive decrease to 16.3% for days 22 through 30 post-surgical.

There has long been a debate about the appropriateness of surgical intervention, and at what time this intervention should be implemented. Critics of Canada’s universal healthcare coverage point to the fact that those requiring medical attention often have to wait excessive amounts of time\textsuperscript{18}. This, however, provides a stark comparison to our own Capitalism-based healthcare system.

In a study by Ho et al\textsuperscript{19}, 185 randomly selected knee replacement recipients discharged from five Ontario hospitals between 1985 and 1990, were telephoned and mailed follow-up questionnaires. These questionnaires probed for information such as waiting times for their initial orthopedic consultation, subsequent knee replacement surgery, and their acceptance of these waiting times.

Two categories were generated based on satisfaction with surgery: acceptable and non-acceptable. The mean wait time for the initial consultation was 4.0 weeks for the acceptable group and 9.5 weeks for the non-acceptable group. Waiting time for surgery was 13.2 weeks for the acceptable group versus 34.3 weeks for the non-acceptable group.

These results are in stark comparison to a study posited by Coyte et al\textsuperscript{20}. This study compared 1,486 Medicare recipients and 516 people from Ontario. Both groups of subjects had been hospitalized for knee replacement between 1985 and 1989. They were surveyed by mail in 1992.

Of the eligible respondents, the median wait time in the United States was 3 weeks compared to 8 weeks in Ontario. Following suit, 95% of patients in the US
considered their waiting time acceptable, compared with 85.1% in Ontario. However, overall satisfaction rates did not differ dramatically. In the US, 85.3% stated they were “very or somewhat satisfied.” Compare this to 83.5% of Canadians who felt the same way\textsuperscript{20}.

Waiting time is not an isolated issue, however. Issues about the medical management of osteoarthritis also need to be examined. In a study by Riley et al\textsuperscript{21}, a community-based cohort was created to compare patient satisfaction of surgical management cases and medical management cases. Each of these groups was mailed two surveys, one of which was a generic questionnaire, the SF-36. In addition, they were given a validated, knee-specific measure of functional status and pain, the Western Ontario and McMaster University Osteoarthritis Index (WOMAC).

Satisfaction with knee care was measured using a single 5-point Likert question (very satisfied—very dissatisfied: 1-5). At baseline, there was no difference in satisfaction with knee care (2.7 vs. 2.8). Contrastingly, at six months, surgical patients had much greater satisfaction with care (2.6 vs. 1.6). Therefore, the authors’ position is that the surgical group attained a higher level of satisfaction after some time was allowed to pass after surgery. They caution, however, that unmeasured factors unique to surgical management need further examination\textsuperscript{21}.

In a study by Lubitz et al\textsuperscript{22}, two groups were created to study. Both groups had severe knee osteoarthritis. Members of the surgical group had elected to have surgical management, whereas the medical group preferred medical management. Baseline data were gathered and compared. The surgical group had a baseline pain of 16 (5-25;
5=worst, 25=best), whereas the medical group had a baseline pain of 13. Functionally, the surgical group had a 55 (17=worst, 85=best), whereas the medical group had a 45.

Follow-up data attained after two years illustrated changes with both groups, but more pronounced changes associated with the surgical group\textsuperscript{22}. Pain levels had decreased in the surgical group from their baseline of 16 to 7.8, whereas the medical group only dropped from 13 to 11.9. Functionally, the surgical group dropped their score (increased their function) from 55 to 30.3. The functional change attained by the medical group was from 45 to 42.4. The data generated illustrates the principle that when viewing interventions, the long-term effects need to be examined.

Results obtained from the SF-36 questionnaire also distributed during this study illustrate that surgical patients had greater mean improvements in all domains measured by the SF-36. Physical function increased 27.5 points (out of 100) for surgical, whereas medically managed patients increased only 1.9, body pain improved by 25 points compared to only 1.9, social function increased 20.1 compared to decreased 2.6. Similarly, role emotional and role physical improved 15.8 and 30.8 for surgical patients, respectively. Medical management showed a decrease of 2.4 and 0.6, respectively\textsuperscript{22}. 
CHAPTER IV
QUALITY OF LIFE

Quantifiable outcome measures for disabling diseases such as osteoarthritis are necessary if we are to compare the benefits of different interventions. This is becoming increasingly important with the decrease in expendable financial resources. In addition, the expenditure of financial resources has to be justified and the best way of spending money identified. Quantifying the benefit of an intervention is, therefore, important.

In this presentation, quality of life is defined as: "individuals' perception of their position in life in the context of the cultural and value systems where they live in relation to their goals, expectations, standards, and concerns." Quality of life is a broad concept. It involves social well-being, physical health, psychological state, level of independence, social relationships, environmental factors, and personal beliefs. All of these items factor into one's determination of his or her quality of life.

In the literature, a wide range of components to determine quality of life exist. Among these are functional ability, including role functioning, the degree and quality of social and communal interaction, psychological well-being, somatic sensations, happiness, life situations, satisfaction with life, and need satisfaction. Obviously no single definition of quality of life is universal and applies to everyone. Therefore, the definition previously given will be used here. Surveys are an effective way of measuring health care efficiency. Quantifiable outcomes and patient's perceived quality of life can be measured appropriately utilizing these questionnaires.
Several health status measures exist. These will be mentioned briefly here. Then, if applicable, will be expanded upon to provide the reader with more insight about that particular measuring device. Surveys included in this list are the Beth Israel/UCLA Functional Status Questionnaire (FSQ), Nottingham Health Profile (NHP), Duke Health Profile, Dartmouth COOP Function, McMaster Health Index, Rosenberg Self-Esteem scale (RSE), General Health Questionnaire 28 (GHQ 28), and the related short forms: Medical Outcomes Study (MOS) Short Form 36 (SF-36), MOS SF-20, and MOS SF-12.

The Beth Israel/UCLA Functional Status Questionnaire (FSQ) is a multiple-choice instrument designed to assess six aspects of well being. These are:

1. Physical health
2. Mental health
3. Psychological function
4. Social activities
5. Work performance
6. Quality of interaction

According to Jette et al, the FSQ has been shown to be a reliable and valid instrument in an ambulatory and chronically ill population attending outpatient clinics. It is also, reportedly, useful in changing therapies or changing type of intervention.

The Nottingham Health Profile (NHP) was originally developed in Great Britain in the late 1970s and has been tested extensively throughout Europe. The NHP contains 38 questions with a yes/no format, describing problems on six health dimensions. These are:

1. Energy
2. Pain
3. Emotional reaction
4. Sleep
5. Social isolation
6. Physical mobility

According to Jenkinson et al.\textsuperscript{31}, the Medical Outcomes Study Short Form 36 (MOS SF-36), however, is a more comprehensive measure than either the NHP or the FSQ. This questionnaire has 36 questions with a multitude of possible answers. This variation in answering capabilities allows the numerical component (the sum of all dimensions) to represent a more true representation of the patient's perception of his or her quality of life. The questionnaire is divided into eight continuums of health. These are:

1. Physical functioning
2. Role limitation due to emotional problems
3. Role limitation due to physical problems
4. Social function
5. Mental energy
6. Pain
7. Energy
8. Health perception

In contrast to the NHP and the SF-36, which measure multiple dimensions of health, the General Health Questionnaire 28 (GHQ 28) measures only the patient's
psychological well-being\(^{32}\). Similar problems exist with the Rosenberg Self-Esteem Scale (RSE)\(^{33}\). This device measures only subject's self-concept.

There are, however, more specific measures for health status. For purposes of brevity, in this paper only those pertaining to orthopedic procedures will be discussed. These include: The Arthritis Impact Measure Scale (AIM)\(^{34}\), Western Ontario McMaster University Osteoarthritis Index (WOMAC)\(^{35}\), and the Function Milestone Scale\(^{37}\).

These measures can be limiting, however. Quality of life determination, whether it is through a subjective or objective questionnaire, requires more assessment than any of these measures can prove. When used appropriately, however, these can be useful as measures for determining potential benefits from orthopedic intervention.

In a quality of life study by Campbell\(^{36}\), an interesting age-related difference appeared. Satisfaction increased continuously with age. The relevance of this conclusion to this study, you will recall, is that the propensity for osteoarthritis increases with age. Campbell\(^{36}\) posed as a reason for his conclusion that, as people become older, their achievements increase and their aspirations decline, until eventually the gap closes. This may or may not affect the rehabilitation of the patient.

Construction of quality of life questionnaires is not a simple task; it is a major undertaking. Many factors need to be taken into consideration, including domain representation of health concept, long form with many questions versus short form with few questions, and ordinal/rank order data versus interval/numeric score derivation.

McHorney et al\(^{38}\), pointed out that questionnaire "side effects" may appear if a limited amount of health concepts are examined. Among these are coarseness (definition
of relatively few levels of health), lower score reliability, and more restricted representation of all the important domains of a health concept.

Ware et al\textsuperscript{39}, continue this discussion of form construction by discussing the trade-off present in the construction of a short form versus a long form health survey. Breadth, an issue of comprehensiveness, and depth, precision in measuring each concept, are at odds. To achieve breadth, the number of questions must be large. This is the antithesis to achieving depth which requires that fewer questions be utilized. In addition, their focus is to become more specific.

This strikes a good argument of how short can a form be without compromising the reliability of the results obtained. Clinical usage of a form dictates the ease with which the form can be completed as well as the shortened length. Simply providing a person with a form to fill out does not guarantee compliance. The more complicated the form, the less likely the person is to fill it out completely and correctly.

Another confounding variable may present itself such as bias if office staff or hospital personnel assist patients with the filling out of questionnaires. If the authors intended the patients to fill them out alone, this could potentially harm the overall results obtained by the study.
CHAPTER V
ECONOMICS

With the decline in available health care dollars, third party payers are becoming increasingly selective in services for which reimbursement is given. Not immune to this phenomenon is elective total joint replacement. As mentioned previously, the most common disabling disease requiring total joint replacement is osteoarthritis. Because osteoarthritis is present in a large segment of the older population, it cannot be ignored when examining associated problems.

In addition to overall reimbursement decreasing, those who do reimburse are requiring more empirical proof. Empirical in this case will use the operating definition given in Webster's 3rd edition as, "originating in or relying on or based on factual information, observation, or direct sense experience as opposed to theoretical knowledge."40"

One can see that requiring empirical proof for medical procedures is a complete abandonment from the "conventional wisdom" which has been used to make these decisions. A paradigm shift is needed in not only the repayment of medical procedures, but also in the decision-makers for these medical procedures. Prior to the dramatic change in health care regarding Health Maintenance Organizations (HMO) and other third party payers, decisions about patients were made entirely by the physician and patient. This has changed, though, along with a number of other changes that occurred in the 1980s.
The changes that occurred in the 1980s, in an attempt to control the cost of health care, would forever change the face of medicine. Managed care plan administrators now find themselves in the middle of the health care delivery process with the power to evaluate the process. They also have the power to choose the right location, level, and type of care needed to achieve desired health outcomes at the least possible cost\textsuperscript{41}.

With third party payers and health insurance companies decreasing the overall reimbursements, HMOs and most insurance companies have increased the amount of money the individual is to contribute to his or her health care. These increases have come in the form of increased deductibles, increased co-pays, and denial of repayment without prior authorization to receive medical services. This has made the consumer of health care more skeptical and cost-conscious than in previous times.

When the payment method was changed, an early effort to limit cap payer financial risk came from the federal government in the form of the Tax Equity and Fiscal Responsibilities Act (TEFRA) of 1982\textsuperscript{41}. This was an effort to control the growing cost of the Medicare program. Under this system, the previously used cost-based reimbursement method of payment for inpatient acute hospitalization was changed to one of a prospective per case payment. This system became known as the prospective payment system (PPS). The PPS uses a patient's primary diagnosis to categorize them into a diagnostic-related group (DRG).

Each DRG represents a mutually exclusive grouping that is used to assign a case payment rate. The provider is paid at the fixed rate regardless of the cost incurred while caring for a patient. It follows, then, that if more money is spent on the care of a patient
than is reimbursed under the DRG, the provider loses money. However, if less money is spent on the care of a patient than is reimbursed, the provider makes money.

Chart review was one of the first strategies implemented to measure health care delivery efficiency. Because documentation is universally required in health care, regardless of discipline, this is a formidable avenue to analyze. Experts in the field have taken positions as reviewers for third party payers and analyze the documentation in any given case. If, according to experts, the documentation is substandard in any way, reimbursement may be denied. However, many review agencies have an appeals process through which the party must go if they desire payment.

According to Abeln\textsuperscript{42}, within most payer organizations there are usually two to three levels of representatives. The first level includes those who review most claims for the initial determination of medical necessity and contractual coverage of services provided. Typically, these are non-medical personnel with minimal training in medical terminology. She describes the second level as including nurses, LPNs, vocational counselors, and rehabilitation counselors. Any claim that must be reviewed beyond the second level usually requires a peer review or a review by the medical director of the plan.

With the rise in HMO enrollees and the decrease in reimbursed services, health care providers are being forced to prove the efficacy of what they are doing. A myriad of ways have been utilized in an attempt to illustrate not only cost-effectiveness, but also technique effectiveness and effectiveness of intervention. Better decisions regarding health care dollar expenditure could be made given this quality of life information. This baseline quality of life information could be combined with the patient's goals to
determine appropriate intervention. If the quality of life would not be greatly improved, surgical intervention could be postponed. On the other hand, if patient's goals and baseline quality of life illustrate opportunity for improvement, surgery may be indicated. The most efficacious interventions must provide the greatest benefit to the patient while at the same time limiting the associated costs.
CHAPTER VI

CONCLUSION

As our population continues to age, more people will have problems with osteoarthritis. This will result in more pain associated with joints. A thorough presurgical quality of life analysis needs to be completed to determine cost-effectiveness of total knee replacement on a case-by-case basis. This baseline quality of life can be combined with the patient’s goals to determine appropriate intervention. If the quality of life will not be greatly improved, surgical intervention could be postponed. On the other hand, if patients goals and baseline quality of life illustrate opportunity for improvement, surgery could be performed. This would ultimately increase the patients overall function, health, and perceived quality of life while making sound economical decisions.

Wright et al\textsuperscript{43} published an article in 1995 that illustrated growth rates of total knee replacement surgery from 1985-1990. There was a steady growth rate of 18\% per year during that time period. During this same timeframe, a decrease of 14\% in tibial wedge osteotomies was noted. This illustrates the point made earlier that the number of total knee replacement surgeries is increasing. This is expected to continue as the population ages.

Total knee replacement surgery appears to be a highly cost-effective strategy for managing knee pain associated with osteoarthritis. Incidentally, knee pain was the most important reason patients were willing to undergo surgery.
At its inception, this paper was intended to be an independent study involving participants. These participants were to come from a screened participant pool after satisfying criteria established by this author. These participants were all to be candidates for primary total knee replacement to be performed by a local orthopedic surgeon. These participants were to fill out a subjective quality of life (QOL) questionnaire (SF-36) at least one week prior to their surgery. Follow-up questionnaire scores were to be requested of the participants at approximately 90 days post-surgical. This timeframe was chosen because 90 days is the timeframe generally necessary for the patient to return to all previously performed activities.

It is this author’s opinion that the SF-36 would be a far superior measure than the others for many reasons. Among these are its long-term usage, its sensitivity to domain measure (as mentioned before), and its overall ease of use. It is this author’s opinion that the SF-36 is a superior measure to the other subjective quality of life measures and it is better than the specific orthopedic measures mentioned. The orthopedic measures did not appear to be as comprehensive as the SF-36.

An entire section on differential diagnosis was included to provide the reader with a glimpse of other potential diagnoses which would require total knee replacement surgery. However, the main focus of this paper and the research was osteoarthritis and its association with total knee replacement surgery.

It is this author’s opinion that this idea would be a good one to implement as part of an independent study or as part of future research. There has been limited research, but further outcomes would be helpful in regard to surgeons, patients, and third-party
payers as they may benefit from these results as fiscal responsibility can be exercised when the most efficacious interventions are identified.
REFERENCES


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40.


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36. Bellamy N, Buchanan WW, Goldsmith CH, Campbell J, Stitt LW. Validation study 
of WOMAC: a health status instrument for measuring clinically important patient 
relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the 


UNITED STATES

SF-36

SF-36 Standard United States
Version 1.0
INSTRUCTIONS: This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities.

Answer every question by marking the answer as indicated. If you are unsure about how to answer a question, please give the best answer you can.

1. In general, would you say your health is:
   (circle one)
   Excellent ................................................................. 1
   Very good ................................................................. 2
   Good ................................................................. 3
   Fair ................................................................. 4
   Poor ................................................................. 5

2. Compared to one year ago, how would you rate your health in general now?
   (circle one)
   Much better now than one year ago ........................................ 1
   Somewhat better now than one year ago ........................................ 2
   About the same as one year ago ........................................ 3
   Somewhat worse now than one year ago ........................................ 4
   Much worse now than one year ago ........................................ 5
3. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

(circle one number on each line)

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>Yes, Limited A Lot</th>
<th>Yes, Limited A Little</th>
<th>No, Not Limited At All</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c. Lifting or carrying groceries</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d. Climbing several flights of stairs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e. Climbing one flight of stairs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f. Bending, kneeling, or stooping</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>g. Walking more than a mile</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>h. Walking several blocks</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>i. Walking one block</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>j. Bathing or dressing yourself</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

(circle one number on each line)

| a. Cut down on the amount of time you spent on work or other activities  | YES | NO |
| b. Accomplished less than you would like                                | 1   | 2  |
| c. Were limited in the kind of work or other activities                | 1   | 2  |
| d. Had difficulty performing the work or other activities (for example, it took extra effort) | 1   | 2  |
5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cut down the amount of time you spent on work or other activities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>b. Accomplished less than you would like</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>c. Didn't do work or other activities as carefully as usual</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

(circle one)

- Not at all ...................................................... 1
- Slightly ...................................................... 2
- Moderately ..................................................... 3
- Quite a bit ................................................... 4
- Extremely ...................................................... 5

7. How much bodily pain have you had during the past 4 weeks?

(circle one)

- None ............................................................. 1
- Very mild ....................................................... 2
- Mild ............................................................. 3
- Moderate ....................................................... 4
- Severe ........................................................... 5
- Very severe .................................................... 6
8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

(circle one)

Not at all ................................................. 1
A little bit .............................................. 2
Moderately .............................................. 3
Quite a bit .............................................. 4
Extremely .............................................. 5

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks -

(circle one number on each line)

<table>
<thead>
<tr>
<th></th>
<th>All of the Time</th>
<th>Most of the Time</th>
<th>A Good Bit of the Time</th>
<th>Some of the Time</th>
<th>A Little of the Time</th>
<th>None of the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Did you feel full of pep?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>b. Have you been a very nervous person?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>c. Have you felt so down in the dumps that nothing could cheer you up?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>d. Have you felt calm and peaceful?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>e. Did you have a lot of energy?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>f. Have you felt downhearted and blue?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>g. Did you feel worn out?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>h. Have you been a happy person?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>i. Did you feel tired?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

(circle one)

- All of the time .............................................. 1
- Most of the time .............................................. 2
- Some of the time ............................................. 3
- A little of the time .......................................... 4
- None of the time .............................................. 5

11. How TRUE or FALSE is each of the following statements for you?

(circle one number on each line)

<table>
<thead>
<tr>
<th></th>
<th>Definitely True</th>
<th>Mostly True</th>
<th>Don’t Know</th>
<th>Mostly False</th>
<th>Definitely False</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>I seem to get sick a little easier than other people</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b.</td>
<td>I am as healthy as anybody I know</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c.</td>
<td>I expect my health to get worse</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d.</td>
<td>My health is excellent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
BETH ISRAEL / UCLA

FUNCTIONAL STATUS QUESTIONNAIRE

GENERAL INSTRUCTIONS

** We want your responses to be CONFIDENTIAL — all data will be used only for the purposes of this study.

** When you complete the questionnaire, please fold and return it in the enclosed envelope. No postage is needed.

TODAY'S DATE

_________ month _________ day _________ year
INSTRUCTIONS

This questionnaire will provide the Beth Israel/UCLA Functional Assessment Study with important information about your health.

All information that would permit you to be identified as a member of the study will be regarded as strictly confidential and will be used only for this study. Your name will not appear on the questionnaire. The number on top of this page will allow us to keep track of who returns each questionnaire.

Please read carefully each question in this booklet. Circle the number of the answer that most closely fits you.

For example:

1. HAVE YOU EVER HAD A COLD? (Circle one)
   - YES .................................. 1
   - NO .................................... 2

Please try to answer every question that applies to you. If none of the answers provided seems exactly right, choose the one that comes nearest to being right for you.

Please read carefully the instructions provided at the beginning of each section.

Please begin on the next page
### DAILY ACTIVITIES

This group of questions refers to many types of physical and social activities. We would like to know how difficult it was for you to do each of these activities, on the average, during the past month. By difficult, we mean how hard it was or how much physical effort it took to do the activity because of your health. Circle the number:

- 4 if you usually had no difficulty doing it;
- 3 if you usually had some difficulty doing it;
- 2 if you usually had much difficulty doing it;
- 1 if you usually did not do the activity because of your health; or
- 0 if you usually did not do the activity for other reasons.

<table>
<thead>
<tr>
<th>DURING THE PAST MONTH, HOW MUCH PHYSICAL DIFFICULTY DID YOU HAVE...</th>
<th>USUALLY DID WITH NO DIFFICULTY</th>
<th>USUALLY DID WITH SOME DIFFICULTY</th>
<th>USUALLY DID WITH MUCH DIFFICULTY</th>
<th>USUALLY DID NOT DO BECAUSE OF HEALTH</th>
<th>USUALLY DID NOT DO FOR OTHER REASONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Taking care of yourself, that is, eating, dressing, or bathing?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2. Moving in and out of a bed or chair?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3. Walking several blocks?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4. Walking one block or climbing one flight of stairs?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5. Walking indoors, such as around your home?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6. Doing work around the house such as cleaning, light yard work, home maintenance?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>7. Doing errands, such as grocery shopping?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>8. Driving a car or using public transportation?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>9. Visiting with relatives or friends?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>10. Participating in community activities, such as religious services, social activities, or volunteer work?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>11. Taking care of other people such as family members?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>12. Doing vigorous activities such as running, lifting heavy objects or participating in strenuous sports?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
3. During the past month, how many days did illness or injury keep you in bed all or most of the day? (If none, write “0”)

_______ DAYS IN BED during the past month

4. During the past month, how many days did you cut down on the things you usually do for one-half day or more because of your own illness or injury? (Do not count the day(s) spent in bed)

_______ DAYS during the past month

15. Are you unable to do certain kinds or amounts of work, housework, or schoolwork because of your health?

(Circle one)

YES, for less than 3 months ............................................ 1
YES, for 3 or more months ............................................. 2
NO, my health does not limit me this way ........................................... 0

16. Does your health keep you from working at a job, doing work around the house, or going to school?

(Circle one)

YES, for less than 3 months ............................................ 1
YES, for 3 or more months ............................................. 2
NO, my health does not limit me this way ........................................... 0

17. How do you feel about your own health?

(Circle one)

VERY SATISFIED ......................................................... 5
SATISFIED .......................................................... 4
NOT SURE .......................................................... 3
DISSATISFIED ..................................................... 2
VERY DISSATISFIED ............................................... 1
These next questions ask about how you feel and how things have been with you during the past month. For each question, please circle the number for the one answer that comes closest to the way you have been feeling.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Have you been a very nervous person?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>19. Have you felt calm and peaceful?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>20. Have you felt downhearted and blue?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>21. Were you a happy person?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>22. Did you feel so down in the dumps that nothing could cheer you up?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>23. Did you isolate yourself from people around you?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>24. Were you affectionate toward others?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>25. Did you act irritable toward those around you?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>26. Did you make unreasonable demands on your family and friends?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>27. Did you get along well with other people?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
SOCIAL ACTIVITIES

28. About how many close friends do you have — people you feel at ease with and can talk with about what is on your mind? (You may include relatives.)

(Enter number on line:)

________________ CLOSE FRIENDS AND RELATIVES.

29. During the past month, about how often did you get together with friends or relatives, like going out together, visiting in each other's homes, or talking on the telephone?

(Circle one)

EVERY DAY .......................................................... 6
SEVERAL TIMES A WEEK ....................................... 5
ABOUT ONCE A WEEK ........................................ 4
2 OR 3 TIMES DURING THE MONTH .......................... 3
ABOUT ONCE A MONTH ....................................... 2
NOT AT ALL ......................................................... 1

30. During the past month, how satisfied were you with your sexual relationships?

(Circle one)

VERY SATISFIED .................................................... 5
SATISFIED ............................................................ 4
NOT SURE ............................................................. 3
DISSATISFIED ...................................................... 2
VERY DISSATISFIED ................................................ 1
DID NOT HAVE ANY SEXUAL RELATIONSHIPS ............. 0
EMPLOYMENT

The next question concerns your present working situation other than managing your home.

31. Which of the following statements best describes your work situation during the past month?

(Circle one)

<table>
<thead>
<tr>
<th>WORKING FULL TIME</th>
<th>WORKING PART-TIME</th>
<th>UNEMPLOYED, LOOKING FOR WORK</th>
<th>UNEMPLOYED BECAUSE OF MY HEALTH</th>
<th>RETIRED BECAUSE OF MY HEALTH</th>
<th>RETIRED FOR SOME OTHER REASON</th>
<th>OTHER:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

These next questions ask about how your health affects your work.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>32. Do as much work as others in similar jobs?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>33. Work for short periods of time or take frequent rests because of your health?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34. Work your regular number of hours?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>35. Do your job as carefully and accurately as others with similar jobs?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36. Work at your usual job, but with some changes because of your health (for example, use special equipment, trade tasks with other workers)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>37. Fear losing your job because of your health?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Thank you very much for taking the time to complete this questionnaire. We appreciate your cooperation. If you have anything else you wish to add, please write in the space below. Thank you.