

Université de Montréal

THE WAIT FOR TOTAL HIP REPLACEMENT BY PATIENTS WITH OSTEOARTHRITIS

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Identification du jury

**Université de Montréal
Faculté des études supérieures**

Ce mémoire intitulé :

The wait for total hip replacement by patients with osteoarthritis

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Résumé

Malgré plusieurs recherches antérieures sur l'attente pour l'arthroplastie totale de la hanche, il y a peu d'information sur le temps écoulé entre le moment de l'apparition des symptômes et le moment de la première consultation chirurgicale. **Objectifs :** Documenter le temps d'attente en décrivant les intervalles entre quatre événements: l'apparition des symptômes, la première consultation chirurgicale, la prise de décision d'opérer et la date de chirurgie. Des analyses détermineront l'effet de l'âge, du genre, de l'occupation et de la qualité de vie sur ces intervalles. **Méthodes :** Les personnes éligibles à l'étude identifiées par les chirurgiens orthopédiques impliqués ont participé à une entrevue 2 à 4 semaines avant leur chirurgie. Les dates des événements mentionnés ci-haut ainsi que deux mesures de qualité de vie (SF-36 et WOMAC) ont été obtenus. Aussi, les traitements non-pharmacologiques et l'occupation antérieure des patients ont été examinés. **Résultats :** L'attente médiane entre la perception initiale de symptômes à la première consultation du chirurgien était de 28.4 mois, et de 0 mois entre la consultation et la décision d'opérer. Il n'y avait aucune différence dans les temps d'attente associés à l'âge, le genre ou l'occupation antérieure. L'attente médiane entre la décision d'opérer et la date de chirurgie était de 6 mois, et ne variait pas selon l'âge, le genre et l'occupation antérieure. Cependant, les individus dont les symptômes étaient plus sévères étaient opérés plus vite que ceux dont la maladie était moins sévère. **Discussion:** Aucune des composantes du temps d'attente n'est associée avec l'âge, le genre ou l'occupation antérieure des participants. Néanmoins, les patients ayant des symptômes plus sévères sont priorisés lors de l'attente pour la chirurgie. **Mots clés:** remplacement total de la hanche, temps d'attente pour chirurgie, âge, sexe, occupation, qualité de vie, services de santé

Abstract

Although waiting times for total hip replacement (THR) surgery have been documented, previous descriptions have rarely included the time elapsed from the perception of osteoarthritis (OA) symptoms to the initial surgical consultation. **Objectives:** We conducted a study aimed at documenting each of the components of waiting time from initial perception of symptoms to first surgical consultation, to decision to operate, to date of surgery, and explored whether these intervals differ by age, gender, occupation, and quality of life score. **Methods:** Patients identified from the offices of the collaborating orthopaedic surgeons were interviewed 2-4 weeks prior to their operation. Questionnaires explored event dates, non-pharmacological disease management and work history, and included generic (SF-36) and disease-specific (WOMAC) quality of life measures. **Results:** The median wait from perception of symptoms to surgical consultation was 28.4 months, and 0 months from surgical consultation to decision to operate. There was no difference between age, gender, or occupation groups. The median wait from decision to operate to date of surgery was 6 months, and did not differ between age, gender or occupational groups. However, those with more severe symptoms underwent surgery earlier than those with less severe disease. **Discussion:** None of the components of waiting time were associated with age, gender, or occupation. However, patients with more severe symptoms appear to be prioritized for surgery.

Key words: total hip replacement, surgery waiting time, age, gender, occupation, quality of life, health services

Table of contents

Identification du jury	ii
Résumé	iii
Abstract.....	iv
List of tables.....	viii
List of figures	ix
List of abbreviations.....	x
Acknowledgements	xi
1 Introduction.....	1
1.1 Objectives.....	2
2 Literature review	3
2.1 Background	3
2.2 Osteoarthritis	3
2.2.1 Aetiology	5
2.2.2 Clinical Manifestations of Osteoarthritis	7
2.2.3 Quality of Life Instruments	8
2.2.4 Treatment.....	14
2.2.5 Total Hip Replacement.....	19
2.2.6 Waiting Time.....	22
2.2.7 Prioritization	24
3 Methodology	27
3.1 Study Population	27
3.2 Inclusion and Exclusion Criteria	27
3.3 Recruitment of patients.....	27
3.4 Interviews.....	27
3.5 Measures	28
3.6 Statistical Analysis	29
4 Manuscript	30
4.1 The Wait for Total Hip Replacement in Patients with Osteoarthritis.....	30
4.1.1 Abstract	31
4.2 Introduction	32

4.3	Method	34
4.3.1	Study sample.....	34
4.3.2	Procedure.....	34
4.4	Analysis.....	36
4.5	Results.....	36
4.5.1	Demographic Data	36
4.6	Quality of Life Measures	37
4.6.1	Waiting Time.....	38
4.6.2	Perception of Reasonable Wait vs. Actual Waiting Times	39
4.7	Discussion	41
4.7.1	Figures Legend	54
5	Additional Results	59
6	Discussion.....	62
6.1	Preliminary data on interval from the initial perception of symptoms to first surgical consult	65
6.1.1	Environment	65
6.1.2	Population Characteristics.....	66
6.1.3	Health behavior.....	69
6.1.4	Outcomes.....	70
6.2	Second interval: from surgical consult to decision to operate	71
6.2.1	Environment	71
6.2.2	Population characteristics.....	71
6.2.3	Health behavior.....	75
6.2.4	Outcomes.....	76
6.3	Third interval: from decision to operate to date of surgery	76
6.3.1	Environment	76
6.3.2	Population characteristics.....	77
6.3.3	Health Behaviour	78
6.3.4	Outcomes.....	79
7	Conclusion	81
8	References.....	82

Appendix I	xii
Appendix II	xvi
Appendix III	xxxi
Appendix IV	xxxii
Appendix V	xxxiii
Appendix VI	xxxiv

List of tables

Manuscript 4

Table 1	53
----------------------	----

List of figures

Figure 1	55
Figure 2	56
Figure 3	57
Figure 4	58
Figure 5	61

List of abbreviations

ACR	American College of Rheumatology
ESR	Erythrocyte sedimentation rate
HHS	Harris hip score
HR	Hazard Ratio
HRQOL	Health related quality of life
IQR	Interquartile Range
IRB	Institutional Review Board
NHP	Nottingham Health Profile
NSAID	Non-steroidal anti-inflammatory drug
OA	Osteoarthritis
OHS	Oxford Hip Score
OJRR	Ontario Joint Replacement Registry
QALY	Quality-adjusted life year
SF-36	Medical Outcomes Study 36-item Short Form
TKR	Total Knee Replacement
THR	Total Hip Replacement
WOMAC	Western Ontario McMaster Universities Osteoarthritis Index

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1 Introduction

Arthritis is one of the most prevalent chronic conditions in developed countries and is the most frequently reported cause of physical disability in the population (1). About three million Canadians—1 in 10—have osteoarthritis (OA), the most common form of arthritis and the most frequent joint disorder in seniors (2).

Non-pharmacological treatments such as education and weight loss are effective interventions in OA and important components of its management (3;4). In addition, clinical trials have provided strong evidence of the efficacy of muscle conditioning and aerobic exercise to lessen symptoms in persons with mild to moderate OA (5-7). Unfortunately, many primary care providers lack knowledge or skills in orthopaedic care and therefore may not prescribe these effective non-surgical options (2).

In severe or advanced cases, the destruction of the joint by the disease necessitates surgical intervention such as joint replacement. Total hip replacement (THR) is highly successful in restoring function in this population (8). Because the number of persons suffering from arthritis is increasing, major joint replacement is in growing demand (9). In Quebec, the annual rate of total hip replacement (from 1995 to 1999) was 4.7 per 10,000 for persons 18 years and older and 80.4% of these are for OA (8).

As a result of the increased demand for joint arthroplastic surgery, long waiting times from orthopaedic consultation to joint replacement surgery are occurring (9). In fact, one survey indicates the median wait across Canada is approximately six months and many patients wait up to a year, or longer (10). Waiting time may or may not aggravate the disease (11), however there are undeniably economic and human costs to

society as a result of waiting. Delayed access to orthopaedic care compromises the health and quality of life of thousands of Canadians, in addition to being a strain for their families and caregivers (2).

This investigation aims to give a practical description of actual waiting times for THR, as well as the waiting period most patients would consider reasonable. Past treatment history, including the use of a cane and physiotherapy, and patient functional status are also examined.

1.1 Objectives

We aim to give a more detailed description of the waiting period for people with hip OA who are about to undergo THR for OA in Quebec. We divide the waiting period into three timelines: 1) Initial perception of symptoms to the first surgical consultation, 2) First surgical consultation to the decision to operate, 3) Decision to operate to the date of surgery;

Specifically, the objectives of this study are:

- I. To document each of the components of waiting time and to explore whether the waiting times from the initial perception of OA symptoms to first surgical consult, and from first surgical consult to decision to operate, differ by age, gender, and occupation
- II. To explore whether the final timeline, from decision to operate to date of surgery, differs according to age, gender, occupation and disease severity (WOMAC).
- III. To explore past use of exercise and physiotherapy for OA.

2 Literature review

2.1 Background

Osteoarthritis (OA) is the most prevalent pain-inducing musculoskeletal condition, with approximately 70% of the population over 65 years of age demonstrating radiographic evidence of this disease (12;13). Most people develop OA after the age of 45 but it can occur at any age (14) and affects about 40 million people in the United States (12) and three million individuals in Canada (2). Because OA increases with age, it will become more prevalent in the future as baby boomers grow older (15). Women develop OA earlier than men, and because they live longer, women also have a greater prevalence of OA (16;17).

OA is a disorder that confines itself to affected joints; it is an important cause of long-term health problems and the most frequently reported reason for disability in the population (18). Effective management of OA involves early diagnosis and effective use of the many treatment methods available (14). The next sections discuss the aetiology of OA, its effects on different populations, evaluation tools used in its assessment, and surgical and non-pharmaceutical management. It should be noted that although this investigation deals with OA of the hip, knee OA and total knee replacement (TKR) will be mentioned, as studies often include patients with OA of either or both weight-bearing joints in their cohorts.

2.2 Osteoarthritis

The disease process of OA can affect one joint or several, with the weight-bearing joints (i.e. knees and hips) most often involved (19). The natural history of hip OA is variable; pathologic changes generally remain stable or worsen (20). Although individuals

over the age of 50 years are at greater risk for developing OA, it is not an inevitable consequence of aging, but rather an acquired degenerative process (12). The diagnosis of OA is largely based on the patient's history and the results of a complete physical examination (12). Radiographic evidence of OA may include joint space narrowing, the presence of osteophytes, the appearance of cysts in subchondral bone, and increased density of subchondral bone (21).

While some research has shown that radiological progression of hip OA could be defined by a change in joint space width and that this is correlated with the changes in clinical status of the patients (22), others have found that the impact of hip pain is not markedly influenced by the degree of structural damage on radiographs (23). According to the American College of Rheumatology (ACR), criteria for the classification of OA of the hip include hip pain and at least 2 of the following 3 features: radiographic femoral or acetabular osteophytes and/or radiographic joint space narrowing as well as erythrocyte sedimentation rate (ESR) of <20 mm/hour (24;25). The sensitivity of these criteria (89%) is similar to that of clinical criteria alone (86%), when subjects identified as having OA by a research centre are independently classified (25). However, there is improved specificity (meaning the extent to which subjects who do not have OA are correctly identified) when clinical criteria are used in combination with radiographic criteria [91%, compare to 75% for clinical criteria alone (25)]. The ACR therefore acknowledges the importance of the radiograph in the classification of hip OA (21;25).

2.2.1 Aetiology

In terms of the disease process of OA, there are different theories regarding the cause of the condition although they lead to the same pathophysiology. It is generally agreed that OA is a result of both mechanical and biologic events that destabilize the normal coupling of degradation and synthesis of articular cartilage chondrocytes and extracellular matrix, and subchondral bone (26). It is unclear whether OA is a single disease or many disorders with a similar final common pathway (15).

OA has traditionally been classified as primary (idiopathic), or secondary to another disease or condition (14;26-28). Risk factors for primary OA include above-average body weight, joint instability and inadequate muscle strength (12;27;29;30). Secondary OA may be initiated by anatomic abnormalities, trauma, metabolic conditions or inflammatory arthritis (26). OA follows genetic defects such as congenital dislocation of the hip, possibly caused by elevated pressure resulting from the distribution of forces over the reduced contact area of the dysplastic femoral head (31). Similarly, joint injury or surgery can cause subluxation, dysplasia, or incongruity preventing normal distribution of contact stress over the articular surface (12;27;29;30). Many metabolic and endocrine disorders have effects on the musculoskeletal system, either due to primary changes in bone and collagen or resulting in secondary arthritic and bone changes (32). Neuropathic arthropathies comprise articular degenerations (known as “Charcot joints”) and result in changes that resemble those of severe OA (31).

There are two principal theories regarding the pathophysiology of primary OA. OA changes have been attributed to “wear-and-tear” of the cartilage, causing its degradation,

and to sclerotic changes occurring in articular bone due to muscle dysfunction. These theories are discussed in the following section.

Recent studies have cast doubt on the previously accepted wear-and-tear explanation for activity-related OA (27;33). Under the original hypothesis, joints subjected to impact forces from work or sport participation would be at increased risk for developing OA. Through 'wear-and-tear', the balance between cartilage synthesis and degradation would be disrupted, leading to increased degenerative changes and an abnormal repair response (12). This would be accompanied by secondary changes around the affected joint, such as muscle weakness and the growth of new bone, with resultant loss of mobility and function (19). It has, in fact, been found that joints subjected to intermittent high or torsional impact loads may be at increased risk of subsequent OA (34;35). However, current biomechanical concepts reflect the idea that lifelong vigorous low impact use of normal joints does not cause cartilage degeneration (5;30;36;37).

A second hypothesis centres on the initial damage to subchondral bone rather than within the cartilage (33;38). There is growing evidence that the pathologic processes of OA, including micro-fractures and subchondral trabecular sclerosis (31), may be initiated by dysfunction of the muscle surrounding the joint which compromises the muscle's role in the absorption of impact forces crossing a joint (33;38). This hypothesis is supported by the fact that strengthening and endurance exercises are beneficial for mild and moderate OA, and by the fact that impaired muscle function is a frequent predecessor of OA (33). Slemenda et al. found that lesser quadriceps strength was strongly predictive of both

radiographic and symptomatic OA of the knee after adjustment for body weight, age, and sex, (29).

Regardless of the origin of OA, it results in changes in the composition and mechanical properties of the articular cartilage (12;15;20). In healthy cartilage, continual internal remodelling occurs as the chondrocytes replace macromolecules lost through degradation, however this process becomes disrupted in OA, leading to increased degenerative changes and an abnormal repair response (12). The process that leads to the disruption of cartilage remodelling remains unclear.

The significance of the pathogenesis and progression of OA is that addressing the appropriate structural impairment will be instrumental in developing safe and cost-effective management strategies to prevent serious disability due to OA.

2.2.2 Clinical Manifestations of Osteoarthritis

In order to evaluate the pain and disability experienced due to OA it is necessary to look beyond the pathophysiology, because although physiologic measures provide information to clinicians, they are of limited interest to patients (39). OA is characterized by joint pain, tenderness, limitation of movement, crepitus, occasional effusion, and variable degrees of inflammation without systemic effects (26). The effects of OA range from mild pain to severe incapacity or disability and account for more dependency in walking, stair climbing, and other lower extremity tasks than any other disease, particularly in the elderly (40). Costs of OA include medication, special aids or supplies, health and medical services not covered by insurance, modifications to residence, transportation and

8
personal services such as housekeeping and attendant care (18;41). Individuals with OA also incur increased costs of treating associated conditions due to the greater susceptibility of arthritic people to certain co-morbid conditions (41). The economic burden is exacerbated by the loss of wages, attributable to both OA and age (18).

In order to perceive the broader implication of disease and its treatment (42), it is necessary to consider outcomes that encompass several dimensions of health, which are often assessed by health-related quality-of-life instruments (43). Health-related quality-of-life is a broad concept that reflects widely valued aspects of life including income, freedom, and quality of the environment (39) as well as individual responses to the physical, mental, and social effects of illness on daily living (42).

2.2.3 Quality of Life Instruments

Many health-related quality-of-life (HRQOL) evaluation tools have been developed to allow health researchers to evaluate function and subjective aspects of health (42). HRQOL assessed through standardized questionnaires can be generic (applicable to all diseases) or disease specific (applicable to the disease of interest). The most commonly used measures in hip OA are discussed in the following section.

2.2.3.1 General Measures

The Medical Outcome Study Short-Form 36 is one of the most frequently used general health-related quality of life. It will therefore be discussed in greater detail. Other

instruments, including the 15D scale and the Nottingham Health Profile are briefly discussed.

2.2.3.1.1 SF-36

The SF-36 is a generic measure of quality of life that was constructed to survey health status in the Medical Outcomes Study. (44) It was designed for use in clinical practice and research, health policy evaluations, and general population surveys. The SF-36 includes one multi-item scale that assesses eight health concepts: 1) limitations in physical activities because of health problems; 2) limitations in social activities because of physical or emotional problems; 3) limitations in usual role activities because of physical health problems; 4) bodily pain; 5) general mental health (psychological distress and well-being); 6) limitations in usual role activities because of emotional problems; 7) vitality (energy and fatigue); and 8) general health perceptions. The survey was constructed for self-administration by persons 14 years of age and older, or for administration by a trained interviewer in person or by telephone (45). This 36 item short-form generates a health profile consisting of 8 scales and two summary measures describing health-related quality of life. The subscales have scores ranging from 0 (worst) to 100 (best) (44).

As documented in previous publications, the SF-36 has proven useful in monitoring general and specific populations, comparing the burden of different diseases, differentiating the health benefits produced by different treatments, and screening individual patients (46-48). There are also data describing the SF-36 test results on the general population (49), and this allows for the comparison of THR patients with population norms (50). The SF-36 is

often used in research involving our population of interest (11;44;50-52). Both English and French Canadian versions of the SF-36 are valid and reliable. (44;53;54).

Nevertheless, the SF-36 was not specifically designed to assess patients with arthritic conditions. When compared to a physician-administered scoring system (Harris Hip Score), the SF-36 was found to be less sensitive to change pre and post THR on pain and function subscales (50).

McGuigan et al. (55) examined the predictive relationship between preoperative and postoperative scores on a population undergoing total knee replacement (TKR). They found that there was no difference between the patients' preoperative and postoperative health perception score on the SF-36, despite the improvement in quality of life and function following TKR. They contend that the SF-36's ability to predict individual postoperative improvement is poor, and recommend that it should not be used alone to determine treatment selection.

Other measures include, but are not limited to the 15D and the Nottingham Health Profile, both of which will be discussed in the following section. The 15D is a generic, 15-dimensional, standardized, self-administered measure of health-related quality of life (HRQOL) that can be used both as a profile and single index score measure (56). The dimensions are ranked relative to each other and by summing up their scores it is possible to obtain a value of 0-1, which represents the patient's overall quality of life. A completely healthy person in good condition thus scores 1 on the 15D scale (56;57). The 15D scores are shown to be reliable, sensitive and responsive to change, generalizable at least in

Western-type societies, and particularly valid for deriving quality-adjusted life years (QALYs) gained (56).

The Nottingham Health Profile (NHP) is also a self-report questionnaire, which consists of two parts. The first part includes weighted yes/no questions, which yield quality of life scores on six dimensions (energy, pain, sleep, social isolation, emotional reactions, and mobility). The second part consists of seven statements pertaining to problems caused by health status, with which the patient either agrees or disagrees. The NHP hence does not yield a single score but rather a profile of the patient's quality of life (57;58). Knahr et al. found that in their sample, the SF-36 showed methodological advantages compared to the NHP for the measurement of subjective pain and function. A Danish study on whether different HRQOL measures show comparable results (59) found there was slight but significant disagreement between HRQOL scores obtained using the 15D and NHP, and a fair comparison requires that patient and disease or treatment characteristics should be taken into account when interpreting these scores.

2.2.3.2 Disease-specific Measures

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and the Oxford Hip score are used as disease-specific measures of quality of life in people with lower extremity OA. The Harris Hip Score is discussed, although it should be noted it is in a separate class, as a functional measure used by physicians and surgeons for the specific evaluation of the hip, unlike the former two which are patient-reported measures.

2.2.3.2.1 WOMAC

The WOMAC is a multi-dimensional, self-administered questionnaire developed specifically for people with hip and knee OA. It has 3 subscales that measure pain, stiffness, and physical function, and each sub-scale is scored as a summation of items, with a higher number representing a lesser function or worse pain. For example, the WOMAC pain score is the summation of the scores ranging from 0 (none) to 4 (extreme) in response to each of 5 items (range of possible scores from 0 to 20). Similarly, with regard to scoring for stiffness on the WOMAC, 2 items are scored (range 0–8), and for WOMAC function, 17 items are scored (range 0–68). In contrast to the SF-36, a higher score on a WOMAC subscale represents more limitation. Both English and French Canadian versions of the WOMAC are valid and reliable. (44;53;54)

Many studies have used the WOMAC, either alone or in combination with other quality of life measures, to assess change in physical function before and after hip or knee replacement (11;44;60). However, despite the fact that it is considered the leading outcome measure for patients with OA, recent work has challenged its factorial validity (61). Factorial validity examines the extent to which domains hypothesized to make up a measure – pain, stiffness, and physical function in the case of the WOMAC – actually underlie patients' responses (62). The Physical Function subscale of the WOMAC has a limited capacity to detect change in the presence of discordant change in pain and function (e.g. improved pain but worse function) (62). This is attributed to the fact that an overlap of questions on the WOMAC pain and physical function subscales interferes with the measure's ability to detect change. They suggest that WOMAC items do not group by pain and function as originally conceived, but rather by activities with overlap of the pain and

function items. Therefore the WOMAC may not be capable of distinguishing between changes in pain and functional status when these attributes have discordant changes (61;62).

2.2.3.2.2 Oxford hip score

The Oxford Hip Score (OHS) is a 12-item questionnaire that measures the severity of hip problems as determined by the patient. It addresses the patient's experience of pain, disability and loss of physical function arising from hip disease results in a value between 12 (no disability) and 60 (maximum disability) (63).

The OHS has been found to be a valid and reliable instrument that is responsive to change over time (64). As it is short and may be self-administered by patients, it is simple and inexpensive to use. However, having a smaller number of items than the WOMAC, it may not provide as much insight as that seen with the WOMAC's three subscales (pain, stiffness and function).

An informal survey of articles related to hip OA reveals the use of the WOMAC and no reference to the OHS in eight recent North American studies (11;42;44;60;65-68). In contrast, three European articles use the OHS (64;69-71) and not the WOMAC.

2.2.3.2.3 Harris Hip Score

The Harris Hip Score (HHS) is a commonly used physician assessment of localized pain and physical functioning (72). It was originally developed in 1969 to help evaluate the results of hip replacement and has become widely used as a means of comparing results and hip pathology. Patients are scored up to a maximum of 100, with a higher score reflecting

better function. Factors assessed are: pain; function (total score of 47); range of motion (total score of 5); and absence of deformity (total score of 8). Function is further broken down into daily activities (14 points) and gait (33 points) (72;73).

The advantage of the HHS is that it was specifically designed with this population in mind (72). This scoring system is quite popular among orthopaedic surgeons, however it has never been validated psychometrically, nor does it adequately address a variety of quality-of-life issues that may be important to patients (50).

2.2.4 Treatment

2.2.4.1 Pharmacological treatment

Pain is the primary symptom of OA, and multiple medications are available to relieve pain and improve function (12;14). The Canadian Consensus Conference has issued guidelines for the evidence-based use of NSAIDs in the treatment of OA (74). The authors of the guideline emphasize that decisions about the choice of pharmacological management should be made in concert with patients after discussing a drug's efficacy, safety, tolerability, and cost (75).

Acetaminophen can be considered as primary therapy in mild OA and as an adjunct therapy in moderate or severe OA (74;75). Using acetaminophen may only provide sub-optimal pain relief (76), therefore stronger analgesics may be considered (14). In such cases, non-steroidal anti-inflammatory drugs (or NSAIDs) are indicated (74;75). Although NSAIDs and aspirin have analgesic and anti-inflammatory properties they also have adverse effects, including the risk of gastrointestinal haemorrhage and renal toxicity

(12;14). NSAIDs should therefore be initiated only after consideration of side effects and counselling of the patient (76); the prescription should be given for short periods of a few weeks only, to help overcome exacerbation of pain rather than as a lifetime prescription (14).

Newer therapeutic agents called COX-2 inhibitors have been developed that act as specific inhibitors of the enzyme, which gives rise to articular pain, swelling, and stiffness (COX-2) without affecting its other isoform (COX-1) which produces prostaglandins that protect the stomach (76). Clinical trials showed selective COX-2 inhibitors had comparable clinical efficacy and renal toxicity and an improved GI safety vs. non-selective NSAIDs (77), however, it was recently revealed that rofecoxib (a COX-2 inhibitor) increases the risk of cardiovascular disease (78). After it was shown that long-term use could increase the risk of heart attack and stroke, rofecoxib was withdrawn from the market at the end of September 2004 (79). In the United States, the Food and Drug Administration (FDA) now encourages physicians to use the lowest effective dose for the shortest duration consistent with individual patient treatment goals, and to carefully weigh the potential benefits and risks of using this type of medication (80).

Glucosamine sulphate and chondroitin sulphate are alternative medicines taken alone or together to prevent and treat OA (12). Some studies have shown that glucosamine and chondroitin sulphate improve the symptoms of OA, whereas others have concluded that reported effects of these preparations on OA symptoms are likely exaggerated (81). More recently, however, two randomized, placebo controlled trials have demonstrated that the use of glucosamine sulphate (in the form of an approved prescription drug) over 3 years

could prevent joint structure changes and significantly improve symptoms in patients with osteoarthritis of the knee (82;83).

2.2.4.2 Non-pharmacological treatment

Non-pharmacological therapy alternatives include patient education, weight loss if clinically indicated, the use of assistive devices or orthotics as needed, and active physical therapy (13). The interventions discussed below are more likely effective when used in combination as part of an intervention program tailored to individual patient needs.

2.2.4.2.1 Education

Due to the chronic nature of arthritis, self-management is essential (84). Patients should be thoroughly educated about the natural course of OA because a proper understanding will allow appropriate expectations of treatment to be established (12). Knowledge about the disease process and beneficial health behaviours is considered necessary, but not sufficient, to lead to positive behaviour change (84). Patient education should also focus on helping patients to gain confidence in new skills such as exercise or functional activities, diet and assistive devices (14). Education may also consist of helping patients find community programs. These education programs, offered by organizations such as the Arthritis Society, effectively increase self-efficacy for self-management and improve function and quality of life (84).

2.2.4.2.2 Weight control

Patients who are overweight should be advised to lose weight for the health of their weight-bearing joints (14). After age, obesity is the strongest risk factor for knee OA,

particularly in women (85;86), as weight gain can accelerate OA of weight-bearing joints and exacerbate symptoms (19). Unfortunately, weight loss is often a challenge for people with OA, due to the pain and consequent loss of mobility.

2.2.4.2.3 *Assistive devices*

When a joint is painful, swollen, or weak, using walking aids such as a cane or walker can decrease compressive forces through affected joints (84). A simple walking stick can make a big difference, reducing loading on a hip by 20-30% (14), thereby helping to reduce pain. Other devices that can help improve function include crutches, and orthopaedic footwear (84). Assistive devices such as long-handled reachers can substitute for impairment in range of motion, muscle strength, joint stability, coordination, and endurance (87). These devices contribute to independent functioning in patients with OA (87) although they are not always accepted by the patient.

Van Der Esch et al. (87) studied a sample of patients with OA who were registered at an outpatient rheumatology rehabilitation clinic in The Netherlands and found that of 44% of OA patients who owned a walking aid, approximately 30% did not use them. They report that non-use is associated with less need (due to less pain and disability), and negative evaluation of the aids (i.e. unpleasant and hard to handle inside and outside the house) (87). Assistive devices should be used when indicated for pain and function, as long as they are accepted by the patient (84).

2.2.4.2.4 *Orthotics*

One goal of management is to restore nearly normal mechanics of motion, which may require aligning the foot to provide a stable base of support, and providing a shoe that absorbs ground reaction forces to help mitigate the forces through the hip (26). In case of leg length discrepancy secondary to flexion contracture, a shoe lift is used to balance the pelvis (26). Research suggests that a brace can be beneficial when applied to the correct candidate, however these findings are based on patients with OA of the knee rather than hip (88;89).

2.2.4.2.5 *Exercise*

Exercise, both therapeutic and recreational, is an effective therapy in management of OA (90). Clinical trials have provided strong evidence of the efficacy of muscle conditioning (5;7;91;92) and aerobic exercise (6;93;94) to lessen symptoms in persons with OA. A customized exercise program can be well tolerated in the elderly patient with severe hip arthritis (95). Strengthening and endurance exercises, in particular, have been found to be beneficial to patients with mild to moderate OA (5;33;92;96).

Although studies have indicated that the effect of exercise in persons with arthritis is promising, deficits exist in the literature on the types of specific exercise protocols that are most effective in persons with hip OA (92). For instance, a review of randomized clinical trials to determine whether therapeutic exercise is beneficial for people with OA identified only 2 studies that could potentially provide data on people with hip OA, and both studies were inconclusive (97).

Although OA patients should continue to lead an active life, not all forms of exercise are beneficial. Individuals with early OA can benefit from regular physical activity, but they should have a careful evaluation of their joint structure and function before participation (7;30).

However, all too frequently, people with OA do not exercise since pain leads to a reduced level of activity (19). Other reasons for decreased activity levels are the lack of prescription by physicians, possibly due to past reports of exercise as an etiologic factor in OA of weight bearing joints as well as lack of standard protocols, outcome measures and maintenance strategies (96). Also, the idea of exercising with swollen, painful joints and weakened muscles may seem counterintuitive (19). For the person with arthritis, the consequences of prolonged inactivity add measurably, and unnecessarily, to disease-related impairments, functional limitation, and disability (98). Patients with advanced lower extremity OA are severely deconditioned and may be at increased risk for the development of coronary heart disease (99).

Given the overall safety and likely benefits of exercise, it should be included in the overall treatment of patients with OA. Patient evaluation and education about exercise should be a part of comprehensive OA management programs (100).

2.2.5 Total Hip Replacement

In patients whose symptoms persist despite appropriate treatment (patient education, drug intervention, exercise, modification of activities of daily living, and physical therapy), referral to an orthopaedic surgeon is appropriate (12). Total joint replacement (or

“arthroplasty”) appears to be a successful therapy when joint pain substantially limits a patient's ability to function (13) and causes intractable pain (42). Approximately 270,000 of these procedures are done annually in the US and an estimated 40,000 in Canada (44). The short-term cost of THR in the United States is US\$ 20 000.00 (44). Chang et al. (101) reported that for persons with hip osteoarthritis associated with significant functional limitation, THR can be cost saving or, at worst, cost-effective when both short- and long-term outcomes are considered.

More than 90% of patients experience substantial pain relief post THR and total knee replacement (TKR) (44). Most patients have an excellent prognosis for long-term improvement of symptoms and physical function (102). Nevertheless, arthroplastic surgery is not without risks. Infection is a complication in 0.5 to 1% of THR (103;104). The functional prognosis for these types of infections remains poor, despite long-term intravenous antibiotic therapy combined with a one- or two-stage replacement of the orthopaedic implant (105). There is also the possibility of deep venous thrombosis (blood clot in veins of the lower extremity) and a less than 1% chance of pulmonary embolism (106). Blood-thinning medications are administered to prevent these complications (107). Other risks associated with THR include the remote possibility of fracture and nerve injury (106), and, as with any surgery, there are risks associated with anaesthesia. Joint replacement has limited durability for individuals with life expectancies exceeding 20 years and those who wish to participate in high-demand activities (4). The most common reasons for the need for revision surgery are aseptic loosening and osteolysis, processes which

result from the interaction between corrosion and debris generated from the implant materials and the cells within the prosthetic environment (108;109).

The risks associated with THR may account, at least in part, for some patients' lack of willingness to undergo surgery; research shows no more than 15% of patients with severe arthritis are willing to undergo joint replacement (110). For many patients, decision-making involves ongoing deliberation of the surgical option, often resulting in deferral of the option to have surgery (111).

The ideal point at which to perform surgery in the course of arthritis is a crucial parameter that remains to be defined. Traditional orthopaedic practice has been to delay surgery until pain and functional limitation are intolerable. Shortening the wait and prioritizing patients would serve to reduce the burden of waiting for surgery and likely prevent loss in quality of life and function, as the years without disability and pain that are lost while waiting for a THR are not regained after surgery (42;52). However, if surgery is done too early, immediate and long-term complications related to the surgery or the prosthesis itself may be excessive. Younger adults (under 65 years old) with an arthritic hip cause concern with regard to prosthetic longevity and the potential need for revision (112). Yet, if surgery is done too late, muscle deconditioning, loss of mobility, and lack of exercise may compromise the outcome of surgery (44).

2.2.6 Waiting Time

Public perception is that waiting lists are unduly long (2). In fact, one survey indicates the median wait across Canada is approximately six months, and many patients wait up to a year, or even longer (10).

Access to many types of surgery in Canada is poorly managed, and even more poorly understood (113). Waiting time was not found to have a measurable negative impact on symptom severity over the pre-operative period in a study (average waiting time was 4.5 months) (11), but prolonged suffering undeniably results in economic and human costs to society. People with arthritis disability are more likely to be out of the labour force due to arthritis-related disabilities and incur significantly more charges for medical care than their non-arthritic peers (1;114). Thousands of Canadians endure poor health and diminished quality of life due to delayed access to orthopaedic care, in addition to being a strain for their families and caregivers (2).

2.2.6.1 Gender

It is generally reported that women are at a more advanced stage of disease than their male counterparts when they undergo THR (16;17;55;115;116), although one study reports the time from first symptom of hip OA to THR is similar for both genders (117). If women do undergo THR at a more advanced stage of OA, their functional level may be more impaired pre-operatively than men's. Patients with OA who have lower preoperative function fail to attain postoperative functional levels comparable to those with higher

preoperative function (16;44). This suggests diminished function, rather than female gender, affects the outcome of joint replacement (118).

2.2.6.2 Age

Past research advised against THR in the elderly because of the increased risks of surgery in this age group (119;120). Although their long-term post-operative function is comparable to younger patients with similar preoperative co-morbidities, patients over 80 may experience more peri-operative complication and slightly longer hospital stays (119-121). More recent investigations have demonstrated a satisfactory and cost-effective health outcome for THR in the elderly population aged over 80 years despite the fact that patients over the age of 85 years had increased intra-operative blood loss, an increased blood transfusion rate, and remained in hospital longer compared to the younger patients (122;123). Longer hospital stays in the elderly may be attributed to social factors, as it is often necessary to organize appropriate home or institutional support for older patients (119;121;123). Despite the above findings, THR in elderly patients is a relatively safe procedure that leads to functional improvements similar to those seen in younger counterparts (122). It is felt that the improvement of quality of life has to be balanced against the increased risks and costs for this group (119).

2.2.6.3 Socio-economic Status

Despite Canada's universal health care system, access to medical care, and joint replacement in particular, has been found to vary across socio-economic status (SES) gradients in individuals with OA (68). Access to orthopaedic surgery in England can also

vary according to social factors such as housing tenure, with social deprivation resulting in longer waiting times (71). Individuals in Ontario with less education and/or income had greater need for arthroplastic surgery, therefore even if access to care was equal, individuals with lower SES were more likely to have their needs unmet if they required joint replacement (68). One study, conducted in Edmonton, Alberta found that SES had no influence on waiting time for joint replacement surgery, however these findings may be specific to the location (124).

2.2.7 Prioritization

In a publicly funded health care system such as in Canada, fair access is a concern when setting priority for THR. There is a critical need for the systematic development of information systems based on consistent and reliable data, that can form the basis for appropriate management strategies (113). Research has demonstrated that the burden of pain and disability could be reduced by ordering waiting lists for THR and Total Knee Replacement (TKR) with respect to severity of disease (65), and it is generally agreed by patients (125) and health practitioners (65;126;127) that patients with more pain and greater disability should receive services ahead of those with less urgent conditions.

Unfortunately, there are no standardized mechanisms for prioritizing patients on be fair (128). Most classification systems currently used to categorize patients according to urgency for THR and TKR are highly subjective and inadequate to prioritize patients on waiting lists (65;126), therefore waiting times are unrelated to the severity of pain or functional difficulty (65;125;126) and can vary substantially from doctor to doctor and

hospital to hospital (127). Patients on waiting lists for TKR are aware of the lack of standardization in ordering queues, and some believe that knowing or bothering the surgeon (and excessive complaining) could result in earlier treatment (125). It is not surprising, then, that Canadian waiting lists have been described as “non-standardized, capriciously organized, poorly monitored, and... in grave need of retooling” (113).

It has been proposed that standardized measures are needed to assess and compare patients' priority based on the urgency of their conditions and the extent of benefit expected from services for which they are waiting (127). For instance, objective measures of severity of symptoms or functional disability could be obtained using such instruments as the WOMAC and SF-36 (65). Another approach consists of using standardized point-count measures, where points are assigned according to the severity of patients' symptoms and clinical findings in order to assess patients' relative clinical urgency or priority (127). Groups such as the Western Canada Waiting List Project (WCWL) and the National Advisory Committee on Health and Disability in New Zealand have developed and tested standardized clinical criteria for setting priorities among patients waiting for THR and TKR (126;128). At present, there are no universally accepted criteria for THR, nor has it been resolved whether non-clinical factors should be considered for prioritization (127). These may include social factors, such as the extent to which a patient's ability to work is threatened or whether they are caretakers for another family member (125;127). Woolhead et al. report that patients stress the need for an individualistic approach that considers social factors, but acknowledge the difficulty of harmonizing an individualistic approach with a standardized, criterion-based method of prioritization (125). Hadorn et al. consider that

incorporation of non-clinical factors among standardized criteria will depend on the social–medical culture within which those criteria are developed (127).

Regardless of the criteria applied to managing queues, there are drawbacks to assigning priority based on severity of disease. For instance, patients who describe less severe symptoms and functional limitations will always score lower than patients with more symptomatic, serious conditions. As new, high-scoring patients are seen, low-scoring patients will never reach the top of the list (126). Also, because pain and functional limitations are based on patients' perceptions of physical limitations, they can be over-reported even on standardized measures. Clinicians could also bias scores in their patients' favor by virtue of knowing how the points are allocated (126).

Nevertheless, health-care providers and patients seem to agree on the importance of developing an instrument to permit accountability and fairness in the context of orthopaedic waiting lists (126). Accommodating views of patients may require that physicians and surgeons suspend some of their current practice criteria and take greater account of the social factors that patients consider important (125).

3 Methodology

3.1 Study Population

Patients with OA who were scheduled to undergo primary THR surgery from five Quebec hospitals were invited to participate in this study and to be interviewed at their pre-operative evaluation. Ethics approval was obtained from the IRB's of each of these establishments.

3.2 Inclusion and Exclusion Criteria

We excluded those individuals who were undergoing a revision of a previous surgery as well as those who could not speak, or understand English or French.

3.3 Recruitment of patients

Trained interviewers received lists of the next months' surgical bookings from the offices of collaborating orthopaedic surgeons. Patients on the list who signed the informed consent form (Appendix I) were interviewed by telephone in the 2-4 weeks prior to the scheduled date of surgery.

3.4 Interviews

The interview consisted of several questionnaires (Appendix II). The first questionnaire had previously been used in a pilot project involving 39 patients with low back pain (129) and evaluated patients' perception of time of onset (in month and year) of symptoms, date of first surgical consultation, and the date that the decision to operate was made.

Other information obtained with this questionnaire included previous past use of an ambulatory aid such as a cane, physiotherapy, exercises, work history as well as how long patients would consider it reasonable to wait for surgery. Work history was categorized as manual, non-manual or mixed (involving both manual and non-manual components, such as nursing)(130).

The second questionnaire was the Medical Outcomes Study Short Form 36 (SF-36) which measures general quality of life (44) and provides summary measures for physical health and mental health (Please see section 2.4).

Third, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for the hip and knee was administered. The WOMAC is a multi-dimensional questionnaire developed specifically for people with hip and knee OA. It has 3 subscales that measure pain, stiffness, and physical function, and a higher score represents a lower function, worse pain or more stiffness (124;131) (Please see section 2.4).

3.5 Measures

The date of decision to operate was verified for a sub-sample of patients from two of the participating institutions. The date that patients reportedly made the decision to operate was compared to the documented date entered into the medical charts by the surgeon.

3.6 Statistical Analysis

Descriptive statistics (means \pm SD or medians (IQR) for continuous variables and percentages for categorical variables) are used to illustrate waiting times, quality of life, and past use of non-pharmacological treatments. Quality of life scores are compared to norm-based scores using age appropriate values. Kaplan-Meier graphs are plotted for each component of waiting time, from initial perception of symptoms to the first surgical consultation, first surgical consultation to the decision to operate, and decision to operate to the date of surgery.

Log rank analysis is employed to determine whether any of these delays differed based on age, gender, or occupation. We used Cox regression to adjust for the variables simultaneously. We also applied these analyses to categories grouped by disease-specific quality of life score (total WOMAC scores were categorized into tertiles: mild, moderate and severe symptoms), but only for the decision to operate to date of surgery timeline. Past research has demonstrated that there is little change in function during the pre-operative waiting period (11;52), therefore the WOMAC score obtained shortly before surgery was considered valid for the entire waiting period (decision to operate to date of surgery).

4 Manuscript

4.1 The Wait for Total Hip Replacement in Patients with Osteoarthritis

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4.1.1 Abstract

Objectives: To document the components of waiting time for total hip replacement (THR): first surgical consultation, date of decision to operate, date of surgery, and explore whether these intervals differ by age, gender, occupation, and quality of life score.

Study Setting: Primary data were collected from patients 2-4 weeks before undergoing THR.

Study Design: Cross-sectional design.

Data Collection: Trained interviewers administered questionnaires that included data on event dates, conservative treatment, demographic information and quality of life (SF-36 and WOMAC). Waiting times, quality of life, and past use of conservative treatment (cane, exercise and physiotherapy) were illustrated using descriptive statistics (means \pm SD or medians (IQR) for continuous variables and percentages for categorical variables). Kaplan-Meier graphs were plotted for each component of waiting time, and log-rank analysis was employed to determine whether any of these delays differed by age, gender, occupation or disability. We also performed a Cox regression to adjust for all covariates simultaneously.

Principal Findings: The median wait from surgical consultation to decision to operate was 0 months. There was no difference between age, gender, or occupation groups. The median wait from decision to operate to date of surgery was 6 months, and did not differ between age, gender or occupational groups. However, those with more severe symptoms (WOMAC) underwent surgery earlier than those with less severe disease.

Conclusion: Neither of the components of waiting time was associated with age, gender, or occupation. However, patients with more severe symptoms appear to be prioritized for surgery.

Keywords: total hip replacement, surgery delay, age, gender, quality of life, health services research

4.2 Introduction

Total hip replacement (THR) is a highly successful and frequently employed method for restoring function to people affected by osteoarthritis (OA). In Quebec, the average annual rate of THR in 1995-1999 was 4.7 per 10,000 and 80.4% of these cases were diagnosed with OA (1). Unfortunately, patients needing elective THR in our publicly funded health care system often wait because resources do not match demand (2). One survey indicates the median wait across Canada is approximately six months (3), with some patients waiting one year or longer.

There are numerous findings of human and economic costs to society as a result of waiting for THR (3-7). Performing the surgery later in the natural history of functional decline has been associated with worse outcomes (8;9). Delayed access to orthopaedic care compromises the health and quality of life of thousands of Canadians, in addition to being a strain upon their families and caregivers (7).

Waiting for THR has received a lot of attention in the media and by health policy makers, however little is known about how patients are prioritized for surgery. For instance, we do not know whether queue order is based solely on clinical findings or whether personal factors such as occupation are considered. Also, time elapsed prior to deciding to undergo surgery is rarely described.

The objectives of this study are to document two components of waiting time for people with hip OA who are on a waiting list and about to undergo THR in Quebec and to explore whether these waiting times differ by age, gender, occupation and, for the second timeline only, disease-specific quality of life score (WOMAC). We define the two periods as 1)

First surgical consultation to the decision to operate, and 2) Decision to operate to the date of surgery. Analyses for the first timeline are presented as exploratory only and should be interpreted cautiously because we only had access to the operating surgeons' charts and patients could have had previous surgical consultations without our knowledge.

4.3 Method

4.3.1 Study sample

Patients with OA who were scheduled to undergo first THR surgery in one of five tertiary care hospitals in Quebec, Canada, were invited to participate in this study and to be interviewed at their pre-operative evaluation. We excluded those individuals who were undergoing a revision of a previous surgery as well as those who could not speak English or French.

4.3.2 Procedure

All patients were identified from the offices of the collaborating orthopaedic surgeons at the time that the surgery was scheduled. Participants who signed the informed consent form at that time were contacted by telephone in the 2-4 weeks prior to their operation by a trained interviewer. The Ethics Committee of each participating institution approved the study.

The interview comprised several questionnaires. The first section consisted of a survey previously used in a pilot project involving 39 patients with low back pain (10) It addressed questions such as when a surgeon was first consulted and when the decision to operate was made. The date of decision to operate was verified for a sub-sample of patients from two of the participating institutions: the date that patients and their surgeons reportedly made the decision to operate was compared with the documented date entered in the medical charts by the surgeon. Other information obtained with this questionnaire included aspects of

previous non-pharmacological treatment (physiotherapy, use of a cane and exercise), how long patients would consider it reasonable to wait for surgery, and work history, which was categorized as manual (e.g. dressmaker, machinist), non-manual (accountant, teacher) or mixed (involving both manual and non-manual components, such as nursing) (11).

The second questionnaire was the Medical Outcomes Study Short Form 36 (SF-36). The SF-36 is a generic measure of quality of life (9) with excellent psychometric qualities (12-15). Its eight subscales have scores ranging from 0 (worst) to 100 (best) and assess various components of health-related quality of life.

Third, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for the hip and knee was administered. This multi-dimensional questionnaire has 3 subscales that measure pain, stiffness, and physical function, and each subscale score has been normalized to a score from 0 to 100, with a higher count representing a lower function, worse pain or more stiffness (16-18). Both English and French Canadian versions of the SF-36 and WOMAC are valid and reliable (9;19;20).

4.4 Analysis

Descriptive statistics (means \pm SD or medians (IQR) for continuous variables and percentages for categorical variables) are used to illustrate waiting times, quality of life, and past use of physiotherapy, cane and exercise. Quality of life scores are compared to norm-based scores using age appropriate values.

Kaplan-Meier graphs are plotted for each component of waiting time. Log rank analysis is employed to determine whether any of these delays differ based on age, gender, or occupation. We use Cox regression to adjust for the variables simultaneously. In the decision to operate to date of surgery timeline, we add disease severity based on the disease-specific quality of life score [WOMAC]). Total WOMAC scores are categorized into tertiles. Scores of less than 58 are recoded as Lowest Tertile; scores between 58 and 69 are classified as Middle Tertile; and scores of 70 or more represent those with Highest Tertile. Past research has demonstrated that there is little change in function over the waiting period (21;22), therefore the WOMAC score obtained pre-operatively is considered an appropriate estimate for the last time period.

4.5 Results

4.5.1 Demographic Data

Of the 164 patients approached by the interviewers, all agreed to participate in the telephone interview. Three of the eligible candidates could not be contacted prior to their surgery, leaving 161 subjects to participate in the study. The majority (139/161) of the participants

were from two of the five participating hospitals (73 from one and 66 from another) whereas the remaining 22 were from the three other facilities. General demographic data is summarized in Table 1. The mean age was 68.7 ± 10.1 years, with men being slightly older (69.4 ± 9.7 years vs. 67.4 ± 10.7). Of the 161 participants, 59 (36.6%) were male. When categorized by age group (younger than 65, 65-79 and 80 years and over), the ratio of males to females was similar in all three groups. All of the men and 81 (81.9%) of the women reported having been employed in the past; 32 in manual jobs, 91 in non-manual jobs and 37 in "mixed" jobs (11). Only 45/161 (28.0%) reported having received physiotherapy treatments in the past. As many as 123 (76.0%) said they had been told to use a cane in the past, and 101 of these 123 ($82 \pm 3.5\%$) complied. An additional 11 people used a cane without it being recommended, for a total of 112/161 ($69.6 \pm 3.6\%$) cane users overall.

4.6 Quality of Life Measures

Our study sample's WOMAC scores were compared to scores for a healthy population over 55 with no history of knee or hip pain (17). As illustrated in Table 1, our scores on the Pain, Stiffness and Function subscales were considerably higher than the norm, indicating a significant level of impairment and disability in our sample.

Our sample's scores on the SF-36 Physical Function, Role Physical, and Body Pain subscales were significantly lower than norm-based scores for the general American population, 65 years and older, again indicating high levels of impairment and disability.

4.6.1 Waiting Time

The total waiting time from the first surgical consultation to the surgical date was divided into two intervals and was based on recall. We were not able to verify whether it was the patients' first surgical consultation ever, but we could ascertain it was their initial consultation with the operating surgeon. Also, we were able to confirm the date of surgery (interview only done 1-2 weeks prior to surgery) and the date of decision to operate. When we compared the date of decision to operate on the questionnaire to the date recorded in the medical chart, 93.5% (130/139) of the participants' responses were accurate to within two weeks (Figure 1). We consider this to be an acceptable degree of precision as we asked only the month (we used the 15th day of the month for comparison) and year. The few (n=9) outliers were examined more closely. In 6/9 cases, the date the patients reported was the date surgery had been discussed with their surgeon or referring specialist, but evidently their name had not been placed on the waiting list at that time. Only 3 of the 139 (2.2%) dates verified were erroneous due to poor patient recollection. We verified that these outliers did not significantly affect our results, by reanalyzing the data with only the validated decision to operate dates.

Kaplan Meier survival analyses for each of the two intervals are shown in Figures 2 and 3. The median wait for each of these timelines was 0 months (IQR=4.1) and 6 months (IQR=7.8), respectively.

The majority (65.8%) of the participants recalled deciding to have surgery at the time of their first surgical consultation (Figure 2). At one year from their first visit with the surgeon, more than 80% of all participants had taken the decision to operate. There was

little change in the time-to-event curve beyond the first 12 months. In the univariate analysis, delay from surgical consultation until decision to operate did not differ based on age ($p=0.99$), gender ($p=0.71$), or occupation ($p=0.22$). Results from the Cox regression were similar (data not shown).

As seen in Figure 3, about 80% of our participants had their surgery within a year of their decision to be operated, and the median wait from decision to operate to date of surgery was 6 months. There were no significant differences between age ($p=0.42$), gender ($p=0.12$), or occupation groups ($p=0.27$) in either the univariate analysis or Cox regression. However, there was a significant difference between groups divided according to WOMAC scores in univariate analysis, with patients with severe symptoms (Highest Tertile) being operated earlier than those in the Middle Tertile, which in turn were operated earlier than those with milder symptoms (Lowest Tertile) ($p=0.03$). In the Cox regression model, individuals with the worst symptoms were more likely to have surgery sooner than those in the lowest tertile (hazard ratio: 1.6, 95% C.I.: 1.1 – 2.5), and those with moderate symptoms were more likely to be operated before individuals in the lowest tertile (H.R.: 1.4, 95% C.I.: 0.9-2.2). Finally, results were unchanged when we used the date of decision to operate documented by the surgeons rather than the date reported by the patient (data not shown).

4.6.2 Perception of Reasonable Wait vs. Actual Waiting Times

When asked how long they felt it was reasonable to wait for THR once the decision to operate was made, 43.5% felt it was unreasonable to wait more than 3 months, and an additional 31.7% felt it was unreasonable to wait more than 6 months. The median waiting

time patients considered reasonable was 12 weeks (IQR: 17.5 weeks, range=0-56 weeks, n=161).

We also analysed whether the actual time waiting for surgery affected the patients' perception as to what would be considered a reasonable wait. Figure 5 shows there are no clinically relevant differences between groups divided according to actual time waited. For instance, $57.1 \pm 12.4\%$ (n=16) of people who waited less than three months, and $39.5 \pm 8.6\%$ (n=32) of those who waited six months or more, felt that three months or less is a reasonable wait. When the waiting time of each individual was compared to their opinion of a reasonable wait, 82.6% of the study participants waited longer than they felt was reasonable.

4.7 Discussion

Our findings reveal no difference in the delay from surgical consultation to decision to operate between age, gender or occupation groups. Once the decision to operate was made, the delay until surgery did not differ between age, gender or occupation groups, however those with more severe symptoms underwent surgery earlier than those with mild or moderate symptoms.

There were some limitations to our study. First, our findings are applicable only to those people with OA who went on to have THR. We did not track patients who were placed on the waiting list but did not have surgery. Second, although there is a possibility of confounding by institution, descriptive statistics of the patients from the two major institutions involved in the study did not differ significantly. Third, there is the potential for recall bias because we did not have access to recorded values to verify the history of physiotherapy intervention, exercise program or use of cane. However, a pilot study that assessed the validity of recall of events surrounding past knee-replacement surgery concluded that “the level of agreement between survey responses and the medical records was “moderate” to “almost perfect” for recall of events before knee replacement, such as prior surgery, use of medications, occupational status, and living circumstances (weighted kappa, 0.41 to 0.98)” (23;24). Possibly, the validity of patients’ recall of events such as previous conservative treatment may also be satisfactory. Finally, we were able to verify if the reported dates for the decision to have surgery matched with the recorded dates in the medical chart for 139 of our study participants. Only 6.5% of responses were inaccurate,

and only 2.2% (n=3) patients reported an erroneous date due to poor recollection. Finally, we did not follow the patients prospectively through their wait, and we used the pre-operative WOMAC score as a covariate to decide if patients' waiting time was affected by disease severity. Although there is evidence from cohort (21;22) and cross-sectional (8;25) studies that pain and dysfunction do not change during a 6-month wait for THR, there may be some effect when waiting time exceeds 6 months. First, Mahon et al found extremely variable WOMAC scores for patients who waited over 12 months, with an unexplained improvement in function at six months (26). Second, Kili et al (27) found disability according to the Harris Hip Score increased with time, but 1) the slope of the regression line reported appears to be driven by the extreme waiting times of approximately 2000 days (5 1/2 years) for surgery and 2) there was no apparent relation between Harris Hip Score and a wait of up to 500 days.

Our sample resembled those described in previous studies on waiting for THR. We had a female majority at the time of surgery (63.4 %), comparable to samples in other studies (range: 57.4% to 71.8%) (8;28-31). The average age in our sample (68.7 ± 10.1 years) was also consistent with that of previous studies (18;22;26;29). Our sample's WOMAC scores were very similar to those reported in Mahon's study (26) and to the 'low function' group described by Fortin et al. (9). Although patients in the Hawker et al. (32) study had higher function, they used a community based sample which comprised all adults aged 55 years or more, regardless of OA severity.

In terms of the non-pharmacological interventions we considered, only 45 (28.0%) of the patients previously received physiotherapy, despite the fact that this intervention has been shown to be effective in the treatment of OA (33-36).

We analyzed the time from first surgical consult until the decision to operate, and from the decision to operate until the time the actual surgery occurred. Our exploratory analysis of the timeline from date of first surgical consultation to decision to operate shows 65.8% of our participants deciding to have THR at the time of their first consultation, which is similar to Mahon et al. who reported a value of 57.2% (123/215) (26). We further delineated this analysis based on age group, and found that almost 80% of the individuals in the over 80 age group made the decision the same day, compared to about 60% of those under 65 years. Deciding to have surgery on the day of the first consultation may indicate that people are being referred for surgical consultation only when surgery is indicated (i.e. appropriately), or that the condition was already severe enough to warrant surgery and they possibly should have been referred earlier. The decision to operate may have been delayed in cases where patients were given other treatments by the surgeon prior to deciding to undergo surgery.

In the second timeline, from decision to operate until surgery, the median wait of 6 months (or 26 weeks) was comparable to that reported elsewhere for arthroplasty of the hip, knee, ankle or shoulder in Quebec (24.5 weeks) (37). Median waiting times were similar in Ontario (24.0 weeks) and Manitoba (26.0 weeks) and slightly higher in Prince Edward Island (29.5 weeks) and Alberta (32.0 weeks). Patients in New Brunswick and Newfoundland had the shortest wait (16.0 weeks) whereas those in Saskatchewan waited

the longest (72.0 weeks). British Columbia and Nova Scotia were tied for the second-longest median waiting time: 52.0 weeks (37).

Waiting times from decision to operate until surgery differed with respect to symptom severity, but not between age, gender or occupation sub-groups. The Ontario Joint Replacement Registry (OJRR) reported similar findings with regards to waiting time according to gender (no difference between waiting time for men and women), but their results regarding age groups diverged from ours (38). They found older patients waited less for total joint replacements (n=15 146) and felt could relate to decreased health status and increased comorbidity in that age group (38).

With regards to function, the fact that patients with worse symptoms had surgery sooner suggests prioritization based on functional level. Several authors agree that if a health care intervention offers a reasonable probability of tangible benefit, it may be reasonable for those with the greatest need for the intervention to be served first, all else being equal (39-44). According to this philosophy, the participants in our study were appropriately prioritized for surgery, as were those of Mahon et al. (26). This is also consistent with waiting times in Ontario, where patients with the worst pain and function ratings (WOMAC) were operated sooner (38).

This was not the case in other studies (28;29;45), although one of those authors conceded that individuals with severe symptoms who were selected for immediate surgery might have been missed due to the cross-sectional design of their study (28).

Priority for surgery may also be influenced by social factors such as socio-economic status (SES). We obtained data regarding previous employment and considered our results in light

of previous research on either SES or occupation and their influence on the wait for THR. Some studies have demonstrated that lower SES results in longer waiting times for THR (46;47) while others, like ours, found no relation between SES and length of wait (18). Because we used occupation as a proxy for SES, the middle (“mixed”) category might be expected to fall between the other groups. However, individuals in the “mixed” occupation category were operated a little sooner than those in the “manual” and “non-manual” categories (Figure 4). This discrepancy was not statistically significant, and may be attributable to the types of occupations classified as mixed, such as homemakers and nurses. These occupations involve both manual and non-manual tasks, but do not necessarily reflect a mid-level SES. Also, of the 37 participants in the mixed group, 10 had previously worked as nurses. Their proximity to the health-care system did not affect their waiting time, which was comparable to the overall average.

With respect to what patients consider a reasonable wait for surgery, our participants’ perception (median of 12 weeks) was not associated with the time they actually waited for surgery. Derrett et al. (28) reported 84% of people waiting for a hip/knee replacement desired their surgery within 6 months, with no apparent relationship between priority on the waiting list and acceptable waiting time for surgery. A recent report for the Fraser Institute (37) indicated that the median reasonable wait for orthopaedic surgery according to specialists is 10 weeks and that in 92% of cases, patients waited longer than they felt was reasonable. Our sample’s waiting experience was only slightly better, with 82.6% waiting longer than they felt reasonable.

In conclusion, the likelihood of increasing need for THR due to higher prevalence of hip OA in an aging population together with no increase in resources for such interventions make it extremely important to develop prioritizing strategies. Optimization of available resources to those who would benefit the most and have the greatest needs would improve health services allocation to this population. Although not formalized, it is somewhat encouraging that functional status appears to be a criterion for prioritization for THR.

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Table 1

Summary of participants' questionnaire responses (n=161)

<u>Categorical Variables</u>	<u>n (%)</u>
Male	59 (36.6)
Previous physiotherapy received	45 (28.0)
Cane	
Recommended	123 (76.4)
• Used	101 (62.7)
<u>Continuous Variables</u>	<u>mean ± SD</u>
Age	68.7 ± 10.1
WOMAC* (population norm)	
• Pain (4.0)	62.5 ± 19.0
• Stiffness (5.0)	63.0 ± 23.2
• Function (2.6)	66.5 ± 17.2
SF-36 (population norm† ± SD)	
○ Physical Function (41.8 ± 12.4)	31.5 ± 12.7
○ Role Physical (44.0 ± 11.8)	31.5 ± 28.5
○ Body Pain (46.9 ± 10.2)	38.0 ± 17.0

*Higher numbers indicate more pain, more stiffness, and more disability

4.7.1 Figures Legend

Figure 1

Comparison of the date patients reported deciding to have total hip replacement (x axis) and true date of decision to operate from medical chart. Data is from the two institutions where most (86.3%) of the participants had surgery.

Figure 2

Kaplan-Meier curves depicting time-to-event over 5 years from surgical consultation to decision to operate for subgroups divided according to gender, age and occupation group.

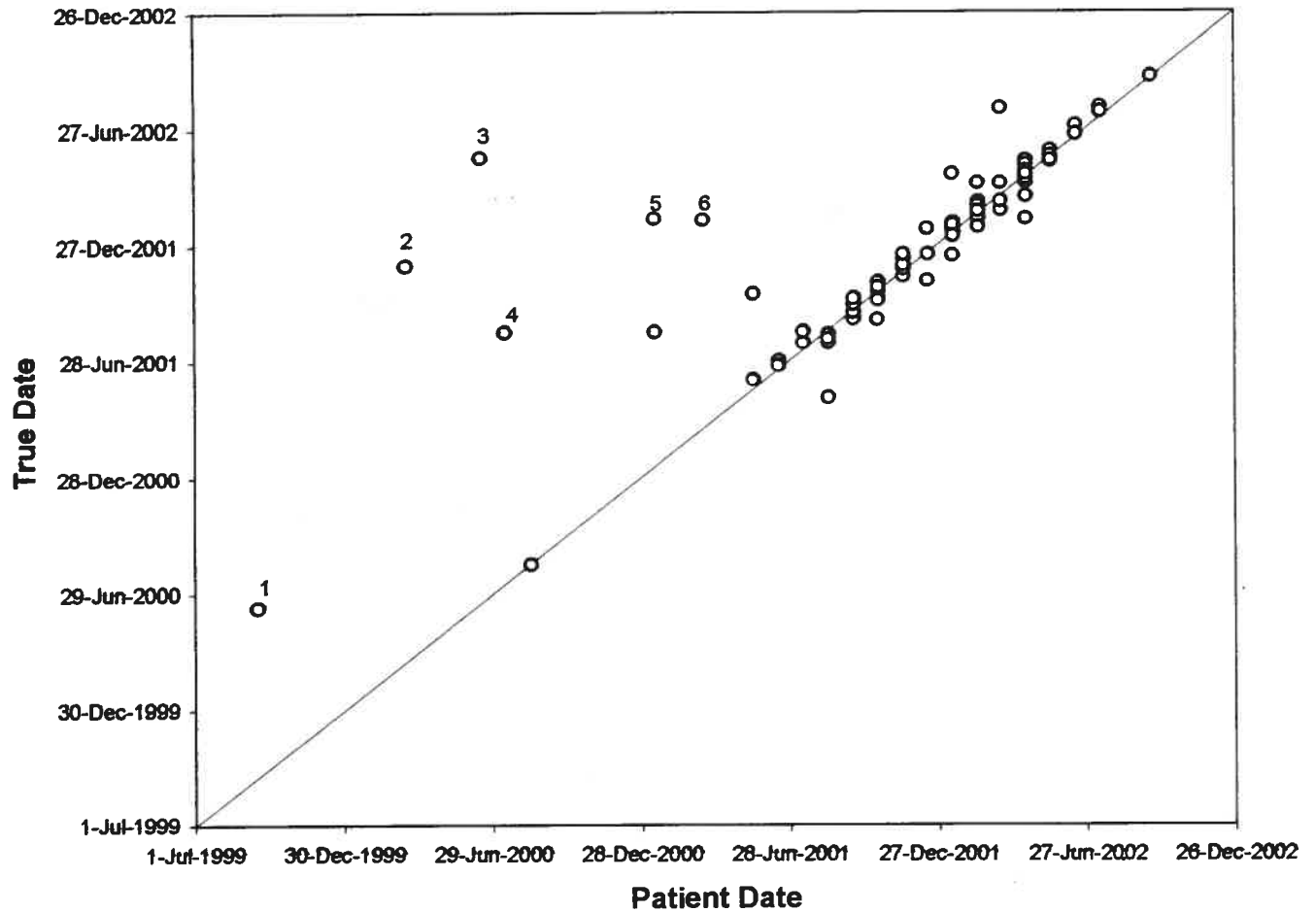
Figure 3

Kaplan-Meier curves depicting time-to-event over 2 years from decision to operate to date of surgery for subgroups divided according to gender, age and occupation group, as well as WOMAC Function subscale score. With Cox regression analysis, the low function group was found to have the operation earlier [HR=1.6 (95%CI: 1.1-2.5), p=0.02] than the high function group. The moderate function group was not significantly different [HR=1.4 (0.9-2.0), p=0.14]. There were no differences between gender [female to male HR=1.2 (0.8-1.7)], age [<65 to 80+, HR=1.3 (0.8-2.2), p=0.3; 65-79 to 80+ HR=1.4 (0.9-2.3), p=0.2] or occupational categories (p=0.18).

Figure 4

Subjects were grouped by actual wait from surgical consultation to date of surgery (for example, 28 study participants waited less than 3 months from consultation to surgery). Within each group, subjects were categorized according to what they consider a reasonable wait. Reasonable wait categories were similar across groups. For instance, approximately half of the individuals in each group felt it was unreasonable to wait was more than 3 months.

Figure 1



1. Called for appointment September 1999
2. Originally booked March 2000 but improved and taken off waiting list
3. Surgery discussed at initial visit in May 2000 but not booked for surgery: probable miscommunication
4. Patient says they were booked January 2001, but 1st visit was August 2001 - patient has past history of stroke
5. Patient says booked March 2001, but 1st visit was November 2001, booked in February 2002
6. Patient says booked March 2001, but 1st visit was February 2002

Figure 2

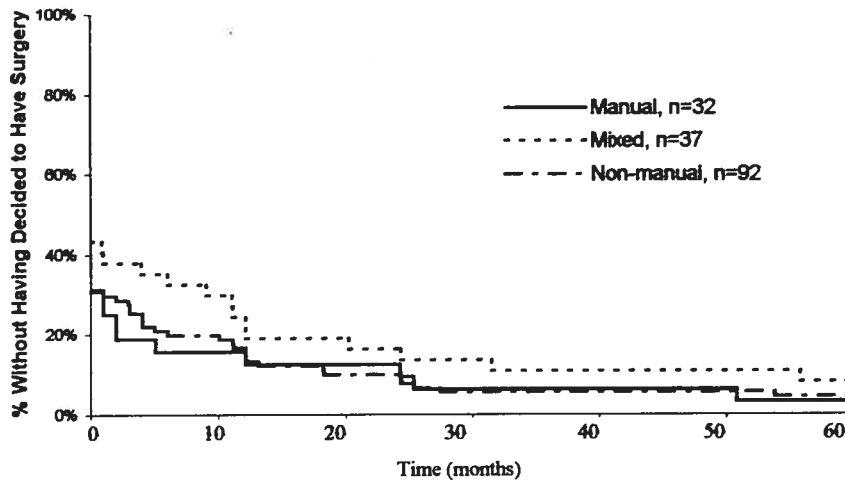
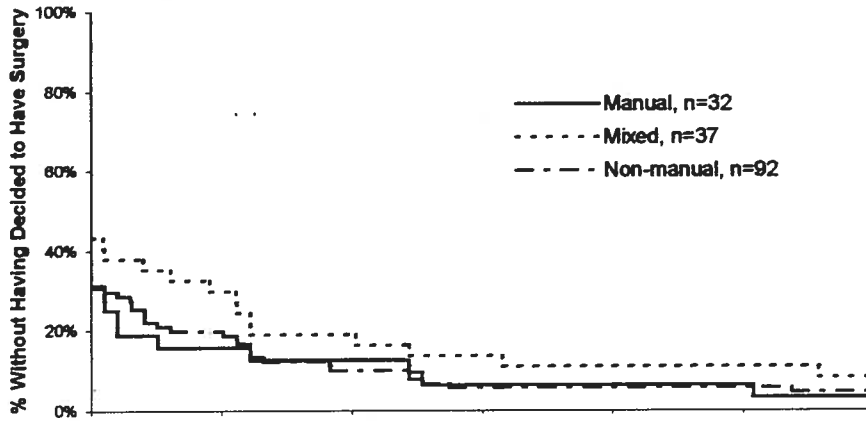
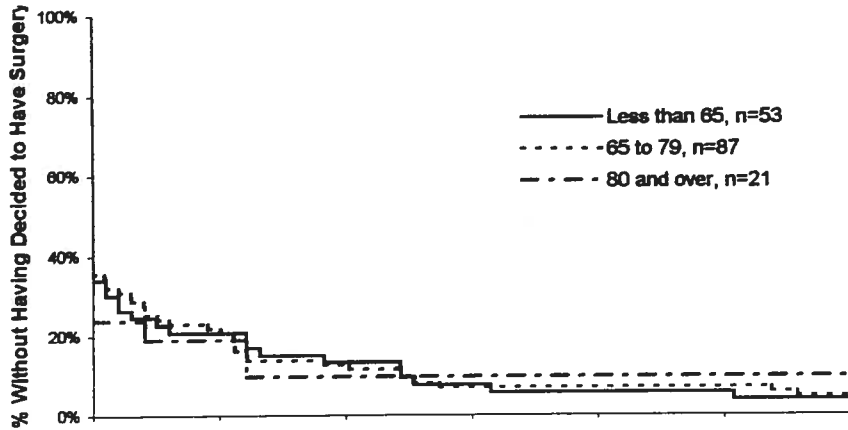


Figure 3

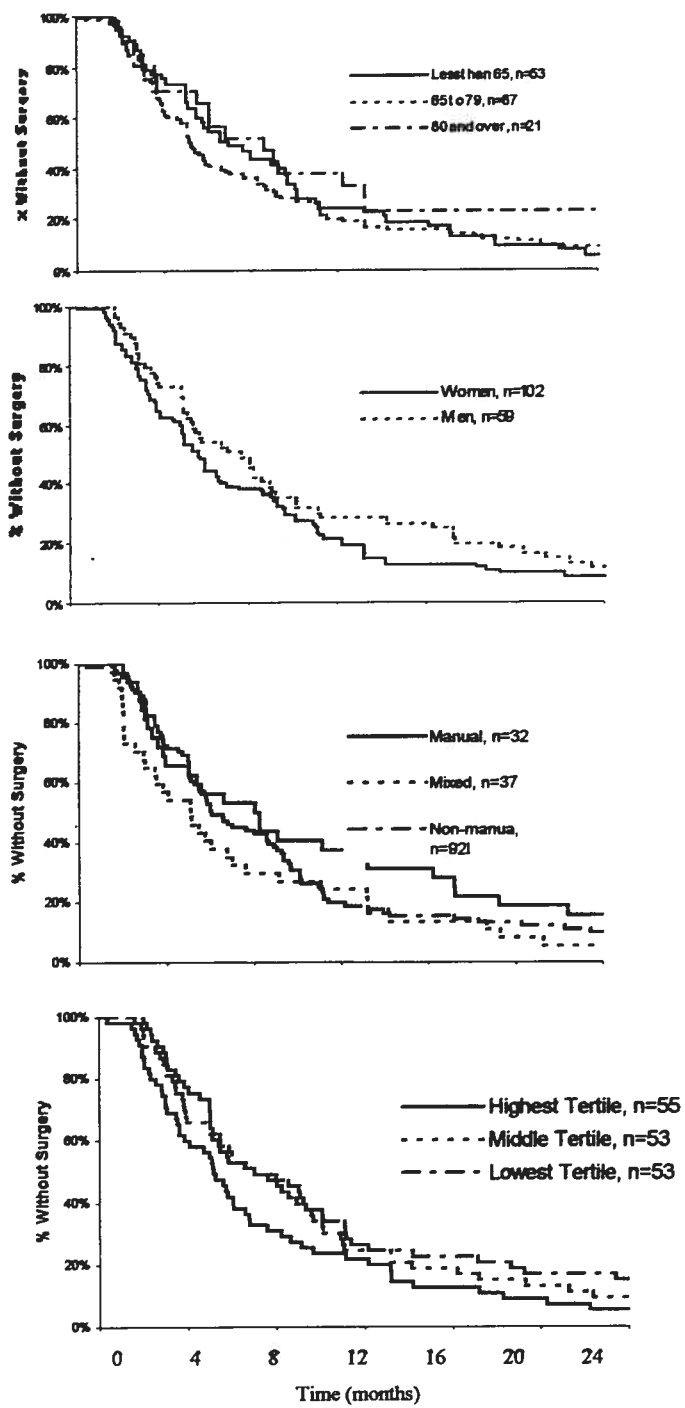
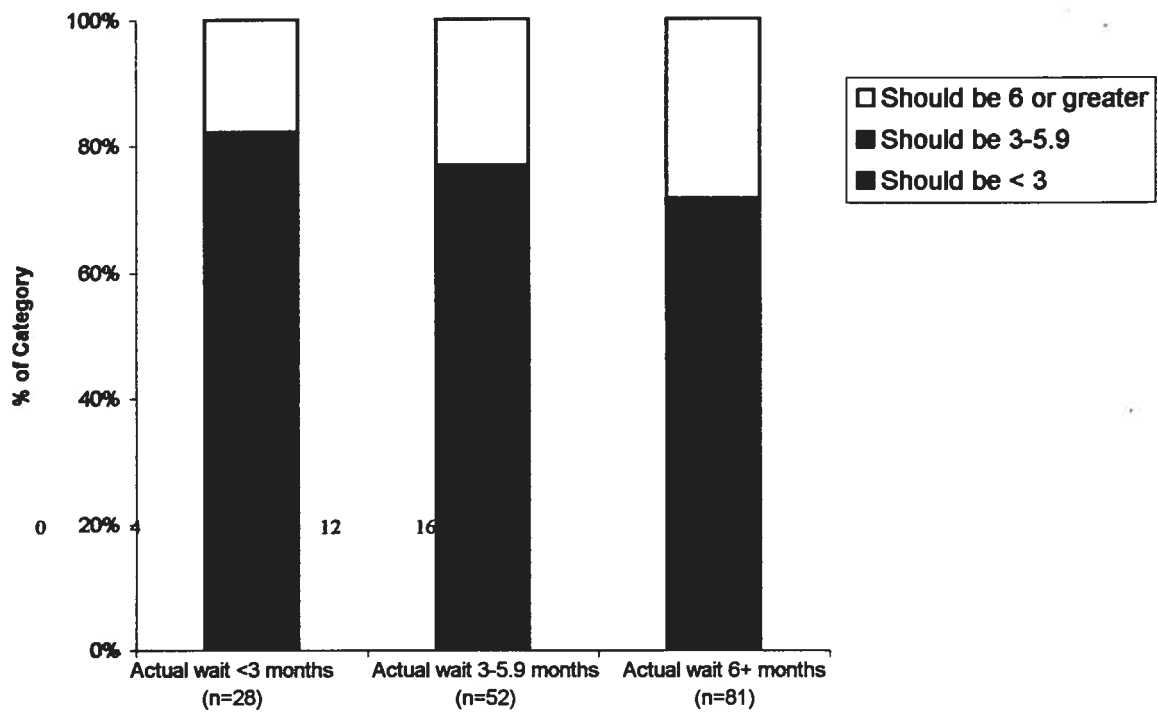


Figure 4



5 Additional Results

The findings for the first timeline are presented here because the exploratory nature of this data resulted in its omission from the article. The timeline from perception of symptoms to first surgical consultation was the most variable (Figure 5); some patients took as long as twenty years to consult a surgeon after they first developed OA symptoms. Approximately half the participants recalled having their first surgical consultation two years after they initially perceived their symptoms (median=28.4 months) and more than two-thirds of the participants had consulted a surgeon five years after they perceived OA symptoms. In the univariate analysis, waiting times did not differ by age ($p=0.13$), gender ($p=0.22$), or occupation ($p=0.23$) during this interval. Results from the Cox regression in which all covariates were simultaneously adjusted for each other were similar (data not shown).

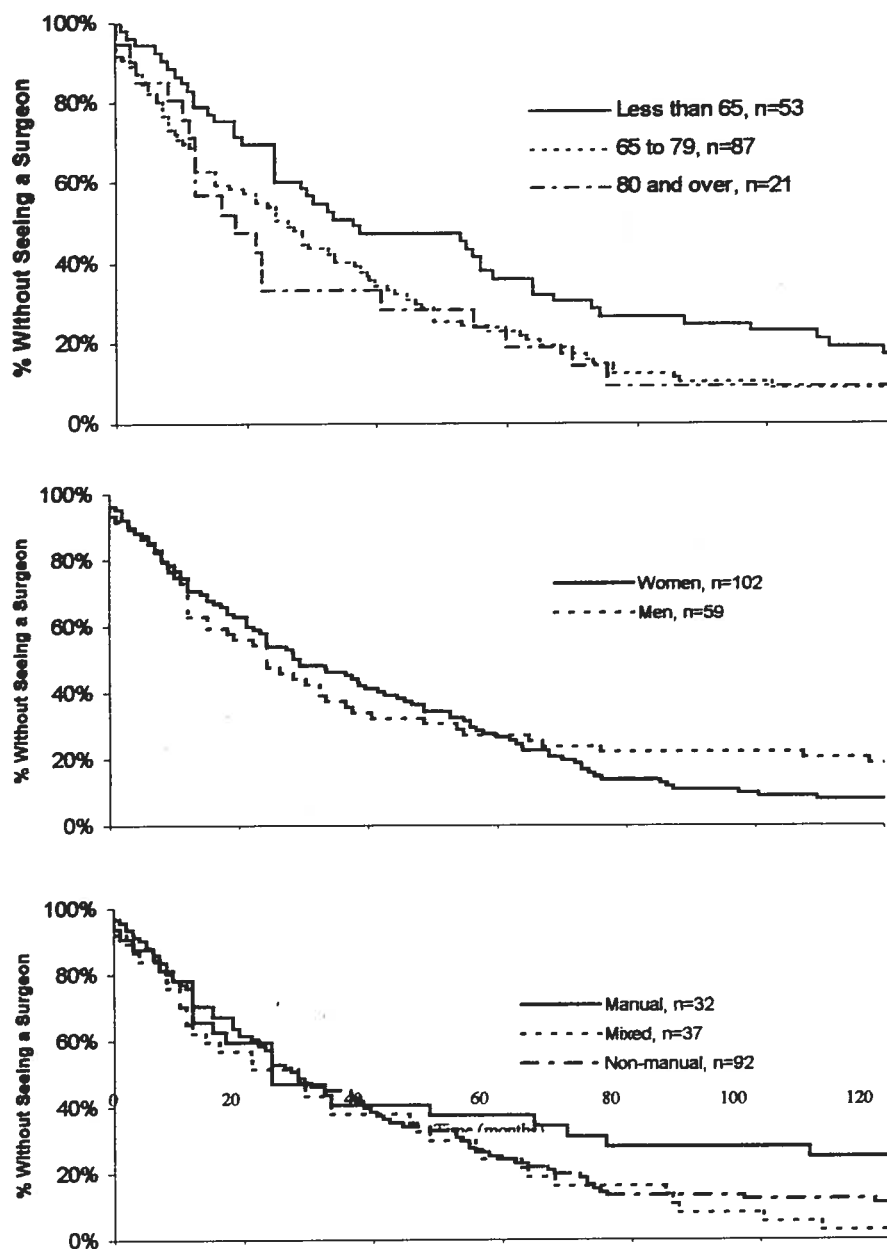
Information regarding the study subjects' previous use of past use of an ambulatory aid such as a cane, physiotherapy and exercises in the management of OA was obtained through the questionnaires. In terms of assistive devices, 76.4% had been prescribed a cane, and 86.2% of this group used a cane or another walking aid. Another 13 of the remaining 38 individuals (34.2%) used a cane without it being prescribed. Those who were prescribed a cane and did not use it ($n=17/42$) cited the following reasons for not using it: vanity (8), not necessary (5), too difficult (2), didn't like it (1) and "no reason" (1).

Physiotherapy and exercise were prescribed less frequently than the use of a cane. Overall, 45/161 (28.0%) of patients recollected attending physiotherapy for the treatment of OA. Of these, 73.3% (33/45) recalled receiving any exercise from the physiotherapist treating their OA, whereas the other 9 recollected only passive treatment (e.g. electric or thermal modalities, manual therapy). Of those receiving exercises in physiotherapy, 84.9%

(28/33) recalled receiving at least one strengthening or aerobic exercise. Only 2.6% of ⁶⁰ patients who did not receive physiotherapy (3/116) recalled having been prescribed exercise for the treatment of OA.

Figure 5

Kaplan-Meier curves depicting time-to-event over 10 years, in months, from initial symptom perception to surgical consultation for subgroups divided according to age, gender and occupation group.



6 Discussion

Our findings reveal that the delay from surgical consultation to decision to operate was no different based on age, gender or occupation group. Similarly, the delay from decision to undergo surgery until the actual surgery did not differ between age, gender or occupation groups, however those with more severe symptoms underwent surgery earlier than those with mild or moderate symptoms. There is also some indication that the delay from perception of symptoms to surgical consultation differs widely between individuals, but these differences cannot be attributed to age, gender or occupation. With respect to what patients consider a reasonable wait for surgery, our participants' perceptions (median of 12 weeks) were not associated with the time they actually waited for surgery. The framework we will follow for the discussion of each of the timelines is Andersen's model of health services' use (155) which is described in the next section.

Andersen's Model of Use of Health Services

Utilization of health services is affected by many factors in addition to medical need (156). The Andersen model (Appendix III) depicts the "multiple influences on health services' use and, subsequently, on health status" (155). In broad terms, these influences are grouped as factors pertaining to the environment, population characteristics, health behaviours and outcomes. Although there is a linear aspect to this model, it is important to note that there are many interactions between the various factors, and these are depicted by feedback loops. For example, the outcome of using health services may affect subsequent predisposing factors, perceived need for services, and health behaviour (155).

Environmental factors consist of the physical, social and attitudinal environment in which people live and conduct their lives (157). This model recognises that the external

environment as well as national health policy and the organization of resources are important determinants of the populations' use of health services (155). Regarding the Health Care System, the National Health Policy in Quebec as in the rest of Canada provides physician and hospital medical services free of charge, providing universal access irrespective of patients' means. In terms of External Environmental Components, Quebec provides free physiotherapy services for anyone who becomes injured in a motor vehicle accident or through a work-related injury. This extends the universal access principle but is outside the scope of the National Health Policy because it only applies to certain mechanisms of injury and not to the condition itself.

Population characteristics are subdivided into predisposing factors, enabling resources and need (155). Predisposing characteristics include demographic factors that influence biological imperatives for the use of health services (such as age and gender), social structure (including educational and ethnic background), and health beliefs (attitudes, values and knowledge that could influence subsequent perceptions of need) (155). Community and personal enabling resources such as transportation and health insurance are necessary for use of services to take place (155). Need is the prime determinant of use of health services; perceived need is more closely related to the type and amount of treatment provided after consulting a medical care provider (155).

Health behaviours consist of both personal health practices (such as diet, exercise, smoking, self-care, etc.) and the use of the health care system (type, site, frequency of use, etc.). Effective access is established when the type, site, purpose and time interval of a health service result in improved health status or consumer satisfaction (155). Access is

considered efficient when the level of health status or satisfaction increases relative to the amount of health care services consumed (155). For instance, access is efficient if consumer satisfaction is greater when interventions require less visits and shorter waiting times. Personal health practices interact with the use of formal health services to influence health outcomes (155).

Outcomes of health services use include perceived and evaluated health status as well as patients' appraisals of their experience using services. This appraisal of satisfaction consists of convenience, availability, cost and quality, as well as certain provider characteristics (e.g. bedside manner) (155). As shown in the model, the outcome can affect subsequent predisposing factors and perceived need for services as well as health behaviour.

Health Inequities, are defined as differences in health that are unnecessary, avoidable, unfair and unjust (158). This is important when studying waiting time. What is considered just and fair in a given situation depends on the paradigms that apply to that particular setting. For example, some argue that service should be prioritised to those with the greatest need (71;124;127;150;159), rather than a first-come, first served basis. Other systems, such as private health care, base priority on the logic that those who can afford better education, housing and nutrition are also entitled to better health services. Because it is not possible to achieve all of these simultaneously, health inequities remain a value-based judgement (158).

In this thesis, I have compared waiting times for THR (i.e. use of health services according to the model) across age, gender and occupation groups (i.e. population

characteristics – demographic factors). Kelly et al. (124) considered waiting time as equitable when it was not affected by gender, age, marital status, education or other non-medical conditions. Although this appears credible at face value, in reality it is more complex. According to the Andersen model, health behaviour is dependent on both perceived and evaluated need, and these are, in turn, affected by gender, age, marital status and non-medical conditions. For instance, because younger adults are generally healthier, they might decide to undergo surgery more quickly than their older counterparts, who often have more comorbidity to consider. This could result in shorter waits for younger patients, which are unequal but not inequitable. Finally, the Andersen model also takes the outcome into consideration whereas Kelly does not. For example, the age of the patient affects the likelihood of improvement in perceived and evaluated health status (e.g. a 90 year old patient is more at risk of post-operative pneumonia), and therefore Kelly's paradigm of inequity does not appear to accommodate all the necessary factors.

6.1 Preliminary data on interval from the initial perception of symptoms to first surgical consult

The behavioural model for the use of health services, according to Andersen (155), is adapted to this timeline in Appendix IV.

6.1.1 Environment

As mentioned previously, the way in which health care resources are organized can influence health services use. In Québec, orthopaedic surgeons receive only \$5 more when a patient is referred by another physician, compared to a non-referred patient. In addition,

they are required to write a consultation report to the referring physician to receive the additional compensation. Other specialties in Quebec (and orthopaedic surgeons in other provinces) may receive up to twice the regular compensation for a consult. Because of these environmental issues (Health Care System), many patients may access an orthopaedic surgeon for hip OA before seeing any other physician. Therefore, a timeline that included physician referral to an orthopaedic surgeon is inappropriate in Quebec, and we defined our first interval as the initial perception of OA symptoms to the first surgical consultation. (10;160)

Although we did not measure external environment, it may affect the perception of “need”, and this notion will be addressed below as it pertains to the timeline from initial perception of symptoms to first surgical consult. For example, an individuals’ choice of treatments for OA can be influenced by physical factors such as climate and terrain (e.g. factors such as living in a house with stairs or in a city with a cold climate), and economic and social factors (e.g. poverty in local community is associated with peer-pressure not to see physicians for “normal” aches and pains). (161).

6.1.2 Population Characteristics

The time between the initial perception of symptoms and first orthopaedic consultation differed substantially between individuals, and this may be partially attributable to differences in predisposing factors, enabling resources or need.

6.1.2.1 Predisposing factors

With respect to predisposing factors, individuals may have had different health beliefs. This may include the belief that joint pain is a normal part of aging or that surgery requires a pain level higher than what they were experiencing (162), a fear of undergoing surgery (17), or a preference for another course of action such as prayer (17;17;163). One epidemiological study suggests that many patients with significant musculoskeletal problems do not consult their health care provider at all (164), and this may be attributable in part to the beliefs mentioned above. Although we did not measure social structure, our preliminary findings indicate that difference in the wait from initial symptoms to orthopaedic consultation was not based on the demographic factors of age, sex or occupational groups (divided into manual, non-manual and mixed categories). Similar findings regarding age, gender (117) and work status (124;165) have previously been reported, although others have described differences in waiting times according to gender and occupation groups (16;17;154). Women, for instance, were found to be less willing to undergo total knee replacement, although this was a hypothetical situation (17). Women tend to undergo surgery at a more advanced stage of disease (16), however this inference was based on data obtained retrospectively (6 months post-op), and pre-operative arthritis severity was based on medical record review. In terms of past occupation, individuals in England who had OA and expressed a need for a hip operation were less likely to receive surgery if they were the “socially disadvantaged” (based on occupation) (154).

6.1.2.2 Enabling resources

A person's family and community may have an effect on the likelihood that they will consult an orthopaedic surgeon. Many patients with hip OA have limited mobility; those without accessible transportation and an assistive device such as a cane or a walker may have difficulty going to see a specialist. A supportive family may affect an individual's decision to seek specialist consultation. As for community, there can be attitudes that either encourage or dissuade patients from seeking specialist care; for instance, the recent highly publicized outbreak of *Clostridium difficile* infections in Quebec hospitals may have left patients less trusting of the medical community (166).

6.1.2.3 Need

In terms of perceived need for THR, patients typically discuss the decision to undergo elective surgery with family and friends. Their opinion can modify patients' willingness to undergo THR, and adds to the complexity of cognitive and social dimensions of the decision-making process for the use of health services (161). In this context, the opinions of friends or family can affect a patient's perception of 'need'.

From a physicians' perspective, the variability in referrals could be due in part to the lack of a clear consensus regarding the indications or need for THR. Also, some physicians may refer patients for surgery partly because waiting lists for non-surgical intervention such as physiotherapy are too long (167;168). Therefore, evaluated 'need' for THR may be dependent on factors other than clinical findings. This will be discussed further with the next timeline.

6.1.3 Health behavior

Personal health practices may vary greatly between individuals with hip OA. In the present study, the time between the initial perception of symptoms and first orthopaedic consultation differed substantially between individuals (more so than the other waiting periods we evaluated) even though this timeline did not differ based on age, gender or occupation. As the initial perception of symptoms was the most remote date that patients were asked to remember (many of our patients recollected a long history of pain), recall of times is expected to vary. Also, the rate of progression of OA can vary significantly between individuals; symptomatic hip osteoarthritis usually begins insidiously, but in some cases pain and impairment start abruptly (14). There also may be differences with respect to how much time was spent trying non-surgical OA intervention such as physiotherapy.

There is evidence that the need for joint replacement can be delayed by treating arthritis with exercise and assistive devices (169). Simple, mostly self-directed exercise programs proven to be effective could be implemented at little cost to the health care system. Lorig et al (170) compared the effectiveness of two arthritis self-management programs to conventional treatment for arthritis and found that a relatively inexpensive mailed program can improve health status with respect to disability, pain, and global patient outcomes and reduce healthcare utilization for up to 2 years. These improvements were equal or greater than those attained with non-steroidal anti-inflammatory drugs (NSAIDS) (170). These findings can help address the lack of resources for non-invasive intervention of OA patients (168).

6.1.4 Outcomes

Due to our study design, we do not have information concerning individuals' satisfaction with their consultation or with surgery.

6.2 Second interval: from surgical consult to decision to operate

Andersen's behavioral model for the use of health services (155), specific to this timeline, is presented in Appendix V.

6.2.1 Environment

As mentioned, environmental factors such as health system policies influence access to services. In Canada, government-funded health care makes elective surgery accessible even to those who are financially disadvantaged. The median in-hospital cost for the primary joint replacement in Canada is \$6080 (171), and this does not include lost income or the cost of equipment, medication, support services and rehabilitation (if applicable). Universal health care minimizes the effect of socio-economic status on access to elective surgery (172). Because cost is not an issue, patients can base their decision to undergo THR on their needs and particular circumstances.

6.2.2 Population characteristics

Within this timeline, predisposing factors, particularly age, affect the time it takes for patients to decide to undergo THR. Enabling resources can consist of the presence of supportive family, friends and employer as well as the absence of comorbidity. In terms of need, evaluated need is assessed whereas perceived need varies with each individual.

6.2.2.1 Predisposing factors

In our study, a majority (65.8%) of the participants decided to undergo THR surgery at the time of their initial surgical consultation. It is possible that they consulted an orthopaedic surgeon regarding hip pain at the appropriate time, in other words when they were ready to undergo surgery. It is also possible that they waited too long, and their severe pain and disability caused them to agree to surgery as soon as the option was made available.

Almost 80% of the individuals in the over 80 age group made the decision the same day, compared to about 60% of those under 65. The results were not statistically significant, possibly because of the small number of 80+ subjects (n=21). However, this may reflect the surgeons' concern with prosthetic longevity and the potential need for revision in younger patients (112).

6.2.2.2 Enabling resources

Social situation undeniably affects the decision to undergo THR. Family members can offer moral support and physical assistance during the recovery period. For those without such support, the recovery period is much more challenging in terms of outlook, mobility and self-care. Further, surgery may be delayed until support can be arranged for both their dependents and themselves (116). "Snowbirds" (retirees who winter in Florida) may also plan their surgery around their winter sojourn in warmer surroundings, delaying their surgery until their return to Canada.

Employers can be supportive of individuals undergoing THR, not only by giving them time off but also with the provision of modified work duties and ergonomic modifications to accommodate employees with hip OA, both before and after surgery (173). These factors may be more or less important to different individuals in their consideration of whether or not to undergo THR. Forty-five (28.0%) of our participants ended their employment less than a year before surgery. We did not ask whether they planned to return to work post-operatively but it is possible that at least some of these patients stopped working because of their pain.

Healthier individuals have fewer factors to consider in the decision to undergo THR than patients with multiple health problems. The presence of comorbidity may decrease their likelihood of having surgery (167). Our study participants, for instance, are healthier than the General U.S. Population over 65 years old, as demonstrated by their score of 77.5 ± 16.7 compared to 47.3 ± 10.7 on the General Health component of the SF-36. Our study sample is not representative of the general population because it excludes individuals who are not well enough to undergo surgery. These excluded individuals are expected to have lower SF-36 scores, and this possibly explains why our population had higher than average SF-36 scores.

Patients may or may not be aware that worse pre-operative function can result in worse post-operative function (70), but the presence of multiple health problems may cause them to avoid undergoing yet another surgery.

As mentioned, although Universal health care mitigates the impact of socio-economic status on access to THR, (172) there have been inequities demonstrated in the

system whereby SES and other factors may contribute to “queue jumping” (71). Our findings, though preliminary, suggest that this was not the case among our patients.

6.2.2.3 Need

As mentioned, there is a distinction between perceived and evaluated need. In the case of the need for THR, perceived need could be interpreted as the patient’s experience of symptoms, whereas evaluated need is based on the surgeon’s objective evaluation. The evaluated need for THR is based on a combination of clinical and radiological findings, as well as symptom severity. In a survey of surgeons in New York City who performed THR and TKR, indications for surgery included a minimum of the following: severe pain on a daily basis, pain at rest, pain during transfers, and destruction of most of the joint space on radiograph (167). Their evaluation of need might also include the consideration of non-clinical factors. Therefore they were less likely to operate on younger patients, or in the presence of comorbidity, technical difficulties, and lack of motivation, and more likely if a patient had the desire to be independent and return to work (167). The authors noted “wide variations among surgeons” (167) as there is no standard criteria for indication of joint replacement and whether it should include perceived need or just clinical (evaluated) findings. Although it has been suggested that social factors such as employment and the presence of dependents should be considered in the determination of urgency for THR (159), there is yet to be a universally accepted method for determining surgical priority (124;152;160). We did measure functional status but this was done only pre-surgically; thus we could not evaluate whether functional status at consultation had an effect on decision to operate. Patients may delay the decision to operate to undergo further tests or

try other interventions prior to deciding to undergo surgery. It is also possible that for some patients, OA symptoms progress very slowly or improve somewhat, causing them and/or their surgeons to delay the decision to operate (44).

The perception that one needs a THR is based on more than a clinical diagnosis of hip OA. According to the WHO definition, disability involves dysfunction at one or more of these levels: impairments, activity limitations and participation restrictions . For example, hip OA symptoms may cause physical impairments such as diminished hip movement, which may result in activity limitations with walking, foot care, and dressing. Participation restrictions are problems an individual may experience with involvement in life situations (e.g. work) and depend on the debilitating effects of chronic pain as well as the degree of physical impairment, activity limitations and environmental factors (157). Because of these factors as well as the wide age range of patients, the needs of individual patients vary greatly; therefore optimal timing and appropriateness of interventions differ between patients.

6.2.3 Health behavior

In this time interval, the use of health services consists of the decision taken regarding THR following consultation(s) with an orthopaedic surgeon. The demographic variables we investigated (age, gender and occupation) were not associated with the length of time between surgical consult and decision to operate.

6.2.4 Outcomes

We did not evaluate consumer satisfaction with the process of consulting a surgeon for THR.

6.3 Third interval: from decision to operate to date of surgery

For this third, and final, timeline Andersen's behavioral model for the use of health services (155) is presented in Appendix VI.

6.3.1 Environment

There is a wait for THR because the demand for services exceeds the availability. In Quebec, it is estimated that the prevalence of OA is 12% (the lowest in Canada) and affects 712 000 people over the age of 15 years (174). Between 1994 and 2001, the rate of Canadians diagnosed with any form of arthritis has increased by 13%, whereas orthopedic procedures for OA and related conditions has remained relatively steady at under 500 per 100,000 population(174). Resources for THR are finite: there are only so many operating room hours allotted for elective surgery, surgeons available to perform these procedures, and hospital beds for patients to occupy during their recovery. This delays access to THR, and is outside the control of consumers. There is hope that this may improve with recent increases in health funding in Quebec.

6.3.2 Population characteristics

6.3.2.1 Predisposing factors

In the present investigation, there was no evidence to indicate that patients were prioritized by age. Individuals with worse function on WOMAC testing, however, did undergo surgery sooner. This suggests that functional abilities are taken into account when setting priority for surgery, regardless of patients' age.

In terms of gender, it has been suggested that women are at a more advanced stage in the course of OA when they undergo surgery (16), although this was not reflected in our findings. The previously reported differences in preoperative functional status between men and women may be because women are more averse to risk than men [54], or because women more often live alone or take care of a disabled spouse or elderly parent (175). Women may also have a higher tolerance for pain, and they may place a different value on physical functioning than men (17;176). Researchers have yet to determine whether the difference between men and women's preoperative status can be attributed, even in part, to a bias in the health care system (115).

6.3.2.2 Enabling resources

It has been suggested there is an association between access and socio-economic status (SES) (71;154;164). If past occupation is considered a proxy for SES, then our results indicate there is no association between SES and wait for surgery from the time of decision to operate. This suggests the absence of systematic queue jumping by affluent individuals. Previous research indicates operation rates for OA decreased among people

with lower SES (154). This would constitute a systematic disparity in the provision of health care services between social groups who have different levels of underlying social advantage (or “inequity”) (177), which was not reflected in our study

6.3.2.3 Need

“Need” can be categorized as either perceived or evaluated. The WOMAC and SF-36 are useful in helping characterize patients’ functional limitations to their medical caregivers. Tools such as the WOMAC help orthopaedic surgeons quantify the patient’s perceived needs, and some surgeons include this data in their clinical evaluation of need. As stated previously, patients with worse WOMAC scores had shorter waits for surgery implying possible prioritization based on severity of symptoms. Our SF-36 scores resembled the results of the WOMAC; on the SF-36, our population’s physical function and pain scores were worse than general population measures (Table I). Waiting times were not analyzed according to SF-36 as this would have been redundant.

6.3.3 Health Behaviour

6.3.3.1 Use of health services

Our findings reveal that once the decision to operate is made, the delay until surgery did not differ between age, gender or occupation sub-groups. The results also suggest prioritization based on functional level because patients with worse symptoms had surgery sooner. This may indicate the absence of inequity in the prioritization of our population. Several authors agree that if a health care intervention offers a reasonable probability of tangible benefit, it may be reasonable for those with the greatest need for the intervention to

be served first, all else being equal (126;127;149-152). Access is equitable when variances in utilization are based on demographic and need variables rather than when social structures, health beliefs, and enabling resources determine who gets medical care (155). According to this philosophy, the participants in our study appear to have been appropriately prioritized for surgery.

6.3.4 Outcomes

6.3.4.1 Consumer satisfaction

We did not follow the patients post-operatively; therefore we have no data concerning the outcome of their surgery. We did, however, examine patients' perceptions on what they considered a reasonable wait for THR would be.

Most (82.6 %) of our participants waited longer than they felt reasonable. Our sample's median wait from decision to operate until date of surgery was 6 months, and they felt it would be reasonable to wait 12 weeks (median). Similarly, Derrett et al. (142) reported 84% of people waiting for a hip or knee replacement desired their surgery within 6 months, and there was no apparent relationship between priority on the waiting list and what was considered an acceptable waiting time for surgery. According to the surgeons themselves, the median reasonable wait for orthopaedic surgery is 10 weeks, whereas 92% of patients wait longer than they feel is reasonable (147).

Nevertheless, availability is only one factor among the many that make up consumer satisfaction. In one survey, for example, knee replacement patients in Ontario were as satisfied with their surgical outcome as their American counterparts despite their

dissatisfaction with longer waiting times for initial orthopaedic consultation and for TKR in Ontario (139). The median waiting time for an initial orthopaedic consultation was two weeks in the United States and four weeks in Ontario, and the median waiting time for knee replacement after the operation had been planned was three weeks in the United States and eight weeks in Canada (139). Despite their satisfaction with their surgery, the fact that patients feel our waiting lists are too long should be addressed. This may involve a reform of select health care policies, improvement in the allocation of services, and consumer education regarding realistic waiting times for THR.

7 Conclusion

The likelihood of increasing need for THR due to higher prevalence of hip OA in an aging population together with no increase in resources for such interventions make it extremely important to develop prioritizing and access strategies as well as non-pharmacological interventions that have been proven to be effective. Optimization of available resources to those who would benefit the most and have the greatest needs would improve health services allocation to this population. For example, with the appropriate systems in place, patients willing to undergo surgery in a community other than their own could have access to surgeons with shorter waiting lists. In terms of prevention, the implementation of interventions that prevent the progression from chronic illness to disability could reduce the need for joint replacement in the future. Proven, effective preventative treatment such as exercise, appear to be underused, however it is somewhat encouraging that functional status appears to be a criterion for prioritization for THR.

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Appendix I

Letter to Patient and Consent Form (French and English)

Lettre adressée aux patients en attente d'un remplacement total de la hanche

Sujet : invitation à participer à une étude sur les soins et services de santé pour les patients avant et après une chirurgie pour remplacement total de la hanche au Québec

Madame, Monsieur,

Je vous écris ... (chirurgien participant à l'étude) pour vous inviter à participer à une étude sur les besoins des patients qui sont en attente, comme vous, d'une chirurgie pour remplacement de la hanche. L'étude est dirigée par le Docteur Ian Shrier, au Centre d'Épidémiologie Clinique et de Recherche en Santé Publique, Hôpital Général Juif-SMBD, Université McGill. Elle a pour but de voir comment les soins peuvent être améliorés et nous désirons connaître votre opinion personnelle là-dessus.

Si vous acceptez, votre participation consistera d'abord à répondre par téléphone à un questionnaire, ce qui prendra de 15 à 20 minutes de votre temps pendant que vous êtes en attente de votre opération. Les questions porteront sur votre état de santé et les problèmes que vous éprouvez à cause de votre problème de hanche.

Toutes les informations vous concernant demeureront strictement confidentielles et votre nom ne sera pas divulgué. L'étude n'entraîne pas d'avantage pour vous mais servira pour l'avenir à améliorer les soins des personnes qui seront dans la même situation que vous. Vous êtes entièrement libre de ne pas répondre à certaines questions ou de ne pas participer à cette étude sans préjudice à vos soins.

Nous comptons beaucoup sur votre participation, elle est importante pour la réussite de l'étude. Un agent de recherche de l'équipe du Docteur Shrier vous téléphonera d'ici quelques jours. Pour toutes questions concernant l'étude vous pouvez contacter le Docteur Shrier au Centre d'Épidémiologie Clinique et de Recherche en Santé Publique, Hôpital Général Juif-SMBD, au numéro 514-340-8222 poste 4562.

Signature du médecin participant dans l'établissement.

Hôpital Général Juif-SMBD: Dr David Zukor

Hôpital Hôtel-Dieu: Dr Nicholas Newman

Hôpital Charles Lemoyne : Dr Charles Gravel

Hôpital Sherbrooke: Dr. François Prince

Hôpital Général de Montréal: Dr. Michael Tanzer

Centre Hospitalier Universitaire de Sherbrooke-Hôpital Fleurimont: Dr. Rejean Dumais

**Formulaire de consentement pour l'étude
Soins et services de santé pour les patients avant et après une chirurgie pour
remplacement total de la hanche ou du genou au Québec**

Je, soussigné, _____ consens à participer au projet intitulé « Soins et services de santé pour les patients avant et après une chirurgie pour remplacement total de la hanche au Québec », dont le but est de définir les soins et services les plus appropriés pour les personnes qui sont en attente d'une telle chirurgie ou qui en récupèrent après.

Je me suis fait expliquer l'étude et j'ai pu poser toutes les questions à la personne dont le nom est apposé au bas de ce formulaire, et j'ai obtenu les réponses à ma satisfaction.

Je comprends que je peux terminer ma participation à ce projet sans avoir à donner ni raison, ni préavis et que je resterai libre de toute obligation envers les personnes et les institutions impliquées dans ce projet.

Ma participation m'a été expliquée de la façon suivante: Je répondrai d'abord par téléphone à un questionnaire, ce qui prendra de 15 à 20 minutes de mon temps pendant la période où je suis en attente de mon opération. Ces questions porteront sur mon état de santé et les problèmes que j'éprouve à cause de mon problème de hanche.

Je comprends que les résultats de cette étude seront publiés mais en garantissant l'anonymat, de telle sorte que mon nom ne sera pas divulgué. Les données me concernant seront tenues strictement confidentielles et ne seront utilisées par les chercheurs que pour les fins de l'étude seulement.

Signé, à _____, ce _____ jour du mois de _____

Signature

Témoin : personne autorisée qui m'a expliqué le projet : Prénom et nom

Signature

Letter addressed to patients waiting for a total hip replacement

Object: invitation to participate to a study regarding the health care for patients who are waiting for a total hip replacement in Quebec.

Madam, Sir,

I am writing to you (participating surgeon) to invite you to participate in a study of the health care needs of patients who are, as yourself, waiting for a surgery of their hip. The study is directed by Doctor Ian Shrier, at the Centre for Clinical Epidemiology and Community Studies, SMBD-Jewish General Hospital, McGill University. The purpose of the study is to see how the health care can be improved and we value your personal opinion on this.

If you accept, your participation in the study will consist in answering by telephone a questionnaire that should take 15 to 20 minutes while you are still waiting for your surgery. The questions will be on your health in general and on the difficulties you are having due to your hip.

All information will remain strictly confidential and your name will not be mentioned. There is no direct benefit to you from the study, but will be useful for patients in the future who have the same problem you do. You are completely free to not answer any of the questions or to not participate in this study without any harm to your current health care.

We count on your help for the success of this study. A research assistant from Doctor Shrier's team will contact you by telephone in a few days. For any question concerning this study, you can contact Doctor Shrier directly at the Centre for Clinical Epidemiology and Community Studies, SMBD-Jewish General Hospital, 340-8222, ext 4562.

Signature of the participating surgeon

Hôpital Général Juif-SMBD: Dr David Zukor

Hôpital Hôtel-Dieu: Dr Nicholas Newman

Hôpital Charles Lemoyne : Dr Charles Gravel

Centre Hospitalier Universitaire de Sherbrooke-Hôpital Fleurimont: Dr. Rejean Dumais

Hôpital Général de Montréal: Dr. Michael Tanzer

Centre Hospitalier Universitaire de Sherbrooke-Hôpital Fleurimont: Dr. Rejean Dumais

Consent form for the study on health care services to patients awaiting total hip or knee replacement in Quebec

I, _____ consent to participate in the study « Health care services for patients awaiting total hip or knee replacement in Quebec». The goal of this study is to help define the most appropriate health care services for patients who are scheduled for total hip replacement.

The study has been explained to me. I have had the opportunity to ask all the questions I have concerning the study, and I have been provided appropriate answers.

I understand that I can withdraw my participation in this project at any time and without giving a reason. I have no obligation to any of the people or institutions involved in the study. My care will not be affected in any way if I refuse or withdraw from the study.

My participation has been explained to me in the following way: I will answer questions over the telephone that will take approximately 15-20 minutes of my time. This will occur within a few weeks of my scheduled operation. The questions will be about the general state of my health, and the specific problems associated with my hip.

I understand that the results of this study will be published but my responses will remain anonymous and my name will not be reported. All my answers will remain strictly confidential and will not be used by researchers except for completion of the study.

Signed, _____, this _____ day of (44)

Signature

Witness: person who explained project (Firstname Lastname)

Signature

Appendix II

French and English versions of the questionnaire including the WOMAC and SF-36.

LISTES D'ATTENTE POUR REMPLACEMENT TOTAL DE LA HANCHE AU QUÉBEC ^{xvii}

Questionnaire administré par téléphone aux personnes en attente de chirurgie

Numéro étude :

--	--	--	--

Établissement :

--	--	--	--	--	--

Date de l'entrevue :

j	j	m	m	a	a		

Prénom et nom du patient :

Critères d'entrée

A. En attente de remplacement total de la hanche = 1 autre = 2

Y a-t-il une date approximative prévue pour l'opération ? (OUI = 1 NON = 2)

Si oui, quelle est-elle ?

m	m	a	a

B. Avez-vous déjà été opéré pour une hanche ?

Si oui: s'agissait-il d'une prothèse totale de la hanche? (OUI = 1 NON = 2)
 Opposite hip (YES=1 NO=2)
 How many years?

Si oui : Nous ne pouvons inclure que les patients qui n'ont pas été opérés pour une prothèse de la hanche. Je vous remercie pour votre temps et vous souhaite bonne chance pour votre opération.
Si non : Poursuivre

Année de naissance:

1	9		
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Sexe: (Homme = 1 Femme = 2)

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En quels mois et année vos symptômes à la hanche ont-ils commencés pour la première fois?

m	m	a	a

En quels mois et année avez-vous consulté pour la première fois le chirurgien qui doit vous opérer ?

m	m	a	a

En quels mois et année votre chirurgien et vous avez-vous décidé de vous opérer à la hanche?

m	m	y	y

Connaissez-vous le diagnostic pour lequel votre chirurgien va vous opérer à la hanche?(OUI = 1 NON=2)
 Si oui : quel est ce diagnostic?

--

Souffrez-vous de varices dans vos jambes?

(OUI = 1 NON = 2)

Avez-vous déjà fait des thromboses dans vos jambes?

(OUI = 1 NON = 2)

(pour les femmes seulement): Avez-vous déjà pris au cours de votre vie des hormones en pilules ou en patch?

(OUI = 1 NON = 2)

Si oui, pendant combien d'années avez-vous pris des hormones à ce jour?

A part la hanche, avez-vous un autre problème qui vous empêche de marcher normalement?

(OUI = 1 NON = 2)

Avez-vous déjà eu de la physiothérapie pour votre problème à la hanche?? (OUI = 1 NON = 2)

Vous a-t-on déjà donné des exercices de renforcement pour votre problème de hanche?

(OUI=1 NON=2)

Si oui, décrivez le ou lesquels:

Établissement : _____

xviii									

Date de l'entrevue : _____

j	j	m	m	a	a				

Prénom et nom du patient : _____

Vous a-t-on déjà donné des exercices d'étirement pour votre problème de hanche?
(OUI = 1 NON = 2)
Si oui, décrivez le ou lesquels:

Est-ce qu'on vous a déjà conseillé d'utiliser une canne pour marcher? (OUI = 1 NON = 2)
Utilisez-vous une canne pour marcher? (YES = 1 NO = 2)
Si non, pourquoi pas?

En attendant votre opération, quels services de soins recevez-vous?

En termes de services de soins, y a-t-il quelque chose qui vous aiderait pendant que vous êtes en attente de la chirurgie?

Selon vous, combien de temps est-il raisonnable d'attendre pour une chirurgie de remplacement de la hanche (e.g. 3 sem, 2 mois)?

QUESTIONNAIRE WOMAC

Prénom et nom du patient : _____

No. d'identification: _____

xix

Section A

Les questions suivantes portent sur les difficultés que vous avez présentement à cause de votre problème de hanches.

Sur une échelle de 1 à 5 où 1 = aucune douleur et 5 = douleur extrême, comment évaluez-vous présentement votre douleur à la hanche dans les différentes activités suivantes :

aucune douleur douleur légère douleur moyenne douleur intense douleur extrême

- Marcher sur un terrain plat
- Monter et descendre des escaliers
- Lorsque vous êtes couché(e) la nuit
- lorsque vous êtes assis(e) ou couché(e)
- lorsque vous vous tenez debout

<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>

Section B

Si on dit que la raideur est une sensation d'ankylose qui vous oblige à bouger vos articulations plus lentement, diriez-vous que vous avez présentement de la raideur à la hanche, sur une échelle de 1 à 5 où 1 = aucune raideur et 5 = raideur extrême :

aucune raideur raideur légère raideur modérée Raideur importante raideur extrême

- lorsque vous vous levez le matin ?
- après avoir été assis, couché ou vous être reposé pendant la journée?

<input type="text"/>
<input type="text"/>

Section C

À cause de votre problème de hanche, quelle difficulté avez-vous présentement à faire les activités suivantes sur une échelle de 1 à 5 où 1 = aucune difficulté et 5 = difficulté extrême? :

aucune diff. diff. Légère diff. modérée diff. importante diff. extrême

- descendre les escaliers
- monter les escaliers
- vous relever de la position assise
- vous tenir debout

<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>

Section C (suite)

Prénom et nom du patient :

No. d'identification:

XX

aucune diff.

1

diff. légère

2

diff. modérée

3

diff. importante

4

diff. extrême

5

- vous pencher comme pour prendre quelque chose par terre
- marcher sur un terrain plat
- entrer et sortir de la voiture
- aller magasiner
- mettre vos bas
- sortir du lit
- enlever vos bas
- vous étendre sur le lit
- entrer et sortir du bain
- vous asseoir
- vous asseoir et vous relever de la toilette
- faire des gros travaux à la maison
- faire des petits travaux à la maison

QUESTIONNAIRE SF-36

Les questions qui suivent portent sur votre santé, telle que vous la percevez présentement. Essayez de répondre à toutes les questions. En cas de doute, répondez de votre mieux.

En général, diriez-vous que votre santé est :

1- Excellente

2- Très bonne

3- Bonne

4- Passable

5- Mauvaise

Par comparaison à l'an dernier, comment évaluez-vous, maintenant, votre santé générale ?

1- Bien meilleure maintenant que l'an dernier

2- Un peu meilleure maintenant que l'an dernier

3- À peu près la même que l'an dernier

4 - Un peu moins bonne maintenant que l'an dernier

5- Bien moins bonne que l'an dernier

Les questions suivantes portent sur les activités que vous pourriez avoir à faire au cours d'une journée normale. Pour les activités suivantes dites-moi si votre état de santé vous limite beaucoup, un peu ou pas du tout.

1- Beaucoup

2- Un peu

3- pas du tout

- Dans les **activités exigeant** un effort physique important comme courir, soulever des objets lourds, pratiquer des sports violents
- Dans les **activités modérées** comme déplacer une table, passer l'aspirateur, jouer aux quilles ou au golf

QUESTIONNAIRE SF-36 (suite)

Prénom et nom du patient :

No. d'identification:

1- Beaucoup

2- Un peu

3- pas du tout

- Pour soulever ou transporter des sacs d'épicerie
- Pour monter **plusieurs** étages à pied
- Pour monter **un seul** étage à pied
- Pour vous pencher, vous mettre à genoux ou vous accroupir
- Pour marcher **plus qu'un kilomètre** à pied
- Pour marcher **plusieurs coins de rue** à pied
- Pour marcher **un seul coin de rue** à pied
- Pour prendre un bain ou vous habiller

Au cours des quatre dernières semaines, avez-vous eu l'une ou l'autre des difficultés suivantes au travail ou dans vos autres activités quotidiennes à cause de votre état de santé physique? Répondez par oui ou non :

- Avez-vous dû consacrer **moins de temps** à votre travail ou à d'autres activités ? (OUI = 1 NON = 2)
- Avez-vous accompli **moins de choses** que vous l'auriez voulu ? (OUI = 1 NON = 2)
- Avez-vous été limité(e) dans le **choix de vos tâches** ou de vos autres activités ? (OUI = 1 NON = 2)
- Avez-vous eu de la **difficulté à accomplir** votre travail ou vos autres activités (par exemple vous a-t-il fallu fournir un effort supplémentaire) ? (OUI = 1 NON = 2)

Au cours des quatre dernières semaines, avez-vous eu l'une ou l'autre des difficultés suivantes au travail ou dans vos autres activités quotidiennes à cause de l'état de votre moral (comme le fait de vous sentir déprimé(e) ou anxieux(se)) ?

- Avez-vous dû consacrer **moins de temps** à votre travail ou à d'autres activités ? (OUI = 1 NON = 2)
- Avez-vous **accompli moins** de choses que vous l'auriez voulu ? (OUI = 1 NON = 2)
- Avez-vous fait votre travail ou vos autres activités avec **moins de soins** qu'à l'habitude ? (OUI = 1 NON = 2)

Au cours des quatre dernières semaines, dans quelle mesure votre état physique ou moral a-t-il nuit à vos activités sociales habituelles (famille, amis, voisins ou autres groupes) ?

1- Pas du tout
4- Beaucoup

2- Un peu
5- Énormément

3- Moyennement

Au cours des quatre dernières semaines, avez-vous éprouvé des douleurs physiques ?

1- Aucune douleur
4- Douleurs moyennes

2- Douleurs très légères
5- Douleurs intenses

3- Douleurs légères
6- douleurs très intenses

QUESTIONNAIRE SF-36 (suite)

Prénom et nom du patient :

No. d'identification:

Au cours des quatre dernières semaines, dans quelle mesure la douleur a-t-elle nuit à vos activités habituelles (au travail comme à la maison) ?

- | | | | |
|----------------|---------------|----------------|--------------------------|
| 1- Pas du tout | 2- Un peu | 3- Moyennement | <input type="checkbox"/> |
| 4- Beaucoup | 5- Énormément | | |

Ces questions portent sur les quatre dernières semaines. Pour chacune des questions suivantes, donnez la réponse qui s'approche le plus de la façon dont vous vous êtes senti(e). Combien de fois au cours des 4 dernières semaines :

- | | | | |
|------------------|------------------------|------------|--------------------------|
| 1- Tout le temps | 2- La plupart du temps | 3- Souvent | <input type="checkbox"/> |
| 4- Quelques fois | 5- Rarement | 6- Jamais | |
- Vous êtes-vous senti(e) plein(e) d'entrain (de pep) ?
 - Avez-vous été très nerveux(se) ?
 - Vous êtes-vous senti(e) si déprimé(e) que rien ne pouvait vous remonter le moral ?
 - Vous êtes-vous senti(e) calme et serein(e) ?
 - Avez-vous eu beaucoup d'énergie ?
 - Vous êtes-vous senti(e) triste et abattu(e) ?
 - Vous êtes-vous senti(e) épuisé(e) et vidé(e) ?
 - Vous êtes-vous senti(e) heureux(se) ?
 - Vous êtes-vous senti(e) fatigué(e) ?

Au cours des quatre dernières semaines, Combien de fois votre état physique ou moral a-t-il nuit à vos activités sociales (comme visiter des amis, des parents, etc.) ?

- | | | | |
|------------------|------------------------|------------|--------------------------|
| 1- Tout le temps | 2- La plupart du temps | 3- Parfois | <input type="checkbox"/> |
| 4- Rarement | 5- Jamais | | |

Dans quelle mesure chacun des énoncés suivants est-il VRAI ou FAUX dans votre cas ?

- | | | | |
|---------------------|---------------------|----------------|--------------------------|
| 1- tout à fait vrai | 2- plutôt vrai | 3- Ne sais pas | <input type="checkbox"/> |
| 4- plutôt faux | 5- Tout à fait faux | | |
- Il me semble que je tombe malade un peu plus facilement que les autres
 - Je suis en aussi bonne santé que les gens que je connais
 - Je m'attends à ce que ma santé se détériore
 - Ma santé est excellente

En terminant, j'ai 3 questions à vous poser sur les métiers que vous avez exercés dans votre vie.

XXIII

Prénom et nom du patient :

No. d'identification

Pendant toute votre vie, quel a été le métier que vous avez exercé pendant le plus longtemps chez un ou plusieurs employeurs?

Pour les différentes viles où vous avez pu exercer votre métier principal, dites-moi en quelles années vous avez travaillé.

(année début - année fin) →

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(année début - année fin) →

--	--	--	--	--

(année début - année fin) →

Au cours de votre vie, y a-t-il d'autres métiers que vous avez exercés de façon significative? (OUI = 1 NON = 2)

--

En commençant par le plus important, quels sont ces métiers ?

(année début - année fin) →

(année début - année fin) →

(année début - année fin) →

Je vous remercie pour votre collaboration. Nous allons vous rencontrer lors de votre admission à l'hôpital.

WAITING LISTS FOR TOTAL HIP REPLACEMENT IN QUÉBEC
Questionnaire for patients awaiting surgery – English Version

xxiv

Subject No.:

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Institution: _____

--	--	--	--	--	--

Interview Date:

d	m	m	y	y			

First & Lastname of Patient: _____

Inclusion Criteria

A. Waiting for a total replacement of the hip =1 other = 2

Is there an approximate date for the operation? (YES = 1 NO = 2)

If yes, what is that date?

m	m	y	y

B. Have you ever been operated for a hip problem?

If yes: Was it for a hip prosthesis? (YES= 1 NO = 2)

Opposite hip: (YES=1 NO=2)

How many years?

If yes : We cannot include in the study patients who have already been operated for a hip prosthesis. I thank you for your time and wish you the best of luck with your operation.
If no : Continue with the questionnaire

Year of birth:

1	9		
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Sex: (Male = 1 Female = 2)

--

In what month and year did your hip-related symptoms first start?

m	m	y	y

In what month and year did you first see the surgeon who will perform the operation?

m	m	y	y

In what month and year did you and your surgeon decide you should have the hip operation?

m	m	y	y

Do you know the diagnosis for which your surgeon is performing the hip surgery? (YES = 1 NO = 2)

If yes, what is that diagnosis?

--

Do you have varicose veins in your legs? (YES = 1 NO = 2)

Have you ever been treated for blood clots in your legs? (YES = 1 NO = 2)

(to women only): Have you ever taken hormones in pills or in patches? (YES = 1 NO = 2)

If yes, and if you are currently still taking hormone replacement therapy, for how many years have you done so?

Beside your hip problem, do you have any other problems while walking? (YES = 1 NO = 2)

Have you ever had physiotherapy for your hip problem? (YES = 1 NO = 2)

Have you ever been given strengthening exercises for your hip problem? (YES = 1 NO = 2)

Describe:

Institution: _____

					xxv

Interview Date: _____

d	d	m	m	y	y

First & Lastname of Patient: _____

Subject Number: _____

S

Have you ever been given stretching exercises for your hip problem? (YES = 1 NO = 2)
Describe: _____

Has anyone suggested you use a cane to help you walk? (YES = 1 NO = 2)
Do you use a cane to help you walk? (YES = 1 NO = 2)
If no, why not? _____

While you are waiting for your surgery, what health services, if any, are you receiving?

Are there health services that you would find useful while you are waiting for your surgery?

What do you think a reasonable wait for your type of operation would be (e.g. 3 wks, 2 mths, etc)?

Section A

The following questions concern the amount of pain you are currently experiencing due to your hip problem.

For each of the following situations, tell me what amount of pain you have on a scale from 1 to 5 where 1 is no pain at all and 5 is extreme pain :

No pain Mild pain Moderate pain Severe pain Extreme pain

- Walking on a flat surface
- Going up or down stairs
- At night while in bed
- Sitting or lying
- Standing upright

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Section B

The following questions concern the amount of joint stiffness (not pain) you are currently experiencing in your hips. Stiffness is a sensation of restriction or slowness in the ease with which you move your joints. Tell me how severe is your stiffness, on a scale from 1 to 5 where 1 is no stiffness and 5 is extreme stiffness:

No stiffness Mild stiffness Moderate stiffness Severe stiffness Extreme stiffness

- ... after first wakening in the morning?
- ... after sitting, lying or resting later in the day?

<input type="checkbox"/>
<input type="checkbox"/>

Section C

The following questions concern the degree of difficulty you have in moving around and looking after yourself, due to your hip problem. Tell me, on a scale from 1 to 5, where 1 is no difficulty and 5 is extreme difficulty, what difficulty you have in :

No difficulty Mild difficulty Moderate diff. Severe diff. extreme diff.

- ... descending stairs
- ... ascending stairs
- ... rising from sitting
- ... standing

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Section C (suite)

First and Lastname of Patient _____

Subject ID Number _____

xxvii

No difficulty 1

Mild difficulty 2

Moderate diff. 3

Severe diff. 4

Extreme diff. 5

- ... bending to floor
- ... walking on flat
- ... getting in/out of car
- ... going shopping
- ... putting on socks/stockings
- ... rising from bed
- ... taking off socks/stockings
- ... lying in bed
- ... getting in/out of bath
- ... sitting
- ... getting on/off toilet
- ... heavy domestic duties
- ... light domestic duties

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
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<input type="checkbox"/>
<input type="checkbox"/>

QUESTIONNAIRE SF-36

The following questions concern your health as you view it now. Try answering all the questions. If you are unsure about how to answer a question, please give the best answer you can.

In general, would you say your health is :

- 1- Excellent 2- Very good 3- Good 4- Fair 5- Poor

Compared to one year ago, how would you rate your health in general now?

- 1- Much better now than one year ago 2- Somewhat better now than one year ago
 3- About the same as one year ago 4 - Somewhat worse now than one year ago
 5 - Much worse now than one year ago

The following questions are about activities you might do during a typical day. For each activity I will mention, tell me if your health now limits you: a lot, a little or not at all.

- 1- Limited a lot 2- Limited a little 3- Not limited at all

- Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports
- Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

QUESTIONNAIRE SF-36 (suite)

Subject ID Number: _____

First and Lastname of Patient _____

1- Limited a lot 2- Limited a little 3- Not limited at all

- Lifting or carrying groceries
- Climbing several flights of stairs
- Climbing one flight of stairs
- Bending, kneeling, or stooping
- Walking more than a mile
- Walking several blocks
- Walking one block
- Bathing or dressing yourself

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? Answer by yes or no.

- Did you have to cut down on the amount of time you spent on work or other activities? (YES= 1 NO = 2)
- Have you accomplished less than you would have liked to? (YES= 1 NO = 2)
- Were you limited in the kind of work or other activities? (YES = 1 NO = 2)
- Have you had difficulty performing the work or other activities (for example, it took extra effort)? (YES = 1 NO = 2)

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)? Answer by yes or no

- Did you have to cut down the amount of time you spent on work or other activities? (YES = 1 NO = 2)
- Have you accomplished less than you would have liked to? (YES = 1 NO = 2)
- Did you work or did you do other activities less carefully than usual? (YES = 1 NO = 2)

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

1- Not interfered at all 2- Interfered slightly 3- Interfered moderately
 4- Interfered quite a bit 5- Interfered extremely

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

1- No bodily pain 2- Very mild pain 3- Mild pain
 4- Moderate pain 5- Severe pain 6- Very severe pain

QUESTIONNAIRE SF-36 (suite)

First and Lastname of Patient _____

Subject ID Number: _____

- During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

1- Not interfered at all
4- Interfered quite a bit

2- Interfered slightly
5- Interfered extremely

3- Interfered moderately

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:

1- All of the time
4- Some of the time

2- Most of the time
5- A little of the time

3- A good bit of the time
6- None of the time

- Did you feel full of pep?
- Have you been a very nervous person?
- Have you felt so down in the dumps that nothing could cheer you up?
- Have you felt calm and peaceful?
- Did you have a lot of energy?
- Have you felt downhearted and blue?
- Did you feel worn out?
- Have you been a happy person?
- Did you feel tired?

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.)?

1- All of the time
4- A little of the time

2- Most of the time
5- None of the time

3- Some of the time

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

1- Definitely true
4- Mostly false

2- Mostly true
5- Definitely false

3- Don't know

- I seem to get sick a little easier than other people
- I am as healthy as anybody I know
- I expect my health to get worse
- My health is excellent

To finish, I have three questions concerning the jobs you did during your life

XXX

First and Lastname of Patient

Subject ID Number:

During your entire life, what job did you have for the longest period of time, with one or several employers?

For each city where you worked at the above principal job, tell me the years when you were working at this job.

(year begin - year finish) →

y y y y

(year begin - year finish) →

| | | |

(year begin - year finish) →

| | | |

Are there other significant jobs that you had during your lifetime?

(YES = 1 NO = 2)

|

What are those jobs, starting with the most significant?

(year begin - year finish) →

| | | |

(year begin - year finish) →

y y y y

(year begin - year finish) →

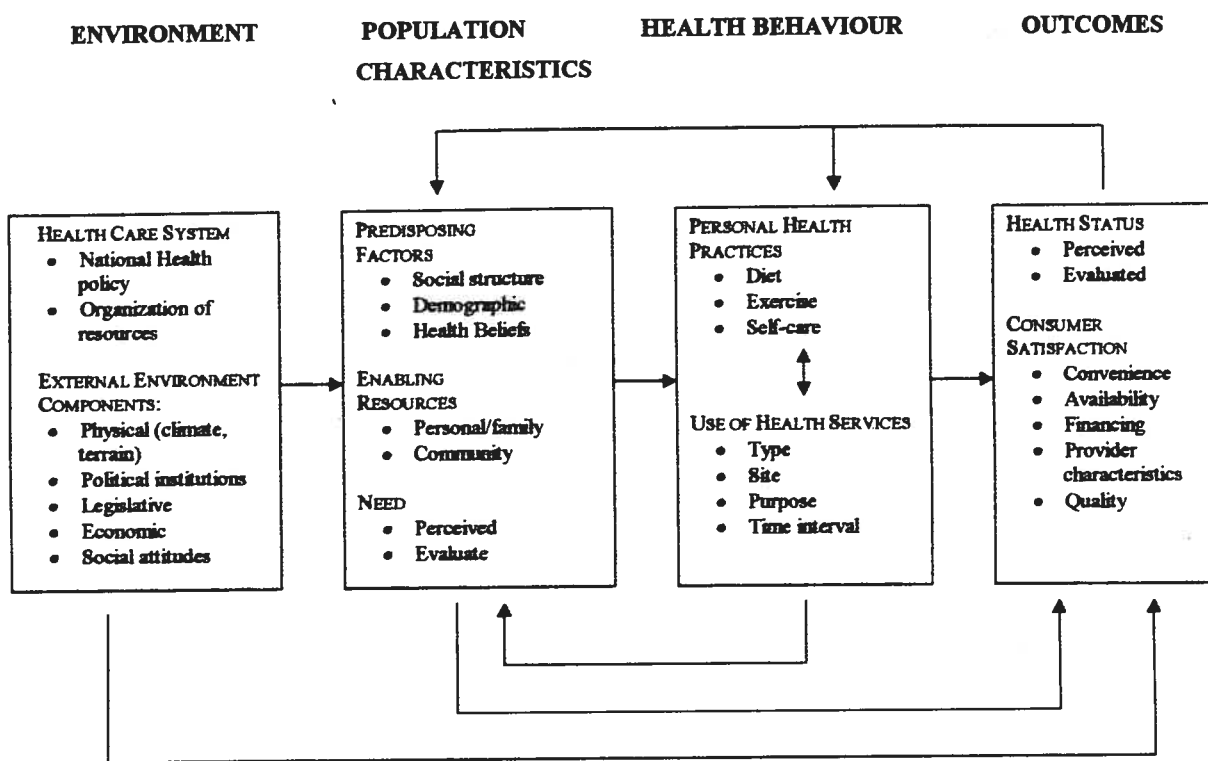
y y y y

y y y y

I thank you very much for your time. We are looking forward to meeting with you when you are admitted to the hospital.

Appendix III

Behavioural Model for the use of health services as proposed by Andersen (1995)

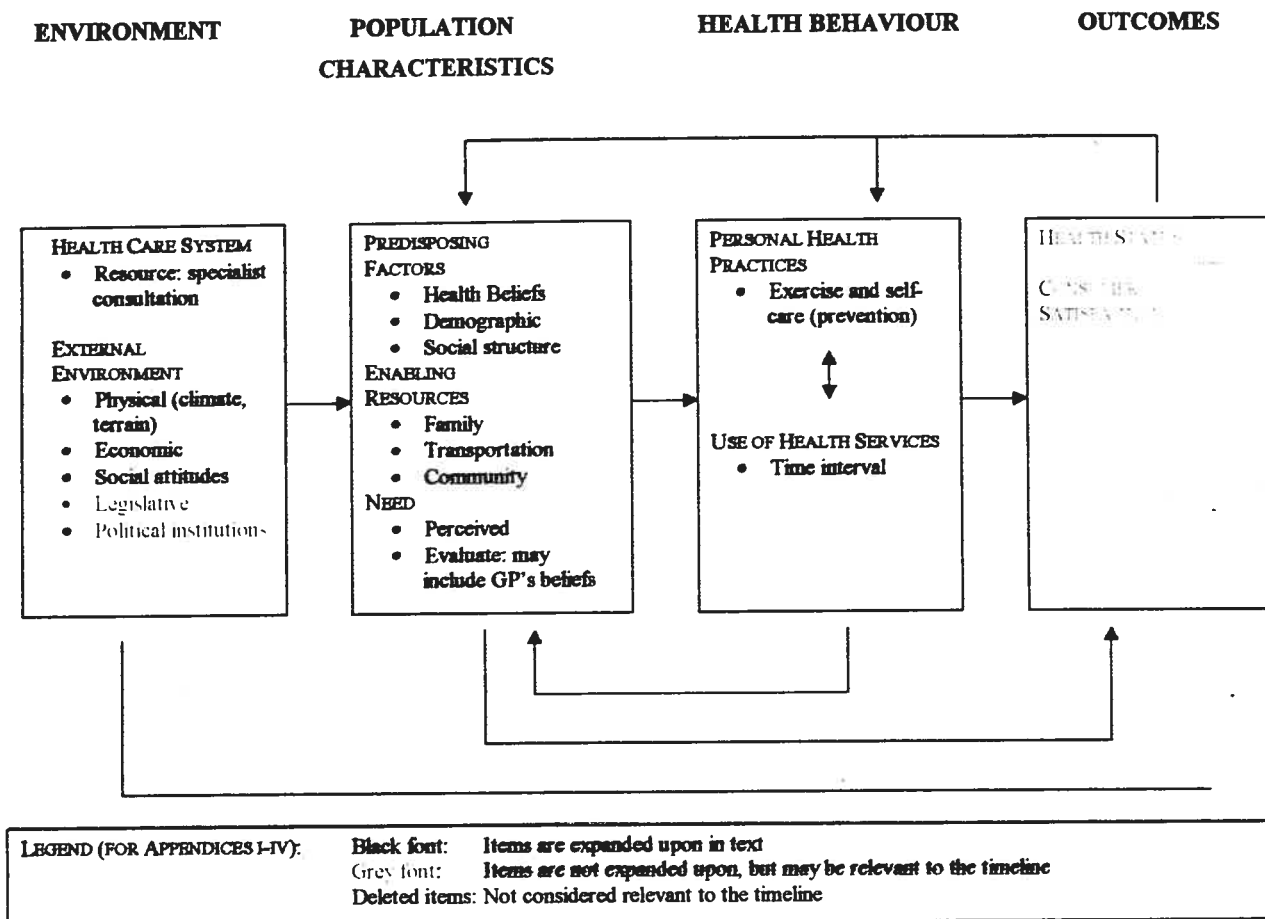


LEGEND (FOR APPENDICES I-IV):

- Black font:** Items are expanded upon in text
- Grey font:** Items are not expanded upon, but may be relevant to the timeline
- Deleted items:** Not considered relevant to the timeline

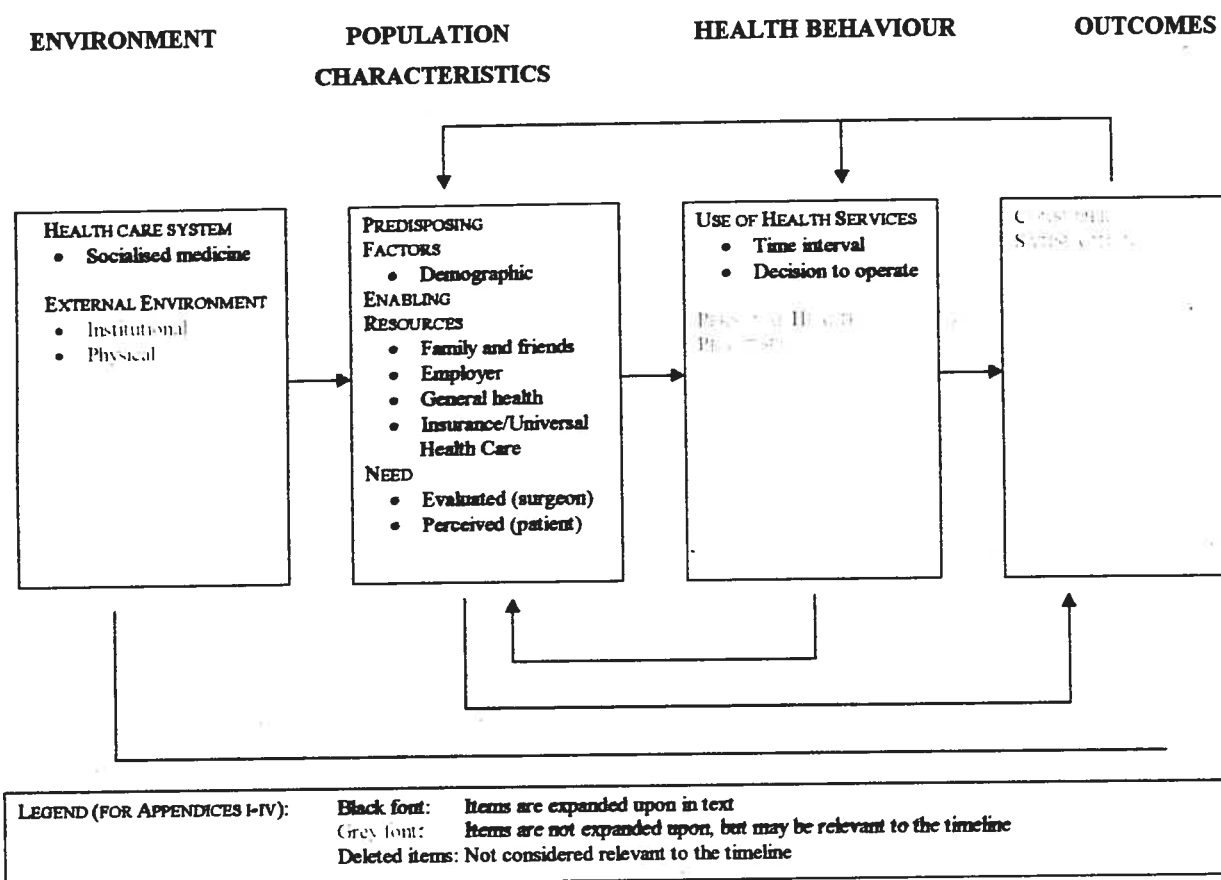
Appendix IV

Anderson's model of health services use, specific to the timeline from initial perception of symptoms to specialist consultation (preliminary data)



Appendix V

Anderson's model of health services use, specific to the timeline from specialist consultation to decision to operate



Appendix VI

Anderson's model of health services use, specific to the timeline from decision to operate to date of surgery

