Equity in waiting times for major joint arthroplasty

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Objective: To ascertain whether waiting lists are managed in an equitable fashion in a universal health system by examining demographic, socioeconomic and clinical factors, along with 2 health systems variables. **Design:** A prospective survey by questionnaire. **Setting:** The Capital Health Region of Edmonton, Alta. **Patients and methods:** A cohort of 553 patients, who were waiting for either total hip or total knee replacement surgery, seen between Dec. 18, 1995, and Jan. 24, 1997. **Interventions:** A home visit was made when the patient was first placed on the waiting list and again just before surgery to complete the questionnaires. The Western Ontario and McMaster Universities (WOMAC) instrument and the Medication Quantification Score were administered at the time the patient was placed on the waiting list. **Main outcome measure:** The length of waiting time, defined as the date the patient was put on the waiting list to the date the patient was operated on. **Results:** There were no biases in waiting time with respect to age, gender, education or work status. Although pain and function were not related to waiting time, multivariate analyses found that marital status, primary language, body mass index, pain medication use and the size of the surgeons' major joint replacement practice determined waiting time for surgery. However, this model explained only 10% of the variance in waiting time. **Conclusion:** Waiting lists were managed unfairly in terms of clinical equity (clinical severity) but managed fairly in terms of social equity.

Objectif : Déterminer si les listes d'attente sont gérées équitablement dans un système de santé universel en examinant des facteurs démographiques, socioéconomiques et cliniques, ainsi que les variables de deux systèmes de santé. **Conception :** Enquête prospective menée par questionnaire. **Contexte :** Région de santé de la capitale à Edmonton (Alberta). **Patients et méthodes :** Une cohorte de 553 patients qui attendaient pour subir une arthroplastie totale de la hanche ou du genou, vus en consultation entre le 18 décembre 1995 et le 24 janvier 1997. **Interventions :** On a effectué une visite à domicile lorsque le patient a été placé pour la première fois sur la liste d'attente et de nouveau immédiatement avant l'intervention chirurgicale pour qu'il réponde aux questionnaires. On a administré l'instrument des universités Western Ontario et McMaster (WOMAC) et le questionnaire sur la quantification de la médication au moment où le patient a été inscrit sur la liste d'attente. **Principale mesure de résultats :** Durée de la période d'attente, définie comme la période qui s'est écoulée entre la date de l'inscription du patient sur la liste d'attente et celle de l'intervention. **Résultats :** On n'a constaté aucun biais de la période d'attente en fonction de l'âge, du sexe, de l'éducation ou de la situation d'emploi. Même si l'on n'a pas établi de lien entre la douleur et la fonction, d'une part, et la durée de l'attente, de l'autre, des analyses à variables multiples ont révélé que la durée de la période d'attente qui a précédé l'intervention chirurgicale était déterminée par l'état matrimonial, la langue première, l'indice de masse corporelle, l'utilisation d'analgésiques et l'importance de la pratique d'arthroplastie des articulations majeures du chirurgien. Ce modèle n'expliquait toutefois que 10 % de la variation au niveau de la période d'attente. **Conclusion :** Les listes d'attente étaient gérées de façon inéquitable sur le plan clinique (gravité clinique), mais équitable sur le plan social.

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The Canadian health care system is publicly funded and based on universal and equitable access for all procedures. In terms of waiting lists, this translates into universal, equitable access for all procedures based on patient need.[1] If all else is equal, and the health intervention offers some tangible benefit, those with the greatest need should be served first.[2] In a well-organized health care system, waiting lists should not include patients whose health will deteriorate rapidly while they wait for surgery. Nor should those unlikely to benefit from early treatment get precedence over those for whom early treatment will provide great benefit.[3] Furthermore, patients should not be discriminated against because of social or economic factors.[1] Research in the area of equity in waiting lists is limited, and in a universal health system, where equity is of concern, further research is necessary to monitor the quality of waiting lists for surgical procedures.

At present, thousands of Canadians are on waiting lists for either total hip or total knee replacement. Hip and knee replacements are usually elective procedures, and waiting lists are managed by individual orthopedic surgeons — reluctantly, as most hospitals do not play a role in waiting list management. Priority is based on the surgeon's assessment of the clinical need. However, research has shown that there is considerable diversity among surgeons regarding the indications for this type of surgery.[4–6] The current management of waiting lists is not apparently rationalized (across lists) with respect to the burden of symptoms of those awaiting surgery.[7–9] Inequities in waiting time can also result from the combination of varying lengths in surgeons' waiting lists and their allocated operating time. This study is an extension of a previous study[10] in which we examined the impact of health status on waiting time for major joint arthroplasty. We found that the association between health status (pain and disability) and waiting time was small and concluded that further research was necessary to determine other factors predictive of waiting time.[10] The purpose of the present study was to examine patients' sociodemographic factors, along with clinical and health systems variables, to ascertain whether waiting lists are managed equitably. For the purposes of this study, equity has been defined in terms of both clinical equity — priority being given to those with more severe symptoms — and social equity — the absence of any effects of gender, age, marital status, education or other nonmedical conditions on waiting time.

Method

Patient selection and data collection

The Capital Health Region (CHR) is located in the northern part of Alberta, has a population of approximately 723 000 people and a referral area of 1.2 million people. Major surgery, such as hip and knee replacements, is performed in 2 of 5 acute care hospitals within the CHR.[11] Patients eligible for the study included those living in the Edmonton region who had been recommended by their orthopedic surgeon, between Dec. 18, 1995, and Jan. 24, 1997, for total knee or total hip replacement. Inclusion criteria for the study were as follows: residence within the CHR, a clear understanding of written English and the ability to give informed consent, and primary joint replacement surgery. Once the decision to have replacement surgery was made by the patient and surgeon, the patient's name was manually placed on a waiting list at either of the 2 referral hospitals and then transferred to the computerized regional waiting list, at which time a trained nurse recruited the patient for the study by telephone. If the patient agreed to participate, a home visit was made to further explain the study, obtain written informed consent and complete the self-administered questionnaire. Patients were excluded if a baseline measure could not be obtained within 1 month of the waiting list placement date. This happened occasionally if the patient was entered into the computerized waiting list late (e.g., because of data clerk vacation). We conducted weekly extracts of the regional joint replacement database to capture new patients on the waiting list and to flag people for preoperative measurement once the surgery date was established. We made a second home visit just before surgery. We obtained ethics approval for this study from the University of Alberta Health Research Ethics Administration Board.

Sociodemographic, clinical and health care system variables

The following sociodemographic information was collected from all patients when they were initially placed on the waiting list: age, gender, current marital status (married, other), primary language spoken at home (English, French or other), education (ranked as ≤ grade 8, partial high school, completed high school, partial technical school or university, completed technical school, completed university), work status (full-time, other) and residence type (apartment, condominium, house, senior's complex). Information pertaining to the patient's formal education was collected as a measure of their socioeconomic status, and work status data were obtained to ascertain whether the obligation of returning to work affected the patients' waiting time for surgery. Information on certain clinical variables was also obtained at baseline and included the following: diagnosis (osteoarthritis, rheumatoid arthritis), affected joint (hip or knee), previous arthroplasty (yes, no), body mass index (BMI), walking aids (yes, no), health status, comorbidities and use of pain med-

ication. Health system variables collected were the following: the hospital where the surgery was performed, the surgeon and the number of major joint arthroplasties that the surgeon performs in a year (based on the previous year). The hospital was used as a proxy for many unmeasurable variables such as operating time allocation, availability of operating rooms at the time of the study.

Patients' health status was measured using the Western Ontario and McMaster (WOMAC) universities instrument that was designed specifically for patients with osteoarthritis. This self-administered questionnaire consists of 24 items that are divided into 3 dimensions: pain, stiffness and function. The score for each dimension ranges from 0 to 100, with a low score representing the best health state. The WOMAC instrument's psychometric properties have been tested with patients suffering from arthritis of the hip and knee and has shown to have good responsiveness (significant improvements in pain postoperatively [$p < 0.005$], reliability [reliability coefficients > 0.80] and validity [criterion validity testing coefficients > 0.80 and good convergent construct validity]).[12–14]

Comorbidity was assessed using a 23-item list of chronic problems and conditions based on the Ontario Health Survey.[15–17] Patients were asked to indicate if they were presently suffering from any of the conditions. The comorbidities were then summed to a score ranging from 0 to 23.

Patients' pain medication use was measured using the Medication Quantification Scale (MQS), which provides a method for quantifying medication use for patients with chronic and nonmalignant pain.[18] Each pain-related medication is given a score that is based on the daily dosage and pharmacologic classification of that medication. For a given medication, the detriment weight is multiplied by the dosage level to yield an MQS. For an individual patient, the MQS for each medication is calculated and then summed to yield the total MQS for that patient. The MQS has demonstrated good concurrent validity, in that there is relatively high correlation between total MQSs and the mean clinical judgement of health professionals who are knowledgeable about pain medications.[18]

Waiting time was calculated from the time the patient was placed on the hospital waiting list until the operation took place.

Data analyses

Univariate analysis was conducted to determine the association between the independent variables (age, gender, BMI, primary language spoken, education, marital status, work status, walking aids, type of residence, MQS, diagnosis, affected joint, previous replacement, chronic conditions, WOMAC subscales, referral hospital, orthopedic surgeon and orthopedic surgeon's practice) and the dependent variable (waiting time).

Age was categorized into 4 groups (< 55, 55–64, 65–74 and ≥ 75 years), BMI into 3 levels (≤ 26, 27–32 and > 32), and the number of comorbidities into 3 classes (≤ 2, 3–4 and > 4). The subscales for the WOMAC instrument were categorized into 3 equal groups, similar to those used in other research.[6] The WOMAC instrument was recoded as follows: a score of less than 33.33 was recoded as mild pain or stiffness, or good function; a score between 33.34 and 66.66 was recoded as moderate pain or stiffness, or fair function; and a score more than 66.66 was recoded as severe pain or stiffness, or poor function. The orthopedic surgeons' practice was categorized into 4 groups (< 25, 25–50, 51–100 and > 100 major arthroplasties per year).

Differences in mean values of continuous variables were tested with either *t*-tests or analysis of variance (the Kruskal–Wallis test was used for nonparametric comparisons) and χ^2 tests were used to test proportions. Multivariate analysis was utilized to determine the relationship between sociodemographic variables, health status, health system variables and waiting time. A natural logarithmic transformation was performed on waiting time (dependent variable) to adjust for its positive skewness. For interpretation of the regression coefficients in a model with a transformed dependent variable, the coefficients were then exponentiated. Independent variables considered in model development were the same as those determined by univariate analysis.

Statistical analyses were performed using SPSS software version 7.5. The statistical significance level for the univariate and multivariable procedures was established at $p < 0.05$. When reporting summary statistics, the convention of mean (and standard deviation [SD]) was used.

Results

Patient accrual

During the study period, 965 patients residing within the urban areas of the CHR were placed on the waiting list for major joint arthroplasty surgery and 691 patients met the inclusion criteria for the study. Of the eligible patients, 78 refused to participate, 29 could not be contacted and 14 had surgery before an initial home visit could be made (although indicated as elective, for unknown reasons they had surgery immediately — perhaps filling a cancellation). The participation rate was 82%.

The patients who were excluded from the study were found to be similar to the study group with respect to gender, affected joint and waiting time. However, they were significantly younger ($p = 0.03$) than the participants (65.5 [13.2] v. 68.3 [10.8] years).

During the study period, 31 patients were placed on the waiting list for more than 1 major joint replace-

ment. The second procedure was not included in our analyses.

Patient demographics

The study comprised 570 patients. Of these, 553 (97%) had surgery during the study period. The average age of the population was 68.4 years (range from 27–89 yr). Fifty-nine percent of patients were female, and 63% of patients were married. English was reported as the primary language in 75% of the patients, French in 3% and another language in 22%. Forty-two percent of patients did not complete high school, and 27% had completed post-secondary education. At the time of the study, 58% of patients were retired, 27% stated they were homemakers, 9% were working full time and 5% were working part time. Sixty-nine percent of patients lived in a house, 25% of patients in an apartment or condominium and 6% in a senior's complex.

The breakdown of patients according to their primary diagnosis was: osteoarthritis (94%) and rheumatoid arthritis or other arthropathies (6%). Fifty-five percent of major joint arthroplasties were total knee replacements and 44% were total hip replacements. Thirty percent of patients had undergone previous joint replacement: hip in 51% and knee in 47%. The average BMI for the patient population was 28.7, and 60% of the population were either overweight (BMI between 27 and 32) or obese (BMI ≥ 33). Comorbidities at the time the patients were placed on the waiting list for surgery averaged 3.5 with the maximum of 13.

Patient characteristics and waiting time

At the time the patients were placed on the waiting list, 33% stated they ambulated without any assistance, 54% used a cane and 10% used a walker. In terms of pain medications taken by patients, 17% stated that they did not take any medications at the time they were placed on the waiting list, 29% had a MQS score of 1 to 3, 24% of patients had MQS scores of 7 or more and the rest had scores between 4 and 7. The mean pain and disability scores at the time the patients were placed on the waiting list were measured with the WOMAC instrument. The mean WOMAC subscale scores were: pain 56.6 (17.1), stiffness 60.7 (21.3) and function 59.4 (16.8).

The mean waiting time for major joint replacement was 107 (90) days. Overall, 52% of patients waited less than 3 months for their replacement surgery, 27% waited between 3 and 6 months, and 16% waited longer than 6 months. Univariate analyses indicated no significant differences in waiting time for the categories of age, gender, marital status, education, primary language, work status and residence type. Similarly, no significant differences in waiting time were identified among the categories of diagnosis, affected joint, previous arthroplasty, total number of chronic conditions, use of walking aids and MQS. Table 1 describes the relationship between some of the clinical characteristics of the patient population and the length of time they waited for their surgery. Univariate comparisons indicated that primary language ($p = 0.02$), BMI ($p = 0.04$) and good function ($p = 0.04$) were significantly related to waiting time.

Hospital and surgeon characteristics and waiting time

Major joint arthroplasties performed were evenly distributed between the 2 referral hospitals (55% v. 45%). The waiting times were also found to be similar (103.8 [86.2] v. 110.0 [94.2] d) ($p = 0.39$).

Seventy-nine percent of patients were referred to orthopedic surgeons who performed more than 50 major arthroplasties during 1996–97, and 5% were seen by surgeons who performed fewer than 25 such surgeries during that period. On average, patients who were seen by surgeons with a small major joint arthroplasty practice (< 25 major joint arthroplasties per year) waited 56 days less for their surgery than patients seen by surgeons with larger practices ($p < 0.001$) (Table 1). Further analyses revealed that 7% of knee replacement patients and 2% of hip replacement patients were seen by surgeons who performed fewer than 25 arthroplasties per year ($p = 0.02$). Patients referred to surgeons who performed fewer major arthroplasties per year had less comorbidity ($p = 0.01$), but the difference in the mean number of comorbidities was small.

Multivariate analyses

A multiple linear regression procedure was performed to determine the relationship between the sociodemographic, clinical and health system variables and waiting time, while controlling for the effects of each other. The demographic, clinical and health system variables that were analyzed univariately were considered for inclusion in model development. The significant variables in the regression model (Table 1) were: fewer than 25 arthroplasties per year, marital status, primary language, BMI and medication use. The amount of explained variance in waiting time that was explained by this model was 10% ($R^2 = 0.10$).

The final model suggests that patients seen by surgeons who performed fewer than 25 major arthroplasties per year waited on average 0.54 times as long (less time) for their surgery compared with patients seen by surgeons who performed more than 25 major arthroplasties per year. Married patients waited 0.84 times as long for their surgery as unmarried patients, and patients whose primary language was other than French or English waited 0.81 times as long for their surgery than those whose primary language was

English or French. Obese persons waited 1.27 times longer for their surgery than patients of normal weight and patients taking moderate amounts of pain medications waited 1.28 times longer than those not taking medications for pain.

Discussion

Waiting lists should ensure equitable access based on patient need such that priority is given to those with more severe symptoms, such as pain and function. Although pain, functional limitation and evidence of intra-articular disease on radiographs are the primary indicators of major joint arthroplasty,[5] the extent of disease that should exist before joint surgery is considered has not been agreed upon by orthopedic surgeons. Even though there are wide variations among surgeons, the requirements of most surgeons are at least severe daily pain, pain at rest several days per week and transfer pain several days per week.[6,19] In view of the diversity regarding the appropriateness for this type of surgery, it has been hypothesized that less appropriate indications for surgery are being employed in some areas.[4–6] However, another study identified an underuse of arthroplasties for patients suffering from severe arthritis.[20] When comparing our study population to others in Canada,[8] we found that major joint arthroplasties in this region were appropriately performed. Patients in this study were experiencing a great deal of pain and dysfunction when they were placed on the waiting list, and the pain and function scores in our study were similar to those of other Canadian studies on arthroplasty waiting lists.[7,8]

Although patients in this study were compromised in terms of pain and function when the decision to have replacement surgery was made, it appears that specific consideration was not given to health status when deciding where to place these patients in the queue for surgery. Our previous publication[10] indicated that those with more severe pain and disability did not have surgery substantially earlier. Utilizing the Medical Outcomes Study Short Form 36 (SF-36) general health questionnaire along with the WOMAC instrument, only BMI and social function (SF-36

Table 1

Clinical and Significant Demographic Variables Related to Waiting Time for 553 Patients Scheduled for Major Joint Arthroplasty Between December 1995 and January 1997 at Two Referral Hospitals in the Capital Health Region, Edmonton

Variable	Patients, no. (and %)	Mean (and SD) waiting time, d (univariate comparison)	B* (multivariate comparison)
Marital status			
Unmarried	202 (37)	108.9 (92.6)	Comparison
Married	351 (63)	105.4 (88.5)	–1.18†
Primary language			
English or French	431 (78)	110.5 (91.5)	Comparison
Other	122 (22)	93.2 (83.3)†	–1.24†
Affected joint			
Hip	304 (55)	111.2 (90.3)	Comparison
Knee	249 (45)	101.1 (89.3)	1.15
Diagnosis			
Rheumatoid arthritis	31 (6)	89.4 (83.1)	Comparison
Osteoarthritis	487 (94)	105.3 (85.9)	–1.33
Body mass index			
≤ 26	197 (39)	97.6 (88.9)	Comparison
27–32	199 (39)	109.8 (90.5)	1.14
> 32	105 (21)	121.9 (90.5)†	1.27†
Comorbid conditions			
≤ 2	195 (35)	107.7 (96.1)	Comparison
3 – 4	214 (38)	110.4 (92.9)	1.11
> 4	144 (26)	99.6 (75.9)	–1.03
Medication Quantification Score			
0	94 (17)	102.3 (85.8)	Comparison
1–3	161 (29)	109.6 (95.1)	1.25
4–6	167 (30)	109.1 (91.5)	1.28†
≥ 7	131 (24)	103.1 (84.9)	1.16
Walking aids			
Yes	369 (67)	103.0 (85.0)	Comparison
No	184 (33)	114.0 (99.0)	–1.03
WOMAC pain			
Mild	45 (8)	124.1 (102.3)	Comparison
Moderate	360 (67)	107.6 (90.2)	–1.04
Severe	135 (25)	100.7 (83.0)	–1.22
WOMAC stiffness			
Mild	53 (10)	124.8 (101.8)	Comparison
Moderate	299 (54)	106.0 (88.5)	–1.22
Severe	201 (36)	103.6 (86.8)	–1.16
WOMAC function			
Good	39 (8)	137.8 (103.4)†	Comparison
Fair	310 (62)	108.3 (92.6)	–1.03
Poor	154 (31)	97.4 (74.8)	1.05
Surgeon's practice			
≥ 25 arthroplasties/yr	525 (95)	109.6 (90.3)	Comparison
< 25 arthroplasties/yr	28 (5)	53.9 (42.3)‡	–1.85‡§

WOMAC = Western Ontario and McMaster Universities.
*Exponentiation of the coefficient
†$p < 0.05$
‡$p < 0.001$
§Persons seen by surgeons who performed less than 25 major arthroplasties per year waited on average .54 times as long (less time) for their surgery, in comparison with patients seen by surgeons who performed more than 25 major arthroplasties per year. For negative coefficients only, use the reciprocal for interpretation (i.e 1/1.85 = 0.54).

subscale) were found to be significant predictors of waiting time. Other research examining the relationship between health status and waiting time for major joint arthroplasty found a nonsignificant relationship between these variables.[7,8] In this study, other clinical variables, such as diagnosis, affected joint, previous arthroplasty, comorbidity, use of walking aids and residence type, were also included to determine if an association existed between these variables and waiting time. However, we found no significant relationships.

No biases in waiting time with regard to age, gender or socioeconomic status as measured by education and work status were identified in this study. Specifically, no significant differences in waiting time were observed among the various categories for these demographic and socioeconomic variables. Although research in this area is limited, another study also found that gender bias was not observed when placing patients of waiting lists for major hip replacement.[21]

Multivariate analyses, which controlled for the effects of sociodemographic and clinical factors including pain and function, indicated that the size of the orthopedic surgeon's joint arthroplasty practice, marital status, primary language, BMI and pain medication use were the only significant predictors of waiting time. However, the model explained only 10% of the total variance in waiting time. Variables found to be significant in the multivariate model differed slightly from those found to be significant in the univariate analysis. This results from the modification that occurs with multivariate modelling — the effects that individual variables have on the outcome variable are modified to take into consideration the influence of all other variables in the model.

Patients who were seen by surgeons with a small joint replacement practice had a significantly shorter waiting time. These patients were also more likely to be undergoing knee replacement and have few comorbid conditions. Therefore, surgeons who generally perform fewer major arthroplasties per year performed the less complicated knee replacements. This practice may ensure quality outcomes, but operating times allocated to surgeons should be monitored, so patients with complicating conditions are not unjustly disadvantaged. Perhaps a better balance between allocated operating room times and the length of surgeons' waiting lists could be achieved. Furthermore, publicizing surgeons' waiting times so that patients and their doctor could choose surgeons with shorter waiting times may help balance the waiting times. A recent publication addressing fairness in the coronary angiography queue detected that 9% of the variation in waiting time was explained by physician affiliation alone.[22] Despite equivalent urgency, patients seen by physicians with close affiliations to the cardiac catheterization facilities had significantly shorter waiting times for their coronary angiography. These findings are consistent with our study indicating that resource availability and accessibility correspond to shorter waiting times.

The findings indicating that married people and those who primarily speak languages other than English or French waited significantly less time for their surgery has not been realized in other research. Perhaps these people have significant others who play a stronger role in advocating for earlier surgery. Since we included only those who had a clear understanding of written English, it is likely that the advocacy effect on waiting time would be enhanced if non-English-speaking people were included in the sample. Further research in this area is warranted before specific conclusions can be drawn. Obese patients and those taking moderate doses of pain medications were shown to have significantly longer waiting times than others. Many orthopedic surgeons encourage their obese patients to lose weight before replacement surgery to increase their chances of a successful outcome. The long waiting time for patients taking moderate doses of analgesic medications compared with that for patients who do not take any pain medication may indicate that pain control was used to prioritize patients on the waiting list. However, the difference in waiting times across the various pain medication categories was only 7 days.

In this study, which utilizes the preferred method of prospectively tracking waiting times[23] and had an adequate response rate, analysis indicated that the participants and nonparticipants were similar with respect to gender, affected joint and waiting time. Although the nonparticipants were significantly younger than those in the study group, most likely because they were working and were difficult to contact, they had equivalent waiting times. Therefore, it is unlikely that either selection bias or response bias influenced the findings. Waiting time was an exact calculation, taken directly from the hospital databases, and therefore not subject to recall bias as in previous studies.[7,8] Although there were a few patients (19) who did not having surgery during the study period, we logarithmically transformed waiting time to correct for its positive skewness, therefore minimizing the influence that these few cases would have had on the study findings.

The study, however, did not include patients residing outside the region who had a major joint arthroplasty performed at either of the 2 referral hospitals. Therefore, the results may be generalized to urban populations only, as rural patients may differ with respect to the level of pain and function they experience at the time they are placed on the waiting list.[24] Furthermore, although this study attempted to determine fairness in waiting times for all patients in the queue, it is possible that other factors that we did not measure were

significantly associated with waiting time. We were limited in the availability of variables to assess the impact of socioeconomic status on waiting time, and variables other than education and work status may be related to waiting time. Patients' income, their connection to the attending physician or profile in the community may have an impact on the length of time they waited for surgery. Similarly, whether the patient is a caregiver for his or her spouse or has other role obligations may affect the waiting time. We were also unable to measure the impact that cancellations or other delays in surgery have on waiting time. Further studies utilizing varying methods and additional variables are needed to address the question of what actually drives the waiting lists for major joint arthroplasties.

Our definition of waiting time included only the period following the orthopedic consultation and did not account for the time between the general practitioner's referral and orthopedic consultation. Generally, less than half of the average waiting time is spent on the surgeon's waiting list.[25] Ideally, the entire waiting time from general practitioner referral to surgery should be monitored; however, information on both these waiting periods is seldom available.

The amount of improvement in pain and function after replacement surgery was assessed with the same cohort of patients.[26] The findings of this study were that whereas large improvements were reported in pain and function postoperatively, the improvements were not at a level comparable to the general public when adjusted for age and gender. Further research is required to determine the effect that preoperative pain and function have on postoperative outcomes.

There is also the need in Canada to develop and manage waiting lists for other surgical procedures, to provide the public with a greater sense of confidence about access to and quality of care.[27] Standardized measures are needed to assess and compare patients' priority based on the urgency of their condition.[28] The Western Canada Waiting List (WCWL) Project is currently developing waiting list criteria in 5 clinical areas, including hip and knee replacement surgery. Although the tools developed from the project will not provide information about what is the appropriate time to wait for treatment,[29] they will set up the process, in several clinical areas, to assess the need for and potential benefit of a specific treatment and to prioritize patients in a standardized manner.

Conclusions

Our study found that waiting lists for major joint replacement were managed in a socially equitable fashion and that preferential treatment was not given to specific social or economic subgroups. However, priority was not given to those with more severe symptoms. Multivariate analysis identified that patients who were seen by surgeons with a small joint replacement practice, those who were married and those whose primary language was one other than English or French had significantly shorter waiting times than others. Obese patients and those taking moderate amounts of pain medications had significantly longer waiting times. The effects of these variables were realized while controlling for other demographic, clinical and health system variables. This study further emphasizes the complexity surrounding waiting list placement and reinforces the need for continuous monitoring of procedural waiting lists in a universal health care system.

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