The Development of an Orthopedic Waiting List Algorithm for Elective Total Hip and Total Knee Replacement Surgery

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Key Implications for Decision Makers

- Some surgeons are already effectively and equitably arranging their waiting lists and prioritizing on the basis of disability and functional ability.

- A tested shared waiting list across the five Kingston, Ontario surgeons produced no evidence that sharing the waiting list would decrease the burden of waiting on health-related quality of life for patients.

- A questionnaire could be developed to assist in the prioritization of surgery. This questionnaire would look at lifestyle factors, pain, stiffness and functional ability. The answers should show the optimal time to do the surgery for patients who are expected to have a significant improvement in functional ability.

- The Medical Outcomes Trust 36-item short form (SF-36) questionnaire and the Western Ontario and McMaster Universities Arthritis Index (WOMAC) questionnaire were both used in this study. The SF-36 is more responsive to clinical improvement than the other questionnaires tested, and the WOMAC questionnaire was specifically designed for the evaluation of patients with osteoarthritis of the hip and knee. The WOMAC questionnaire is most useful when determining whether a patient should be put on a waiting list. When it comes to rating the overall impact of surgery, however, the mental and physical scores of the SF-36 are more useful than the WOMAC.

- The researchers developed a program using SAS software (version 8.1) that allowed the user to evaluate the health-related quality of life waiting cost for use in prioritization of patients, then slotted the patients on a waiting list across five surgeons.

- It would be appropriate for a questionnaire determining the prioritization of surgery to find out what patients’ expectations are, discuss them in the light of whether or not they have a significant other illness. It would then be appropriate to use two sets of criteria for those with the one significant illness requiring a hip or knee replacement, or more than one.

- The sample in this study is not guaranteed to be reflective of the general Ontario patient population.
Executive Summary

Elective total hip replacements and total knee replacements are the definitive treatment for the pain and disability caused by arthritic diseases of the hip and knee. Both procedures are increasing in prevalence throughout the developed world due to improved surgical methods and the aging population. These increases have not only had a significant impact on healthcare spending, but have also resulted in lengthy waiting lists for both procedures. There is a clear need to establish objective criteria for case selection and priority, as well as standard measures to assess the urgency of patients’ condition and the extent of expected benefit. Waiting lists should not only be managed on the basis of chronology, but on a number of other factors, including both the clinical and the social impact of delayed surgery.

The objectives of this research were as follows:

1. To assess changes in patient-perceived health-related quality of life and functional status while on the waiting list for hip and knee replacement, and at six months and one year following surgery.

2. To describe and identify factor(s) which predict the post surgical change in health and functional status of patients awaiting replacements.

3. To apply these factor(s) to the actual waiting list for total joint replacement, and compare the changes in health and functioning to those that would have (theoretically) resulted if surgery had been prioritized by the expected improvement as determined by these factor(s).

An observational, prospective outcomes design was used for this study. All patients on the waiting lists of five orthopedic surgeons in Kingston, Ontario between October, 1998 and March of 2001 were invited to participate. All primary hip and knee replacement patients (excluding revisions and fractures) were eligible to participate. Contact information for each eligible patient was obtained from the surgeons, and a survey package was mailed to each, containing a patient information and consent form, the Western Ontario and McMaster Universities Arthritis Index (WOMAC) questionnaire — used to assess quality of life when a patient has osteoarthritis of the hip and/or knee — and the Medical Outcomes Trust 36-item short form (SF-36). The SF-36 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. Baseline scores were collected at the beginning of the study (for those who were already on the list), or at the time that they were put on the list (for those who were subsequently added to the list during the study period). Questionnaires were sent out every three months before surgery and at six and 12 months after the surgery.
To evaluate the proposed prioritization criteria, the differences between the pre-surgical and post-surgical scores were multiplied by the length of waiting time. It was possible to retrospectively examine the impact on the average 'cost' of waiting (health-related quality of life cost), when patients who experienced large improvements following surgery were operated on before patients who experienced less improvement. Due to the large number of outcomes, we used the SF-36 mental component score and physical component score, as they are widely used general measures of overall health-related quality of life, they incorporate all eight domains of the SF-36 and they measure two distinct and broad components of an individual’s general health state. We therefore restricted our evaluation of the cost of waiting (health-related quality of life cost) to the areas defined by the difference between the pre-surgical and the post-surgical mental and physical scores. In order to evaluate the cost of waiting under various re-ordering schemes, a program was developed using SAS software (version 8.1) that allowed the user to evaluate the waiting costs for any prioritization criteria.

A total of 673 patients were initially enrolled in the study. Of these, 658 were evaluable, 389 had surgery during the study period and 250 had useable six-month follow-up data. When patients were placed on the list, they scored far below the mean for age- and sex-matched peers on the SF-36 measure of health-related quality of life. Moreover, in spite of this poor level of functioning, patients continued to deteriorate while on the waiting list. This was more pronounced in hip replacement patients than in knee replacement patients. However, there is strong evidence to suggest that patients with worse physical functioning and more pain received surgery sooner than those experiencing less pain and impairment.

There were clear and statistically significant post surgical improvements in all domains of the Western Ontario and McMaster Universities Arthritis Index and all domains and summary scores of the SF-36. Hip replacement patients had poorer scores initially than the knee replacement patients did, but achieved better scores at the time of the six-month follow-up, reflecting poorer pre-surgical functioning and more post-surgical gain. There was, however, a small proportion of patients who did not improve following surgery. Regression analyses identified that better baseline scores (lower disease severity), a number of comorbid conditions, anesthetic risk and body mass index were associated with less improvement. These results suggest that some patients may receive surgery too early to achieve any significant benefit.

There were differences between surgeons in how severe their patient’s illness was and in health-related quality of life at the time of the initial visit, suggesting that some surgeons place patients on the waiting list sooner than others would. However, these differences were no longer apparent at the time of surgery. Patients with poorer levels of functioning were receiving their surgery sooner than those with higher levels of functioning. This suggests that the surgeons already effectively stratify their patients and prioritize at least in part on the basis of disability and functional status.

Re-ordering of patients on the basis of maximum benefit, defined as maximum change in the physical and mental scores of the SF-36, indicated that while some gains may be possible under optimal circumstances, surgeons performed better than a 'first-come-first-served' and a random allocation. There was no strong evidence to suggest that a shared waiting list would improve health-related quality of life for patients.
A significant limitation of this study was the limited proportion of data available when the database was locked for analysis. Longer follow-up on the enrolled patients would substantially increase the proportion of available data and allow for more reliable results. Also, the sample is limited to five surgeons, which may limit the generalizeability of the results.

This report therefore supports the findings of a number of other researchers, who identified significant gains in quality of life and functional status following total joint replacement. It also finds that patients continued to decline while on the waiting list, but that surgery appears to be allocated in an equitable manner, based at least partially on the surgeons' subjective estimate of disease severity and patient disability.