How effective is our current Orthopaedic Prioritisation Tool for scoring patients for arthroplasty surgery?
Neal Singleton, Lewis Agius, Sudhindra Rao

ABSTRACT

AIM: To compare those patients who are being accepted onto the waiting list for total hip and knee arthroplasty surgery with those patients who are being declined surgery, using a validated functional questionnaire.

METHOD: The clinic records from all patients seen for consideration of total hip or knee arthroplasty at Hawkes Bay Hospital during the preceding four months were reviewed. We sent the Oxford Hip and Knee Score questionnaire to all patients who had been put forward for consideration of surgery.

RESULTS: Of the 150 patients we surveyed, 81 had been accepted onto the waiting list and received a date for surgery within the next four months and 69 had been declined surgery. Of the 81 patients who had been accepted onto the waiting list for surgery, 61 returned the Oxford questionnaire with an average score of 10.9. Of the 69 patients who had been declined surgery, 59 returned the Oxford questionnaire with an average score of 10.8. Thus the mean Oxford score was not statistically different between those patients being accepted onto the waiting list for surgery and those being declined surgery (p=0.925).

CONCLUSION: No difference was found between those patients being accepted onto the waiting list for total hip or knee arthroplasty and those being declined surgery in Hawkes Bay after using the Oxford Hip and Knee Score as a measure of functional impairment. The average Oxford score indicates that patients being seen in Hawkes Bay Hospital for consideration of total hip or knee arthroplasty are severely functionally impaired as a result of their condition.

Osteoarthritis is a common condition affecting about 15% of adult New Zealanders. The incidence increases with advancing age, with a significant rise after the age of 60 years. Given the ageing population it is likely that New Zealand will have to contend with an increasing socioeconomic burden from osteoarthritis in the future. In the US it is projected that by 2030 demand for total hip arthroplasty (THA) and total knee arthroplasty (TKA) will have increased by 174% and 673%, respectively. During the last 13 years in New Zealand the total number of THA cases has increased by 75% and TKA 158% and it estimated that by 2026 the absolute number of THA and TKA cases will increase by 84% (8,950 cases) and 183% (8,613 cases) respectively.

THA and TKA are common procedures which are used to treat end-stage osteoarthritis when all non-surgical management options have been exhausted. The goal of arthroplasty surgery is to alleviate pain and restore function. However, given the costs associated with arthroplasty surgery and the limited resources available, public hospitals cannot offer surgery to all patients seen for consideration of joint replacement. As such, there must be a just and fair way to determine who should be offered surgery. Determining this though, raises a number of ethical, social, economic and surgical quandaries. There are a number of different methods currently in use for prioritising patients for surgery. The goal of all such scoring tools is to prioritise patients according to their symptoms and likely benefit from surgery.

Hawkes Bay DHB uses a prioritisation tool which is based on the New Zealand...
Orthopaedic Association hip and knee prioritisation tool but has three categories:

1. potential deterioration (if surgery were to be delayed),
2. expected benefit from surgery and
3. an overall surgeon assessed severity rating with a score of 1–5 being given (with 5 being the most severe).

A score can be overridden if the planned surgery is for malignancy, impending spinal cord/nerve compression or for a loose/infected joint prosthesis. There is provision for clinical override in exceptional circumstances whereby a patient can be added to the waiting list at the surgeon’s discretion regardless of their prioritised score. Based on the score a patient achieves utilising the prioritisation tool, they are then either placed onto the waiting list for surgery or surgery is declined. This is dependent on what score is deemed the threshold score. A financial threshold score is the minimum score that a patient needs to achieve in order to be listed for surgery i.e., if the patients score above the threshold score then they are listed for surgery and if they score below the threshold score then surgery is declined. This financial threshold is subject to adjustment by individual DHBs’ commensurate with the Health Ministry’s waiting time target of four months.

The aim of this study was to compare those patients who had been accepted onto the waiting list for THA and TKA with those who had been declined surgery, using the Oxford score as a measure of disability in order to determine whether the current prioritisation tool is effective. The Oxford Hip and Knee Scores were devised as joint specific instruments for assessing function while minimising influence from other comorbidities. The Oxford Hip and Knee Scores have been evaluated independently and found to be the best and most reliable systems for the assessment of hip and knee replacement, respectively.5,6,7

We chose to use the Oxford score as it has been validated in a number of studies.8,9,10 Furthermore, it is widely used in national joint registries including the New Zealand National Joint Registry. The score is comprised of twelve questions which assess pain and function. Patients complete each question giving a score of between 0 to 4 with 4 being the best outcome and 0 being the worst. A total score out of 48 is achieved with 48 being the best outcome score and 0 being the worst, indicating severe disability. Kalairajah et al have recommended a category of excellence for an Oxford score of >41, good for a score of 34–41, fair for 27–33 and poor for those <27.11 The minimal clinically important difference (MCID) is the smallest change in score that patients perceive as meaningful and has been reported as 5 for the Oxford Hip Score and 4 for the Oxford Knee Score.12 That the MCID is small indicates that even a small change in score may represent a clinically important change in function.

**Method**

All patients who are referred to Hawkes Bay DHB with a diagnosis of hip or knee osteoarthritis are assessed by a Consultant Orthopaedic surgeon or Registrar in an outpatient clinic. After clinical evaluation, if a patient is clearly not in need of arthroplasty or they do not desire surgery, they can either be discharged back to the care of their General Practitioner (for ongoing non-surgical management) or reviewed in clinic at a later date. These patients do not receive a prioritisation score. All other patients who desire surgery and who are deemed appropriate for surgery are scored utilising the prioritisation tool. The maximum score is 100, the higher the score the greater the level of perceived disability (and the potential need for and benefit from surgery). It is this score that determines those who are referred to the surgical waiting list and those who are declined surgery based on the predetermined threshold score. At the time of completing this study the threshold score in Hawkes Bay DHB was 80 points. The completed forms are forwarded to the Elective Services Manager for final determination of those that will be accepted onto the (four month) surgical waiting list. Those deemed to have not reached the threshold score are not accepted onto the waiting list.

We reviewed clinic records for the four-month period, 1st July 2015 to 31st October 2015. This four-month period was selected at random by the primary author who noted an increasing number of patients with severe disability being declined THA and TKA due to not meeting the threshold score.
All data was collected prospectively. All patients who had an application for THA or TKA put forward for review by the Elective Services Manager were sent the Oxford Hip or Knee Score questionnaire to complete. No patient was aware if they had been accepted or declined surgery at the time of completing the questionnaire. We tabulated the results in order to perform a direct comparison of Oxford scores between those patients who had been accepted onto the waiting list for surgery and those patients who had been declined surgery after receiving the list of accepts and declines from the Elective Services Manager.

Ethics approval was obtained from the hospital's research committee.

Statistical analysis

Standard descriptive statistics including means, ranges, standard deviations, frequencies and percentages were used to summarise the data between those accepted and those declined surgery. Outcomes were compared between those accepted and those declined surgery using t-tests and Chi-square tests. A two-tailed p-value of <0.05 was taken to indicate statistical significance. Data were analysed using SPSSv23.0.

Results

During the four-month study period, 150 patients had an application for THA or TKA put forward for review by the Elective Services Manager (73 applications for THA and 77 applications for TKA). Of these 150 patients, 81 met the financial threshold (average prioritisation tool score 85.4) and were accepted onto the waiting list for surgery (46 for THA and 35 for TKA), and 69 failed to meet the financial threshold (average score 74.2) and were declined inclusion onto the waiting list (27 for THA and 42 for TKA).

Oxford Hip and Knee Score questionnaires were returned by 120/150 (80% of patients) made up of 61/81 (75%) who had been accepted for surgery and 59/69 (86%) who had been declined for surgery. Those who returned the questionnaire are further described in Table 1. This table also shows the associations between being accepted or declined for surgery based on mean score.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Accepted for surgery N=61</th>
<th>Declined for surgery N=59</th>
<th>Mean Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxford score</td>
<td>10.9 (6.0)</td>
<td>10.8 (6.3)</td>
<td>0.1 (-2.1 to 2.3)</td>
</tr>
<tr>
<td>Age</td>
<td>70.5 (9.3)</td>
<td>69.2 (10.2)</td>
<td>1.3 (-2.2 to 4.8)</td>
</tr>
<tr>
<td></td>
<td>(66.5 to 77.5)</td>
<td>(62 to 77)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Accepted N/61 (%)</th>
<th>Declined N/59 (%)</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female gender</td>
<td>32 (50.8%)</td>
<td>31 (49.2%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Male gender</td>
<td>29 (50.9%)</td>
<td>28 (49.1%)</td>
<td>(0.49 to 2.04) P=0.993</td>
</tr>
<tr>
<td>Māori ethnicity</td>
<td>9 (52.9%)</td>
<td>8 (47.1%)</td>
<td>1.10</td>
</tr>
<tr>
<td>Non-Māori ethnicity</td>
<td>52 (50.5%)</td>
<td>51 (49.5%)</td>
<td>(0.39 to 3.08) P=0.851</td>
</tr>
<tr>
<td>THA</td>
<td>39 (67.2%)</td>
<td>19 (32.8%)</td>
<td>3.73</td>
</tr>
<tr>
<td>TKA</td>
<td>22 (35.5%)</td>
<td>40 (64.5%)</td>
<td>(1.75 to 7.95) P=0.001</td>
</tr>
</tbody>
</table>
differences for continuous variables and odds ratios for categorical variables. There was no association between Oxford score and age (r=0.06, P=0.53). As can be seen in Table 1 there was no statistically significant associations between whether or not patients were accepted for surgery except for hip compared to knee surgery.

The mean Oxford score was not significantly different between those patients being accepted onto the waiting list for surgery and those being declined surgery, indicating no significant functional difference between these two groups (Table 1).

Gender, age and ethnicity were not related to acceptance onto the waiting list for surgery. However, those patients seen for consideration of THA were significantly more likely to be accepted for surgery than those seen for TKA (Table 1).

Conclusion

We found that when using the Oxford Hip and Knee Score as a measure of functional impairment there was no statistical difference between those patients being accepted onto the waiting list for THA and TKA and those being declined surgery in Hawkes Bay (p=0.925). One could therefore question the effectiveness of our current prioritisation tool.

Furthermore, the average Oxford score in our study among those patients being accepted for surgery and those being declined surgery suggests that as a region, Hawkes Bay patients who are seen for consideration of arthroplasty surgery are severely functionally impaired secondary to their osteoarthritis with an overall Oxford score of 10.9.

Discussion

In 2004 the Ministry of Health introduced the joint initiative in an effort to increase the number of arthroplasty cases being performed. A recent review by the Director General of Health reported that waiting list times had reduced and the absolute number of joint replacements being performed in New Zealand is increasing. In reality however, given the ageing population, more patients are being seen for consideration of THA and TKA. Blackett et al reported that of 858 patients where surgery was both desired by the patient and deemed appropriate by the surgeon, 307 (36%) were declined for being below the financial threshold. Currently the over 65-year age group represents around 13% of the New Zealand population. This is expected to almost double to 25% by 2031 which will place an increasing burden on healthcare resources, particularly arthroplasty surgery, as the elderly live longer, lead more active lives and are less accepting of disability.

Although the goal of all scoring tools is to prioritise patients according to their symptoms and likely benefit from surgery, it is likely that they struggle to differentiate between patients with greater disability. This may account for the results of our study in which there was no difference between those patients being accepted onto the waiting list for surgery and those being declined surgery despite those patients who were accepted for surgery exceeding the prioritisation threshold score with those who were declined surgery falling below it. A more sensitive scoring tool may be necessary in order to differentiate between patients with higher levels of disability. Furthermore, the prioritisation tool in use is a generic tool and not specific to any particular orthopaedic condition (it is used to score all patients seen for consideration of elective orthopaedic surgery) which makes targeted assessment of a patient's symptoms difficult. Individualised scoring tools tailored to specific orthopaedic conditions may be necessary to achieve greater accuracy.

The MCID has been reported as being 5 for the Oxford hip score and 4 for the Oxford knee score indicating that not only is there no statistical difference in scores between those patients being accepted for surgery and those being declined but there is no clinical difference either and patients are equally disabled.

One of the major determinants of post-operative outcome is pre-operative function and, therefore, those patients who are significantly impaired at the time of surgery are still left with a degree of disability post-operatively and are unlikely to ever achieve the same functional outcome as those patients who are less impaired at the time of surgery. In this study, patients with significant disability (mean Oxford score 10.8) are being declined surgery and are...
therefore either left with significant pain and dysfunction which will no doubt have an effect on their quality of life or if they do eventually make it onto the waiting list (and undergo surgery) they are unlikely to ever achieve the same functional outcome as those who have their surgery at an earlier stage. Furthermore, it is accepted that operating on end-stage osteoarthritis can be more surgically challenging and possibly require the use of more expensive implants.

Williams et al reported that following THA, the mean Oxford score can be expected to increase by an average of 20 points and 14 points following TKA. The mean Oxford score for those being accepted onto the waiting list for surgery was 10.9 in this study. When we separated THA and TKA the mean Oxford score for those being accepted for THA was 11.1 and those being accepted for TKA was 10.5. If the THA group increased by 20 points they would still only achieve a post-operative Oxford score of 31.1 meaning most are, potentially, only achieving a fair outcome. Similarly, in the TKA group, provided patients improve by 14 points, as has been suggested, most patients would only be expected to achieve an outcome of 24.5 points resulting in a poor outcome. In contrast, the New Zealand Joint Registry suggests that 89% of New Zealanders have good or excellent Oxford scores at five years after THA and TKA. These results would suggest that patients in Hawkes Bay (over the study period) are having their surgeries undertaken when they are severely functionally impaired and they are, therefore, potentially unlikely to ever achieve outcomes comparable with those who have surgery earlier. This situation is unlikely to be unique to Hawkes Bay and it is likely that DHBs across New Zealand will encounter similar situations where the threshold score necessary to be listed for surgery will need to be increased to cope with the current burden of disease but with the financial and resource constraints.

Methodological considerations
All data was collected prospectively and the rate of returned questionnaires was similar between those accepted (75%) and those declined surgery (86%), which adds strength to the study. Potential weaknesses of the study include the small number of patients included but even with a larger sample size the results would unlikely change.

In 2013 Gwynne-Jones highlighted the existence of regional variations in the provision of arthroplasty surgery within New Zealand. Variations between regions can be attributed to a number of factors including the age of the population, ethnic diversity, average household income and thus access to privately funded surgery as well as type of employment. This paper has further highlighted variations between regions and suggests that taking these factors into consideration for future planning may be a worthy consideration. In Gwynne-Jones’ paper 96% of patients listed for arthroplasty surgery in Otago had an Oxford score of 20 or less, 74% less than 15 and 37% less than 10 points. In the Hawkes Bay population, during our four-month study period, among those patients who had been declined surgery 90% had an Oxford score of less than 20, 80% less than 15, and 51% less than 10 points indicating that even the patients being declined surgery in Hawkes Bay are equally, if not more, functionally disabled than the Otago population of patients who are being accepted onto the waiting list for surgery. Similarly, in Canterbury the mean Oxford score in 726 patients who underwent THA between 2009 and 2011 was 18 compared with an average score of 10.9 in our study. This could be attributed to the age of the population; 16.8% of Hawkes Bay’s population are over the age of 65 years compared with 15.7% in Otago and 15.5% in Canterbury (and 14.3% for New Zealand as a whole). These results could also be attributed to the ethnic makeup of the regions. Māori are known to present late and with more severe disability secondary to osteoarthritis (and consequently have poorer outcomes following surgery). In Hawkes Bay Māori make up 24.3% of the population compared with just 7.5% in Otago and 8.1% in Canterbury.

Blackett et al reported that the average NZOA score for those patients being listed for surgery (70.62) was higher than those being declined surgery (55.38, p<0.001) at Whangarei Hospital. Similarly, at Hawkes Bay Hospital, the average NZOA score in his paper was higher for those being listed for surgery (76.96) compared with those being declined (64.66, p<0.001). This would
indicate that the scoring tools are working well in differentiating patients being seen for consideration of arthroplasty surgery. However, our study found that when using the Oxford score as a measure of disability, there was no difference between patients being accepted onto the waiting list for surgery and those being declined surgery. Blackett et al also reported that 36% of patients in whom surgery was both desired by the patient and recommended by the surgeon were declined surgery. In our study 46% of patients (69 out of 150) were declined surgery where it was both desired by the patients and deemed appropriate by the assessing surgeon, meaning that close to half of all patients being seen for consideration of arthroplasty surgery in Hawkes Bay are being declined.

Gwynne-Jones reported that in Otago the intervention rate for THA and TKA was 20.4 cases per 10,000 per year publically funded and 17.5/10,000 per year funded by ACC (compared with 33.0/10,000 in New Zealand as a whole) ie, a total intervention rate of 37.9/10,000 per year in Otago (public and ACC funded private). The actual demand in Otago is 41.7/10,000 per year meaning an unmet demand of 3.8/10,000 per year or 73 cases per year. Our results would suggest that the unmet demand in Hawkes Bay is even higher with 69/150 being declined surgery where it is was both desired by the patient and suggested as appropriate by the surgeon over just a four-month period indicating a potential unmet need of 207 cases per year.

This issue of ‘unmet need’ is a common theme in orthopaedic literature and addressing this issue is challenging. Royal Australasian College of Surgeons figures (2011) recommend one orthopaedic surgeon for 15,000–20,000 population. The current New Zealand average is 1/17,700 population. The present situation in Hawkes Bay region is 1/24,200. This suggests significant under-resourcing of orthopaedic specialists in Hawkes Bay.

A nationwide prioritisation tool would help to compare regions in a uniform way and therefore enable for a fairer provision of resources. A trial is currently underway to implement a nationwide orthopaedic prioritisation tool. Its use will become mandatory later this year. The tool is based on a functional impairment questionnaire (“How does your condition affect your life?”), which patients complete themselves. This is based on six categories:

1. social interactions,
2. personal relationships,
3. ability to meet your responsibility to others,
4. personal care,
5. personal safety, and
6. leisure activities.

This score is combined with the score from a surgeon-completed questionnaire based on five categories:

1. surgeon perceived impact on patient,
2. likelihood that significant deterioration in symptoms/function will occur in the next six months,
3. consequences (or significance) of deterioration in symptoms/function occurring in the next six months,
4. amount of benefit from the proposed surgery for this patient,
5. risk of surgery for this patient—death or significant complications.

The combined scores give an overall score (out of 100) which is then used to determine who is placed on the waiting list for surgery based on the current threshold score. This nationwide prioritisation tool is web based and will therefore enable for a comparison between regions and may help government planning for the future. It does not, however, collect data on the type of surgery proposed. It is yet to be seen whether this new prioritisation tool will enable for differentiation between severely disabled patients and therefore effectively score patients for arthroplasty surgery. A study similar in design to this one comparing patients being accepted and declined surgery using the new prioritisation tool with the Oxford score would be a worthy consideration.

In conclusion, this study has shown that there is no difference between those patients being accepted onto the waiting list for THA and TKA and those being declined surgery in Hawkes Bay using the Oxford score as a measure of disability. Nearly half of all patients seen for consideration of THA or TKA are declined surgery despite being severely functionally impaired with
an average Oxford score of 10.8. This study has highlighted the current situation in New Zealand where the ageing population is placing an increasing demand on healthcare services. Even with the introduction of a nationwide prioritisation tool it is unlikely that we will be able to differentiate between those patients who are significantly disabled and as a result there will likely be a large number of patients unable to receive surgery and who are significantly disabled from their orthopaedic condition.

Competing interests: Nil.

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