

# Outpatient Pre-operative Assessment in Joint Replacement Surgery

\*C Y W Chan, MBBS, \*H Y Nam, MSc, \*\*R Raveenthiran, FMM, \*S K Choon, FRCS, \*C C Tai, FRCS (Orth)

\*Division of Joint Replacement, Department of Orthopaedic Surgery, University Malaya Medical Centre, 50603 Kuala Lumpur,

\*\*Department of Anaesthesiology, University of Malaya, 50603 Kuala Lumpur

## SUMMARY

An anaesthetist-led outpatient pre-operative assessment (OPA) clinic was introduced in our unit in an effort to improve patient care and cost-effectiveness. To assess the efficiency of the clinic, 112 patients who attended the OPA clinic (attendance rate 98%) during the first year were assessed prospectively and compared with 118 patients who did not undergo OPA the year before. There were fewer cancellations among those who attended the OPA clinic (13.6% compared to 3.6%), and the hospital stay was shortened from an average of 10.7 days to 7.0 days. This has resulted in more efficient utilization of operating theatre, reduced hospital costs and improved patient satisfaction. More extensive use of the pre-admission clinic is recommended and should be explored in other clinical settings.

## KEY WORDS:

*Pre-operative assessment, Total joint replacement, Anaesthetist, Cancellation, Hospital stay*

## INTRODUCTION

Due to the success of total hip and knee replacements, there is a growing demand for these procedures in Malaysia. As a result, there is growing pressure for hospitals to be more efficient in managing hospital beds and operating lists in order to meet these demands. In 2006, in an attempt to improve service for patients who were scheduled for total joint replacement, we decided to set up an Outpatient Pre-operative Assessment (OPA) clinic in the University Malaya Medical Centre (UMMC).

The concept of OPA is not new and the benefits were first recognized more than 50 years ago<sup>1</sup>. Various authors have reported several advantages with OPA, such as decreased operation cancellation rate<sup>2,4</sup>, better dissemination of patient information and decrease in patient's levels of anxiety<sup>5</sup>, enhanced pre-operative optimisation of patient's medical condition<sup>6</sup>, reduction in hospital costs and improvement in operating room efficiency<sup>7</sup>. However, these clinics have not been practised until recently, and the practice is mainly on general surgical patients<sup>2,3</sup>. In orthopaedic surgery, particularly in total joint replacement, the data on the outcome and the benefits of OPA is scarce. The two published OPA reports in orthopaedic surgery either involved only a small number of patients or were over a short period of time<sup>8,9</sup>.

The purpose of this study is to investigate the outcome of OPA in patients who were undergoing total joint replacement. We sought to establish the benefits of OPA in our centre and to compare the results on our operation and admission data, prior to and after the introduction of OPA.

## MATERIALS AND METHODS

Prior to the establishment of OPA, patients who underwent total joint replacement were admitted a few days prior to the date of surgery for pre-operative assessment and evaluation by the anaesthetist. Patients who were deemed fit for surgery would then undergo the planned operation on the same admission. If patients were not suitable for the planned surgery for any reason, then attempts would be made to replace the unsuitable patient with another candidate on the waiting list, although these were not always possible due to time constraints.

In October 2006, the OPA clinic was introduced into our unit. Patients who were scheduled for surgery were reviewed two weeks before the operation by a dedicated anaesthetist in the outpatient clinic. Where appropriate, medical referral to physicians was performed on the same day. In addition, when necessary patients were admitted for a few days to optimize their medical conditions prior to surgery. Patients who were unfit for operation were replaced by another patient on the waiting list as soon as possible. These 'substituted' patients would be assessed in the OPA clinic the following week, i.e. a week before surgery. Patients who attended the OPA and deemed ready for surgery would then be admitted the evening before surgery.

## Outcome Measures

We collected data from two periods of time. One set of data was collected prospectively after the introduction of OPA, from October 2006 to September 2007. Another set of data was obtained retrospectively a year prior to the introduction of OPA, from October 2005 to September 2006. The following outcome measures were reviewed and compared: the medical cancellation rate of planned operation, the duration of hospital stay, and the number of total joint replacements performed. We also evaluated the attendance rate of OPA clinic. The medical cancellation of planned operation was defined as cancellation of operation due to medical reasons only. Cancellation due to the following reasons were not considered in this study: patients who changed their mind and decided not to have surgery (included those had

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*Corresponding Author: Tai Cheh Chin, Department of Orthopaedic Surgery, University Malaya, 50603 Kuala Lumpur, Malaysia*

*Email: tai.chehchin@gmail.com*

operation performed elsewhere), patients who did not turn up for operation for any reasons other than medical condition, patients who requested change of operating dates which were not within study period, or inadequate operating time.

## RESULTS

During the study period of 12 months between October 2006 to September 2007 (after the introduction of OPA, post-OPA), one hundred and twelve patients attended the OPA clinic. For the period between October 2005 and September 2006 (before the introduction of OPA, pre-OPA), one hundred and eighteen patients were registered for surgery. The majority of cases were total knee arthroplasty, predominantly bilateral cases. The summary of types of operations performed is shown in Table I.

We found that implementation of the OPA reduced the number of patient cancellations from 16 to only four cancellations. This gives a cancellation rate of 13.6% without the OPA and 3.6% with OPA. This difference in the cancellation rate is statistically significant ( $p < 0.05$ ). The reasons for cancellation of operation on the day of admission are given in Table II.

There were 15 cancellations by the anaesthetist in OPA clinic. This resulted in cancellation rate of 13.4%. All the cancellations at OPA clinic were replaced successfully by other patients who were on the waiting lists on subsequent weeks. The reasons for cancellation on OPA were documented in Table III. The overall cancellation rates for pre-OPA and post-OPA are 13.6% and 17% (total of cancellations at OPA clinic and on admission) respectively ( $p > 0.05$ ).

There were 99 patients who subsequently underwent planned operation pre-OPA compared to 107 patients after the introduction of OPA. We found that the ratio of number of operations performed to the total planned operations increased from 84% to 96% upon implementation of the OPA. There were only two patients who did not turn up for the OPA clinic. Both were due to personal/family circumstances and both attended the OPA the following week and underwent operations as planned.

Before the introduction of the OPA, the average duration of pre-operative stay was 3.6 days (range, 1 to 8 days). Sixty eight percent of patients (80 patients) stayed for at least three days prior to surgery. Only twelve patients (10.2%) had a pre-operative stay of less than two days. This compares to a mean duration of stay of 2.1 days (range 1 to 4 days) after the introduction of the OPA. During this period the majority of patients (62%) were admitted only in the afternoon the day before surgery. The difference between the duration of pre-operative stay before and after the introduction of the OPA is statistically significant ( $p < 0.05$ ). The summary of the outcome measures before and after the introduction of OPA is given in Table IV. .

## DISCUSSION

In the past, patients who were planned for total joint replacement in our centre would be admitted a few days

before surgery for anesthetic evaluation and optimisation of their medical conditions. Given that a significant proportion of patients may not be medically suitable for operation, the proximity of anaesthetic evaluation and scheduled surgery did not allow for a replacement patient from the waiting list to be found easily. This in turn led to a large cancellation rate and poor utilization of the operating list. With increased emphasis on quality medical care and the need to curb rising health care costs, cancellation of operations is no longer well tolerated by patients. The long waiting period and the need for rescheduling often result in additional stress among patients and surgeons. We believe that anaesthetists directed outpatient pre-operative assessment clinics, such as the one that we have implemented here, offered several advantages; reduction of the quantity of laboratory tests ordered, better optimisation of medical condition, relevant interdisciplinary referrals when necessary, lower chance of case cancellation as a result of medical condition, adequate time to arrange for a replacement if patients cannot be rendered fit within the fortnight, and shorter hospital stay. All these advantages lead to better care of patients at a lower cost.

Our study has demonstrated that one of the greatest benefits of the introduction of OPA is the reduction of the operation cancellation rate. This is particularly important for institutions where there is a long waiting list for total joint replacement like ours, and any attempt to optimize the operating lists in order to reduce the waiting list is welcome. Klei *et al* reported a reduction of cancellation rate for medical reasons from 2.0% to 0.9% following the introduction of outpatient preoperative evaluation<sup>10</sup>. Fischer also noted a reduction in cancellation rate of 87.9% with preoperative evaluation clinics<sup>4</sup>. When comparing two groups of patients who underwent different admission process, Ferschl *et al* reported a reduction from 13% to 5.3% in patients who attended anaesthetists directed pre-operative clinic<sup>2</sup>. Our experience is very similar to Ferschl *et al*. In our study, the cancellation rate on admission was reduced from 13.6% to 3.6% following the introduction of OPA. As a result, we were able to increase the number of patients operated per theatre list and improve our efficiency in theatre occupancy. This was reflected by higher ratio of number of operation performed against number of operation planned for surgery, and the greater number of patients that were operated during the study period. It is interesting to note that the total number of cancellation of operations were in fact greater after the implementation of OPA (total of cancellations at OPA and on admission) although the difference is not significant. One of the possible explanations is that the anaesthetist was more willing to cancel operation at OPA clinic and less likely to accept sub-optimally fit patients for anaesthesia<sup>11</sup>. However, despite the total number of cancellation being slightly greater, we were able to perform more operations due to 'extra time' (two weeks) available to search for suitable replacement. The other added advantage of OPA clinic is to allow us to identify non-attendance of patients for elective procedures at least two weeks before planned surgery. Most patients either have had the operation performed elsewhere or changed their mind about surgery (some due to financial constraints).

The other benefit of the OPA system is the saving of hospital stay for the patients. This advantage was almost exclusively due to the shorter pre-operative hospital stay, which was

Table I: Summary of total joint arthroplasty cases booked for theatre during the study periods.

|                                    | October 2005 to September 2006<br>(pre-OPA) | October 2006 to September 2007<br>(post-OPA) |
|------------------------------------|---|--|
| Unilateral Total Knee Arthroplasty | 39  | 36   |
| Bilateral Total Knee Arthroplasty  | 44  | 37   |
| Revision Total Knee Arthroplasty   | 12  | 16   |
| Total Hip Arthroplasty             | 19  | 17   |
| Revision Total Hip Arthroplasty    | 4   | 6  |
| Total                              | 118   | 112  |

Table II: Reason for cancellation of cases on admission for surgery.

|                                   | October 2005 to September 2006 | October 2006 to September 2007 |
|-----------------------------------|--------------------------------|--------------------------------|
| Hypertension                      | 3                              | 2                              |
| Cardiac / respiratory problems    | 4                              | 0                              |
| Urinary tract infection           | 1                              | 0                              |
| Upper respiratory tract infection | 2                              | 1                              |
| Other Medical Problems            | 3                              | 0                              |
| Skin Problems                     | 2                              | 1                              |
| Recovery from previous surgery    | 1                              | 0                              |
| Total                             | 16                             | 4                              |

Table III: Reason for cancellation of cases on OPA

|                                   | October 2006 to September 2007 |
|-----------------------------------|--------------------------------|
| Hypertension                      | 2                              |
| Cardiac / respiratory problems    | 3                              |
| Urinary tract infection           | 3                              |
| Upper respiratory tract infection | 2                              |
| Other medical problems            | 4                              |
| Recovery from previous surgery    | 1                              |
| Total                             | 15                             |

Table IV: Comparison of outcome before and after introduction of OPA. Patients who had their operations cancelled due to other reasons rather than medical causes were not included in this study.

|  | October 2005 to September 2006<br>(pre-OPA) | October 2006 to September 2007<br>(post-OPA) | p value<br>< 0.05 |
|--|---|--|-------------------|
| Mean age of patients   | 64.2 ± 12.82                                | 61.8 ± 10.54                                 | > 0.05            |
| Number of patients listed for surgery                                      | 118   | 112  | > 0.05            |
| Number of patients attended OPA<br>(attendance rate)                       | —   | 110 (98.2 %)                                 | —                 |
| Number of medical cancellation on<br>admission (medical cancellation rate) | 16 (13.6 %)                                 | 4 (3.6 %)                                    | < 0.05            |
| Number of patients operated  | 99  | 107  | > 0.05            |
| Mean stay in hospital (days)   | 10.7 ± 2.0                                  | 7.0 ± 2.1                                    | < 0.05            |

reduced on average from almost four days to just over two days. The OPA system has therefore contributed substantially to the reduction of cost for the hospital and patients. Pollard *et al* found a savings of USD\$ 882 000 for 420 patients after the opening of pre-operative unit, which means a saving of USD \$2100 per patient during the six months study period<sup>12</sup>. The reduction of ward stay also allowed the hospital to direct resources to provide care for other patients. More patients from other disciplines such as trauma cases were admitted during the study period because of the availability of hospital beds. We also noticed that a small number of patients were admitted a few days earlier to optimize their medical condition after assessment by anaesthetists in the OPA clinic. Therefore the additional benefit of OPA system was to be able to identify patients who have a higher chance of cancellation due to medical reasons and as such, to admit them earlier for optimisation of medical condition.

We also believe that an anaesthetist led OPA is more appropriate than physician nor nurse led OPA. Various studies have demonstrated that extensive laboratory investigation can contribute to rising patient expenses, and Kaplan *et al* reported that up to 75% of these investigations were deemed unnecessary<sup>13</sup>. In another study, Starsnic *et al* discovered that fewer test's would have been ordered in an anaesthetist directed pre-admission clinic, and these changes produced an average cost savings of USD\$20.89 per patient<sup>14</sup>. In addition, relevant interdisciplinary referrals can be made more appropriately by the anaesthetists, rather than by physicians or surgeons. This will lead to not only saving unnecessary medical referrals but also will improve patient care.

The OPA clinic also allows patients to meet the anaesthetists prior to the operation and could alleviate the anxiety among them. Previous reports have documented good satisfaction levels among patients who attended outpatient anaesthetic

evaluation<sup>15,16</sup>. The OPA clinic also provides an opportunity for the physiotherapists and occupational therapists to introduce themselves to the patients and to answer any queries regarding post-operative rehabilitation. In addition, the shorter pre-operative hospital stay is always welcomed by the patients as it also helps to reduce the anxiety among the patients.

There are some disadvantages of the OPA system. Firstly, patients are required to make an extra visit to the hospital, and this might add burden to the members of the family who need to accompany the patients, as most patients are elderly. However, it is a small price to pay. Patients always appreciate the extra measures taken to ensure they are fit for surgery, and they often derive greater satisfaction from the OPA consultations with other professional health care providers. This was clear from the high attendance rate in our OPA clinic. Secondly, the implementation of this system requires a dedicated anaesthetist, and ideally, the same anaesthetist who is going to anaesthetize the patients. Thirdly, the surgical teams need to finalise their theatre lists at least three weeks in advance and some may argue there is less flexibility for eleventh hour changes. However, in our experience, this is not always the case. In fact due to the advanced pre-operative assessment, we were able to find suitable replacement for some of the patients who were cancelled on admission. Last but not least, there were still some cancellations on admission despite detailed evaluation by anaesthetist in the OPA clinic. Some of the reasons were unavoidable, especially when the two patients who presented with hypertension had only borderline high blood pressure in the OPA clinic. Nonetheless, this is only our initial experience and there is some room for future improvement.

**CONCLUSION**

With increase in aging population and rising healthcare cost, it is essential to maximize the utilization of healthcare resources which includes improving the efficiency of management of operating theatre lists, reduction of unnecessary investigation or inappropriate medical referral, and reduction in occupancy of hospital beds. The OPA

system has proved to be a cost-effective way and can provide one of the solutions to the problem of rising healthcare expenses. In addition, we believe that OPA clinic can improve patient care and patient satisfaction by providing better information and reduce the anxiety of patients. We therefore recommend the introduction of the OPA system to not just other branches of orthopaedic surgery but also to other disciplines of surgery.

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