Patient Education Before Hip or Knee Arthroplasty Lowers Length of Stay

Richard S. Yoon, BS, Kate W. Nellans, MD, MPH, Jeffrey A. Geller, MD, Abraham D. Kim, BA, Maiken R. Jacobs, MA, OTR/L, and William Macaulay, MD

Abstract: From April 2006 to May 2007, 261 patients undergoing primary unilateral total hip arthroplasty or total knee arthroplasty were offered voluntary participation in a one-on-one preoperative educational program. Length of stay (LOS) and inpatient data were monitored and recorded, prospectively. Education participants enjoyed a significantly shorter LOS than non-participants for both total hip arthroplasty (3.1 ± 0.8 days vs 3.9 ± 1.4 days; \( P = .0001 \)) and total knee arthroplasty (3.1 ± 0.9 days vs 4.1 ± 1.9 days; \( P = .001 \)). Keywords: patient education, preoperative care, hip arthroplasty, knee arthroplasty, length of stay.

Osteoarthritis (OA) is ranked the second most common cause of long-term disability among American adults and affects well more than 60 million Americans. It is also one of the major contributors to health care–related economic cost in the United States and worldwide [1,2]. The incidence is growing rapidly with the number affected expected to double by the year 2020, further adding to already rising health care costs [3,4]. Of the millions who have the degenerative joint disease, many fail conservative, nonsurgical management necessitating joint arthroplasty. In the United States per year, more than 600 000 patients elect to undergo hip or knee arthroplasty to help alleviate their debilitating joint pain [5,6], and this number is expected to rise significantly [7].

In efforts to combat the rising costs of treating OA with hip and knee arthroplasty, many centers have developed clinical pathway programs and reported their results [8-18]. With hopes of achieving efficiency while still administering the highest quality of care, these programs were founded on the premise that preoperative preparation may potentially reduce stress and anxiety translating to a faster recovery and a lower length of stay (LOS) [10,14,19-21]. Such programs, despite the use of a variety of media, have met mixed success.

The present study examines the effect of real-time voluntary participation in a one-on-one individualized preoperative teaching program and how that affected LOS in those patients undergoing primary unilateral total hip arthroplasty (THA) or total knee arthroplasty (TKA). The teaching was offered to patients by phone or in person, tailored to patient availability and preference. We hypothesize that mean LOS will be reduced in patients who chose to participate vs those who do not participate in a preoperative educational program. Additional analyses evaluated incidence of complications, the impact of specific days of the week of surgery on LOS, and individual procedural comparisons.

Materials and Methods

Preoperative Education

Patients undergoing primary unilateral THA or TKA between April 2006 (the educational program’s inaugural month) and May 2007 were eligible for voluntary participation in our Center for Hip and Knee Replacement (CHKR) Preoperative Patient Education Program. Patients undergoing revision procedures, having undergone previous hip or knee arthroplasty, bilateral THA or TKA, or other forms of arthroplasty (ie, hip resurfacing, unicompartmental knee arthroplasty), were excluded. Performance of the study was Health Insurance Portability and Accounting Act compliant and institutional review board approved. It is also important to note that a randomized study design was deliberately not chosen as denying a patient the option to participate in an interactive, preoperative education session was considered inappropriate. Furthermore, a randomized study design would have masked a realistic view on the
willingness of patients to participate in an already ongoing hospital initiative.

Approximately 3 weeks before the patients’ scheduled day of surgery (DOS), our CHKR preoperative patient educator (PPE: M.R.J.) contacted the patients via phone to offer a one-on-one education session regarding the specifics of their scheduled procedure, hospital stay, and recovery. A structured script was used by the PPE during recruitment. Upon acceptance of the education session, the patient also chose their preference as to whether they wished to interact with the PPE in person or over the phone. This session was a one-on-one educational review of the 60 to 70-page booklet entitled “What to Expect,” which are available to all patients scheduled for THA or TKA. All patients who chose to receive preoperative education were screened and were logged using Microsoft Excel 2007 (Microsoft Corp, Redmond, WA).

If initial phone contact was not successful, the PPE would leave a message and make additional attempts every 2 days while awaiting a return phone call. If no return phone call was received, repeat contact attempts were continued until approximately 2 business days before the patient’s scheduled surgical date. If a patient did return the phone call even 1 day before their DOS and participated in the education session via phone, they were deemed an education participant (EP). Standardization between phone and in person education was ensured at the time of surgical consent, when education material was provided and used as the structure for the education session. Patients who did not participate (nonparticipants [NPs]) in the preoperative education program were tabulated for inclusion in the current investigation and the reason for nonparticipation documented.

The educational program provided by the PPE followed the material in the respective “What to Expect” patient binders (Table 1). All in-hospital teaching sessions were supplemented with anatomical models and DVD media upon patient request. Duration of the education session was typically 1 hour but varied per patient; time constraints were always flexible as the primary goal was to answer remaining questions. In addition, the PPE’s contact information was provided for simple questions that might arise outside to a teaching session.

### Data Collection

All data were collected retrospectively by a blinded third party (A.D.K.) research assistant and stored within Microsoft Excel (Microsoft Corp, Redmond, Wash). Data were collected from electronic patient charts and cross-referenced with inpatient hard copy charts during their surgical stays. Primary parameters noted and recorded included LOS. Patients, in either the NP or EP groups, observed to display any confounding factors that could have potentially influenced LOS unrelated to the patient education, surgery, or medical condition (ie, insurance discrepancies, logistical issues, and others) was excluded from this study. Secondary parameters included preexisting comorbidities based on International Classification of Disease, Ninth Revision, coding, surgical history, type of insurance, day of week of surgery, and adverse events that occurred in hospital.

### Power Analysis

Because study goals consisted of comparisons between EPs and NPs and not the impact of the education program before and after implementation, already existing data extrapolated from the literature were used to determine the sample sizes of each group [22]. Study goals consisted of the “real-time” group comparisons not only because the preimplementation and postimplementation impact of an education program had already been reported [22], but also the desired data that were hoped to be extrapolated was the impact of patients who chose not to participate. These data, it was hypothesized, could be extremely useful in helping to achieve future 100% program participation, further ensuring increased efficiency during the perioperative period. Thus, because this type of “real-time” comparative data did not exist in the literature, the classical preimplementation and postimplementation data reported by Walter et al [22] were used. Using 1 day as a clinically significant difference in LOS, powered to 0.80 with an α of .05, the SDs from the findings of Walter et al [22] were used to determine that 22 patients would be needed in each EP and NP groups for both THAs and TKAs. Because this was already an implemented hospital initiative, data collection did not stop once adequate power was achieved. Instead, a 12-month data collection period was set not only to achieve appropriate statistical significance but also to gain a realistic view on the success of the education initiative.

### Statistical Methods

Comparisons between the EP and NP cohorts were examined using an independent samples t test for each of the independent variables. The variables of sex, age, number of comorbidities, and surgeon were then used in a stepwise forward regression using SPSS (SPSS Inc,

<table>
<thead>
<tr>
<th>Table 1. Topics Covered in the “What to Expect” Binder (ie, THA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>THA</td>
</tr>
<tr>
<td>What is THA?</td>
</tr>
<tr>
<td>How the normal hip works</td>
</tr>
<tr>
<td>Realistic expectations</td>
</tr>
<tr>
<td>About the surgery/your new hip</td>
</tr>
<tr>
<td>Preoperative checklist (ie, medications, clothing, etc)</td>
</tr>
<tr>
<td>Planning your hospital stay</td>
</tr>
<tr>
<td>Initial recovery in the postanesthesia care unit</td>
</tr>
<tr>
<td>Recovery &amp; rehabilitation</td>
</tr>
<tr>
<td>Progress guidelines</td>
</tr>
<tr>
<td>Discharge instructions</td>
</tr>
<tr>
<td>Home recovery &amp; exercise</td>
</tr>
<tr>
<td>Nutrition</td>
</tr>
<tr>
<td>Other (ie, pastoral/religious care, hospital contact numbers, etc)</td>
</tr>
</tbody>
</table>

THA indicates total hip arthroplasty.
Version 15.0, Chicago, IL) to construct a linear model able to control for their effects on the primary outcome variable of interest, LOS. In other analyses, statistical models were constructed in a similar fashion to determine the effect of comorbid conditions and surgical day of the week on the LOS.

Results

From April 2006 to May 2007, 261 eligible patients (male, 170/261) were successfully contacted and offered voluntary participation in the CHKR Preoperative Patient Education Program. Of the 261 patients, 168 (64%) chose to participate, whereas 93 (36%) did not. Of the 93 who did not participate, reasons included scheduling too close to the DOS; inability obtain contact with the patient, which included no return phone calls from the patient; and simple refusal in participation in the program. Also, some patients were not able to participate due to the PPE’s going on vacation, whereas others were simply no-shows after registering.

Of the 168 EPs, 64% were male, and the mean age was 66.3 ± 11.7 years. Of the 93 NPs, 67% were male, and the mean age was 66.3 ± 11.2 years. Comparisons between the 2 groups revealed no statistically significant differences about the groups’ percentage of males (P = .63) or mean age (P = .98). There was no significant difference in the number of preoperative comorbid conditions between the groups (EP, 4.0 ± 2.9 vs NP, 3.9 ± 2.6; P = .61; Table 2).

When considering our primary outcome, 5 of 168 were excluded from statistical analyses for prolonged LOS caused by medically unrelated confounding factors; 4 of 93 patients from the NP group were excluded for the same reasoning. Controlling for age, sex, and number of comorbid conditions, comparisons between the groups’ mean LOS showed the EP group had nearly a 1.0 day shorter LOS than the NP group at the 0.001 significance level (3.1 ± 0.8 vs 4.1 ± 1.9 days; P < .0001; Fig. 1). Upon further calculation, there were no differences between those educated via phone or in person in either THA (phone LOS, 3.3 ± 1.4 vs in person LOS, 3.2 ± 0.83; P = .85) or TKA (phone LOS, 3.2 ± 1.1 vs in person LOS, 3.3 ± 1.2; P = .60).

Comparisons between EP and NP groups specific to THA and TKA yielded encouraging results. Controlling for age, sex, surgeon, and number of comorbidities, a significantly reduced LOS was observed for EPs for both THA (3.1 ± 0.8 days vs 3.9 ± 1.4 days; P = .0001) and TKA (3.1 ± 0.9 days vs 4.1 ± 1.9 days; P = .001; Fig. 1). Upon further calculation, there were no differences between those educated via phone or in person in either THA (phone LOS, 3.3 ± 1.4 vs in person LOS, 3.2 ± 0.83; P = .85) or TKA (phone LOS, 3.2 ± 1.1 vs in person LOS, 3.3 ± 1.2; P = .60).

Discussion

Despite disparate results from other similar published reports about the effect of TJA preoperative education [10,11,19-21,23], our results indicate that preoperative education does indeed significantly reduce the LOS, by approximately 1.0 day, for those undergoing THA and TKA procedures.

Our results coincided with a Canadian report by Crowe and Henderson [14] in 2003, which also noted a significant decrease in primary THA and TKA LOS with preoperative education in a prospective randomized trial. Crowe and Henderson [14] reported significant decreases in preoperative anxiety and postoperative complications,
albeit in a sample size that was nearly half of the current study (133 patients). Notable differences between this study and the initiative of Crowe and Henderson were our broader inclusion criteria—the Canadian study only included preoperative education for “clients with complex needs (comorbid conditions or limited social support)” [14]. Despite these differences, similarities in study design and methodology led to decreases in LOS in both studies, which was largely attributable to the use of an individualized preoperative educator to conduct interactive, one-on-one sessions with the participants.

We consider the use of an individual counselor of particular importance because most of the studies that reported a nonsignificant decrease in LOS after preoperative patient education [11,21,23] used booklet mailers and/or bedside audio and videotape as educational interventions. The personal nature and ability of patients to ask questions of the “live” counselor used in both the Canadian study and our study seems to be a key contributor to the statistically significant decrease in LOS demonstrated in both studies. In addition, the individualized nature of this program may be more patient friendly than a large classroom type of preoperative education in allowing for added security when asking difficult, personal health-related questions.

In a different report out of Amsterdam, which also used the teaching services of a live educator, those investigators demonstrated conclusions that conflicted with those we have shown in the current study. They reported nonsignificant decreases in LOS [21]. However, further evaluation of their methodology reported a much smaller patient cohort (total n = 64; EP, 31; NP, 33) [21] that was nearly half the number of patients enrolled in the Canadian study (total n = 133) and a quarter the sample size of our study (total n = 261). Perhaps, more important, the major difference in the Dutch study design was that it focused on preoperative exercise and instruction on the postoperative rehabilitation protocol; the educational program did not over view the disease or what to expect perioperatively but rather focused on the recovery that was to follow [20,21].

Our study, however, did have some limitations. A more ideal study design would have called for a prospective randomized trial to reduce potential bias to the extent possible. However, due to the ethical considerations of denying patients a likely beneficial service, a nonrandomized study design was used. Selection bias is a likely confounder in drawing firmer conclusions from this study. The education participant and NP groups were self-selected based on the patients’ desire and ability to participate. Therefore, one could assume that many subjects from the NP group were less likely to take an active role in their surgical experience and recovery. In fact, 12% of the NP group simply refused the educational program, despite they had never before undergone a similar total joint surgery. Another 37% of the NP group either did not return PPE calls (35%) or failed to appear for a scheduled, in person PPE educational session (2%)

that calls into question the reliability and future compliance of this large subset of the NP group and calls into question the wisdom of allowing the program to remain voluntary. We are currently considering making the PPE program mandatory.

In summary, this study has demonstrated that a formal preoperative educational program can indeed help to lower a patient’s LOS. Furthermore, with the study performed in “real-time,” patient self-selection exhibited voluntary participation at a higher rate indicating willingness for patients to participate in such programs. Future studies could include analyses of mandatory participation in a preoperative education program and extrapolation of these decreases in LOS as well as the potential cost-saving economic impact of such an initiative.

Acknowledgments

The authors acknowledge New York-Presbyterian Hospital for the responsiveness and foresight of its administration (Robert Kelly, MD, senior vice president, chief operating officer, and chief medical officer of the Columbia campus) for supporting funding for this consumer-oriented and quality-of-care enhancing patient educational program and to Financial Analyst, Troy Trejo in the Financial Planning Division of the New York-Presbyterian Health care Medical Centers office, for his help in acquiring the inpatient cost summaries. We acknowledge Todd Morrison for his consistent help maintaining our CHKR database and registry.

References