Post-Operative Opioid Use, Hypotension, and Aberrant Laboratory Values Associated with Prolonged Length of Stay Following Total Knee Arthroplasty

Authors:
Kevin X. Farley, BS, Atlanta, GA, UNITED STATES
Albert T. Anastasio, BA, Atlanta, GA, UNITED STATES
Ajay Premkumar, MD, MPH, New York, NY, UNITED STATES
Scott D. Boden, MD, Atlanta, GA, UNITED STATES
Michael B. Gottschalk, MD, Dunwoody, GA, UNITED STATES

Department of Orthopaedic Surgery, Emory University, Atlanta GA
Disclosures

The authors have no financial conflicts to disclose
Summary: This study identifies potentially modifiable factors that are associated with increased length of stay after total knee arthroplasty.
Many studies have examined strategies to reduce length of hospital stay after total joint replacement.

Few studies have focused on modifiable patient-specific information in the acute post-operative period, which may correspond to increasing length of stay (LOS).
Aim

- We sought to identify independent modifiable risk factors for delayed discharge after total knee arthroplasty (TKA) that have been previously underrepresented in the literature, particularly postoperative opioid use, postoperative laboratory abnormalities, and the frequency of hypotensive events.
Study Design

- This was a retrospective cohort review of 1,033 patients undergoing TKA for primary osteoarthritis of the knee between June 2012 and August 2014 at our academic orthopaedic specialty hospital.

- Data were collected on patient demographics, comorbidities, inpatient opioid medication use on post-operative day (POD) 0/1, post-operative hypotensive events on POD 0/1, and abnormalities in laboratory values on POD 0/1.

- The main outcome was hospital LOS. Opioids were recorded in oral morphine equivalents (OMEs).

- Prolonged LOS was defined as >3 days.

- Binary logistic regression analysis to control for confounding variables was performed to identify independent risk factors for LOS >3 days.
One-thousand and thirty-three patients underwent TKA for primary osteoarthritis of the knee between June 2012 and August 2014 at our academic orthopaedic specialty hospital.

The average age of patients undergoing primary TKA in our cohort was 65.9 (SD 9.1) years, and 61.7% were women.

The mean LOS for all patients was 2.64 days (SD: 1.14, Range: 1, 9). 15.3% of patients had a LOS >3 days.
Results

• Multivariate logistic regression analysis comparing patients with a prolonged LOS to those with a LOS of 3 days or less identified significant independent risk factors for prolonged LOS.

• With all other variables constant, for every five additional hypotensive readings during POD 0 and 1, there was a 30.5% increased odds of a hospital LOS of greater than 3 days (p=0.0239).

• Similarly, for every 10 mg increase in OME use during POD 0 and 1, there was a 4.4% increased odds of a LOS greater than 3 days (p<0.001).

• Patients with a low calcium on POD 0 or 1 had 2.15 times increased odds for an increased LOS greater than 3 days (p<0.001).

• The strongest association between any risk factor and LOS in our model was that of low hemoglobin; patients with low hemoglobin values on POD 0 or 1 had a 2.6 times odds of a LOS greater than 3 days than those without abnormal hemoglobin values on those days.
Factors associated with LOS >3 days

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>OR (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotensive events on POD 0/1 *</td>
<td>1.305 (1.036, 1.645)</td>
<td>0.0239</td>
</tr>
<tr>
<td>Race</td>
<td>Non-White Vs. White</td>
<td>2.012 (1.437, 2.817)</td>
</tr>
<tr>
<td>Marital status</td>
<td>Not Married Vs. Married</td>
<td>1.526 (1.101, 2.119)</td>
</tr>
<tr>
<td>Age* 2</td>
<td></td>
<td>1.465 (1.163, 1.845)</td>
</tr>
<tr>
<td>OME (mg)* 2</td>
<td></td>
<td>1.044 (1.030, 1.058)</td>
</tr>
<tr>
<td>Lab Abnormalities</td>
<td>Low Calcium</td>
<td>2.149 (1.463, 3.157)</td>
</tr>
<tr>
<td></td>
<td>Low Hemoglobin</td>
<td>2.625 (1.760, 3.914)</td>
</tr>
<tr>
<td>Narcotic Use on Day 0/1</td>
<td></td>
<td>1.903 (1.090, 3.323)</td>
</tr>
</tbody>
</table>

* variables presented as mean ± sd
1 OR reported per 5 additional events
2 OR reported per 10 units (years or mg as applicable)
Conclusions: Main Take Away Points

• This study identifies potentially modifiable factors that are associated with increased LOS after TKA.

• Doubling down on efforts to control the narcotic use and to use opioid alternatives when possible will likely have efficacy in reducing LOS.

• Attempts should be made to correct laboratory abnormalities and to be cognizant of patient opioid use, age, and race when considering potential avenues to reduce LOS.
References

3. in Health, United States, 2014: With Special Feature on Adults Aged 55-64. 2015: Hyattsville (MD).