

A comparison of the accuracy of customized instrumentation in TKA with arthroplasty and general orthopaedic surgeons

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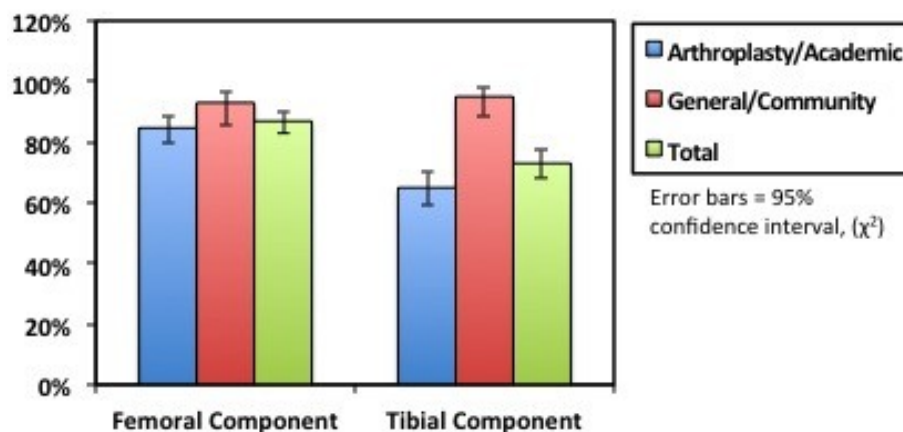
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Introduction: Customized instrumentation (CI) utilizes preoperative MRI reconstructions to generate TKA cutting guides for accurate cutting block placement. One of many benefits of this technology is its ability to utilize a 3D preoperative template to provide the surgeon with highly accurate femoral and tibial component sizing information prior to the time of surgery. This information can potentially assist the surgeon intraoperatively by improving accurate component sizing selection. Knowing prior to surgery the most likely components to be used may also help to reduce overall implant inventories and the significant associated costs. The purpose of this study was to evaluate the accuracy with which the CI preoperative template could accurately predict actual surgeon-selected femoral and tibial component size for both academic, arthroplasty-trained orthopaedic surgeons and well as community-based, general orthopaedic surgeons. Our hypothesis was that general and arthroplasty orthopaedic surgeons would be equal in their ability to correctly select the sizes of femoral and tibial components using CI.

Methods: 274 CI TKA were performed by two arthroplasty-trained surgeons at a large academic institution and 100 CI TKA were performed by a general orthopaedic surgeon in a community hospital. The preoperative, predicted femoral and tibial component size estimates from the CI template were recorded. The actual, femoral and tibial component sizes that were selected intraoperatively by the surgeons were recorded. The CI-predicted and actual femoral and tibial component sizes were compared and stratified by surgeon specialty and institution type.

Results: For all surgeons, CI accurately predicted actual femoral and tibial component selection in 87% (325/374) and 73% (273/374) of cases, respectively. Arthroplasty-trained surgeons at an academic hospital selected the CI-predicted femoral and tibial component size in 85% (232/274) and 65% (178/274) of cases, respectively. The general orthopaedic surgeon at a community hospital selected the CI-predicted femoral and tibial component size in 93% (93/100) and 95% (95/100) of cases, respectively. All changes to the femoral component were within 1 size of the CI-predicted size. All changes to the tibial component were within 1 size of the CI-predicted size except for 4 cases (2 sizes = 3 cases, 3 sizes = 1 case).

Discussion: Customized instrumentation is capable of accurately predicting actual TKA femoral and tibial component size for both the arthroplasty-trained and general orthopaedic surgeons. In this study, we found that the arthroplasty-



trained surgeons were more likely to select a TKA component that differed from the CI-predicted component size than the general orthopaedic surgeon. This may be due to differences in templating technique, intraoperative assessment of what was deemed to be the most appropriate component size, or possibly differences in inventory and component availability between an academic institution and a community hospital. This study suggests that the potential beneficial impact that accurate pre-operative planning with CI can have on reducing implant inventory can be realized in community hospitals as well as academic medical centers. The cost savings associated with a reduction in inventory may represent an important consideration for introducing CI technology into a hospital system. The accuracy with which CI permits proper prosthesis size selection may also have an important impact on implant vendors responsible for providing appropriate implants and instruments to hospitals that may not specialize in arthroplasty surgery.

Conclusion: Both general orthopaedic surgeons at community hospitals and arthroplasty-trained surgeons at academic medical centers can achieve a high degree of accuracy with CI in accurately predicting preoperatively actual intraoperative femoral and tibial component size selection.