

Does Implant Design Affect Hospital Metrics and Patient Outcomes? TKA Utilizing a “Fast Track” Protocol

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Introduction

Improved perioperative care has been shown to lead to total knee arthroplasty (TKA) surgeries with lower blood loss/need for transfusions, better pain management with multimodal strategies, and reduced hospital stay¹. Additional data shows that a “Fast Track” procedure should also reduce the duration of hospitalization, morbidity, and prolonged convalescence, as well as lead to subsequent economic savings². Multiple factors affecting outcomes in a fast track surgery have been previously investigated. However, to our knowledge, there has been no study that has looked at the influence of implant design on outcomes after fast track surgery. The objective of this study was to investigate the potential influence of implant design during the episode of care in a fast track setting.

Methods

A prospective, single center case series enrolled TKA patients treated at a single institution, by the same surgeon, utilizing an identical preoperative, perioperative, and postoperative fast track protocol. The study sample consisted of 62 TKA patients having received either a Customized Individually Made (CIM) TKA (32) or Off The Shelf (OTS) TKA (30) with no statistically significant differences reported in demographics (gender, age, BMI). Data collected included: patient demographics, length of hospital stay (LOS), discharge destination, range of motion, and adverse event rates at discharge. Seventeen comorbidities (e.g. diabetes, coronary artery disease, hypertension etc.) were compared between the two groups and were found to be similar.

Results

“Fast Track” surgery decreased LOS to 2.1 days versus 3.6 days (prior to instituting the program) (Figure 2). The average length of stay for CIM patients (1.6 days) was significantly lower than OTS patients (2.7 days; $p=0.004$). Specifically, a significantly higher proportion of CIM patients were discharged in ≤ 24 hours ($p=0.006$) (Figure 1). 20% (6/30) of OTS patients were directly discharged to skilled nursing facilities when compared to 3.1% (1/32) of CIM patients ($p=0.0496$). At the most recent follow up (average 16 months), a significantly higher percentage of CIM patients (84%) achieved $\geq 120^\circ$ ROM when compared to OTS patients (45%; $p=0.003$). Additionally, 0% of the CIM patients and 14% of the OTS patients reported a ROM $\leq 100^\circ$ ($p=0.046$) (Table 1). There have been no revisions in either arm of the study to date. There was one Manipulation Under Anesthesia (MUA) in the OTS group and two in the CIM group ($p=0.99$).

Utilizing previously published studies that conducted cost analysis of both length of hospital stay³ and discharge destination⁴ revealed that by shortening the LOS by 1.1 days compared with OTS implants, CIM patients show a potential to save a hospital \$1,100 per patient. Similarly, reducing the likelihood of patients being discharged to skilled nursing facilities shows potential savings of \$1,100 per patient. CIM implants show potential for total savings up to \$2,200 per patient.

Table 1: Assessment of ROM (avg. 16 month post-op).

	iTotal CR	OTS	p-value
ROM $\geq 120^\circ$	84%	45%	0.003
ROM $\leq 100^\circ$	0%	14%	0.046

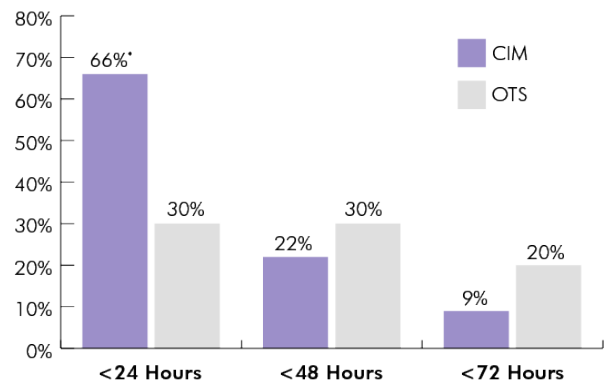


Figure 1: Comparison of length of hospital stay between OTS and ConforMIS TKAs for all hospitalizations. * indicates statistical significance.

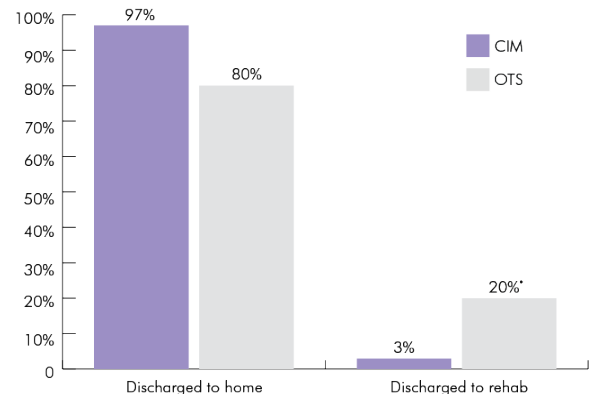


Figure 2: Comparison of discharge destinations between OTS and ConforMIS TKAs. * indicates statistical significance.

Discussion

This study compared hospital trends for patients undergoing TKA surgery under a “Fast Track” protocol utilizing two different implant systems. Results showed that hospital stay metrics such as LOS and discharge disposition were different based on the type of implant used. Given that the exact program was used for both implant groups, we conclude that the choice of implant does play a significant role in influencing hospital stay metrics after TKA surgery. Hospitals and clinicians should consider implant selection as an important avenue to influence positive changes in the episode of care after TKA to reduce hospital cost and effect patient outcomes in the new bundled care environment.

Total in-hospital savings was projected based on calculated reduction in LOS and decreased likelihood to be discharged to a skilled nursing facility. When total cost of care was calculated, it was concluded that patients in the CIM implants have the potential for a total savings of approximately \$2,200 per patient.

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