

Value of Robotics in Total Knee Arthroplasty – An Assessment of a Hospital’s Experience in the CMS Bundled Payment for Care Improvement (BPCI) Model



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Introduction

Shift Towards Value-Based Reimbursement:

- Effort to improve quality and reduce costs by US government, Center for Medicare & Medicaid Services (CMS)
- Shift from Fee-for-Service model to Single payment structure covering entire episode of care (90 days)
- Evaluate model efficacy: Bundled Payments for Care Improvement (BPCI) initiative Model #2 [1,2]

Study Objective: Compare costs and clinical outcomes of robotic vs conventional TKA in a value based bundled payment environment

Methods

- Single Institution Retrospective Review
- CMS claims data reviewed over a 7 quarter period (Jan 2014 – Sep 2015) for primary TKA, DRG 470 (Major Joint Replacement w/o MCC)
- All Medicare patients from all surgeons performing more than 7 TKAs over study period were included (6 surgeons total)
- Cost analysis included all costs associated with the consignment and use of the robotic system (OMNIBotics®, Corin-Group, Raynham, MA), including pay-per-use/disposables costs
- A standardized care pathway was implemented across all service departments and physicians at NYU Winthrop:
 - All patients participated in NYU Winthrop’s *Joints in Motion* program, a patient-centered, family/friend-focused approach to TJA care
 - Pre-op education, peri-op in-patient mobilization PT protocols (as tolerated) and post-op discharge rehab protocols were standardized
- **Data analysis:** Mann-Whitney *U* test used for continuous variables; Chi squared tests were used for categorical variables (significance: $p < 0.05$).

Robotic Group
 n=147 episodes, 3 surgeons



Conventional Group
 n=85 episodes, 3 surgeons



Results

Cost Savings and Clinical Outcomes of Robotic vs Conventional TKA

Robotics Group (Tables 1 and 2):

- Overall 90-day costs were lower in the robotic group by **\$2,059 USD**, $p=0.047$.
- Anchor Inpatient Stay costs were slightly higher, by **\$375 USD**
- Readmission rates and costs tended to be lower: **5.4% vs 11.7%**, **\$962**, $p=0.042$
- More patients discharge to home: **62% vs 48%**, $p=0.030$
- Reduced SAR/SNF usage: **37% vs 51%**, **\$1,469 savings**, $p=0.038$

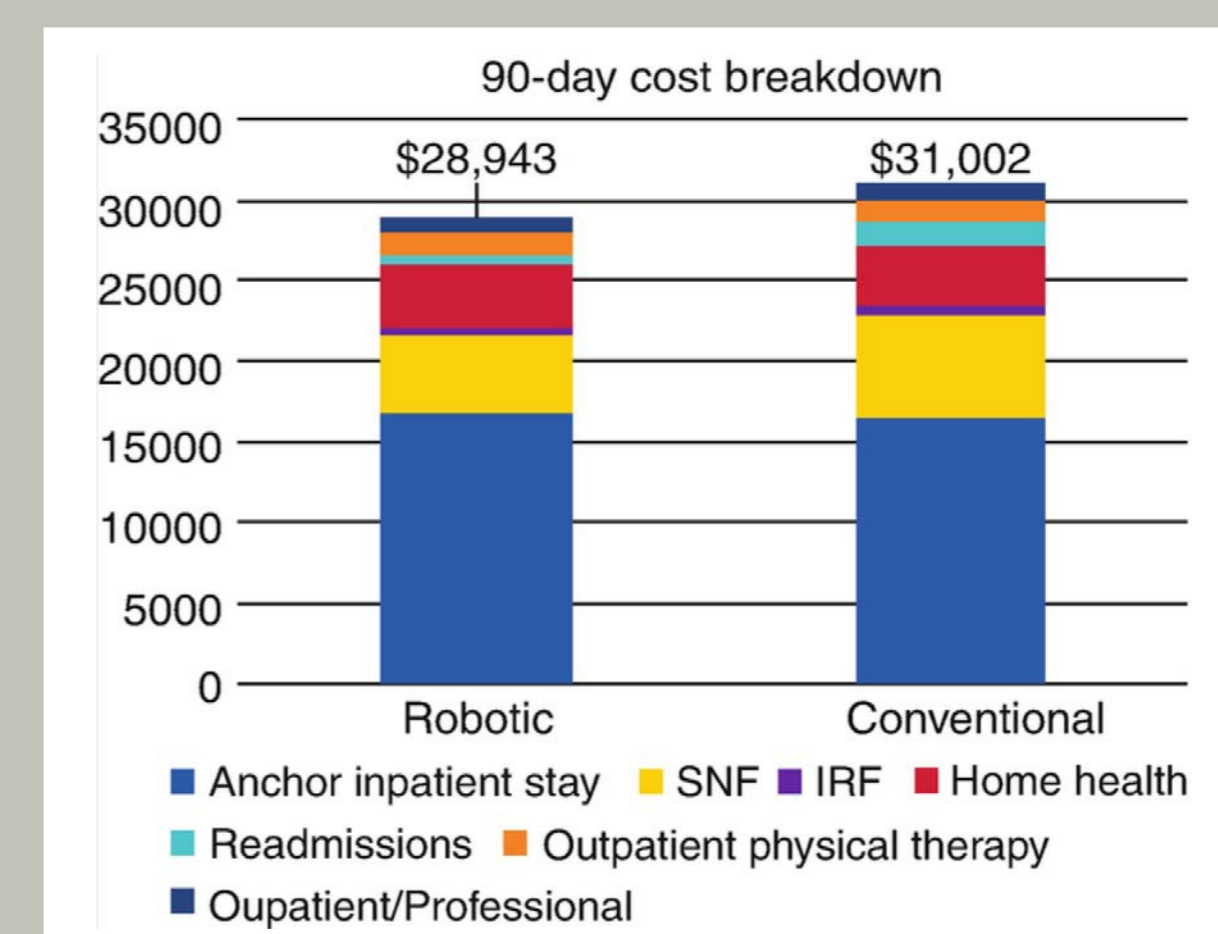
Table 1. Clinical outcomes and gains per episode for robotic and conventional TKA groups

	Gain/ Episode*	LOS (Days)	90 Day Re-Admit	% Home	% SAR
ROBOTIC-TKA Group (3 Surgeons, n = 147)					
Surgeon A	\$ 7,603	3.4	5 %	66 %	31 %
Surgeon D	\$ 8,838	3.3	11 %	39 %	61 %
Surgeon F	\$ 4,292	4.7	0 %	43 %	57 %
Group Average	\$ 7,600	3.4	5.4 %	62 %	37 %
CONV-TKA Group (3 Surgeons, n = 85)					
Surgeon B	\$ 6,629	3.5	14 %	57 %	38 %
Surgeon C	\$ 6,639	4.1	9 %	56 %	41 %
Surgeon E	\$ 1,033	3.6	12 %	12 %	88 %
Group Average	\$ 5,579	3.8	11.7 %	48 %	51 %

Table 2. Breakdown of 90-day costs/episode in robotic and conventional groups

Average Cost per Episode for Knees (DRG 470)				
	Robotics ¹	Conventional ²	Difference	
Anchor Inpatient Stay	\$ 16,802	\$ 16,427	\$ 375	
SNF	\$ 4,847	\$ 6,316	\$ (1,469)	
IRF	\$ 440	\$ 616	\$ (176)	
Home Health	\$ 3,878	\$ 3,665	\$ 212	
Readmissions	\$ 531	\$ 1,493	\$ (962)	
Outpatient Physical Therapy	\$ 1,461	\$ 1,413	\$ 48	
Oupatient/Professional	\$ 985	\$ 1,073	\$ (88)	
Total	\$ 28,943	\$ 31,002	\$ (2,059)	

¹ 3 Robotics physicians (n=147 episodes)
² 3 Conventional physicians (n=85 episodes)



* There was a \$38 difference in the gains/episode data vs the 90-day cost breakdown savings data which was due to adjustments in the claims by CMS from the time the two datasets became available

Discussion and Conclusions

By integrating robotic TKA into a standardized coordinated evidence-based clinical care pathway, coupled with excellent quality indicators and short term results, we have demonstrated that a further reduction in the overall cost per episode of care is obtainable in a BPCI reimbursement model.

This supports our premise that Robotic TKA does not have to add significant cost to the TKA procedure and may even be a cost saver in both the short and long term, while also adding significant benefits to the short and long term results of TKA.

Further long term new and ongoing studies are necessary to further validate this premise.

References

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2. Iorio R, Clair AJ, Inneh IA, Slover JD, Bosco JA, Zuckerman JD. Early results of medicare’s bundled payment initiative for a 90-day total joint arthroplasty episode of care. *J Arthroplasty*. 2016;31(2):343–50.

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