

Medical Resource Utilization and Costs for Total Hip Arthroplasty: Benchmarking an Anterior Approach Technique in the Medicare Population¹

Kamath AF^a, Chitnis AS^b, Holy C^b, Lerner J^c, Curtin B^d, Lochow S^e, DeCook C^f, Matta JM^g

a. Department of Orthopaedic Surgery, University of Pennsylvania, Philadelphia, PA, USA; b. Medical Devices Epidemiology Department, Medical Devices & Diagnostics Global Services, LLC; c. Health Economics & Market Access, Medical Device Business Services, Inc., Warsaw, IN, USA; d. OrthoCarolina, Charlotte, NC, USA; e. Scott Orthopedic Center, St. Mary's Medical Center, Huntington, WV, USA; f. Arthritis and Total Joint Specialists, Northside Hospital, Atlanta, GA, USA; g. Hip & Pelvis Institute at St. John's Center, Santa Monica, CA, USA

DePuy Synthes ANTERIOR ADVANTAGE™

As an industry leader in Anterior Approach, DePuy Synthes launches ANTERIOR ADVANTAGE™, a differentiated solution for Anterior Approach, inclusive of DePuy Synthes primary and revision hip implant products, instrumentation, enabling technologies, and world class professional education designed to help decrease the learning curve and increase OR efficiency and surgical reproducibility with the goal of better patient outcomes.

DePuy Synthes has had a long-standing collaboration with Dr. Joel Matta, who has championed and evolved the Anterior Approach in the U.S. and expanding the adoption outside of the US to what is now known as the ANTERIOR ADVANTAGE™ MATTA METHOD™, a defined ANTERIOR ADVANTAGE technique, which specifies the use of Hana™, or other orthopaedic table and intra-operative imaging for cup placement.²

The purpose of this document is to review a published retrospective cohort¹ of ANTERIOR ADVANTAGE™ MATTA METHOD™ clinical outcomes.

Study Rationale

- Clinical studies indicate that the anterior approach (AA) to total hip arthroplasty (THA) allows for faster recovery when compared to other surgical approaches to THA.^{3,4}
- However, no studies have characterized the impact of a pre-specified AA technique on costs or resource utilization over the 90-day period relevant to the Centers for Medicare and Medicaid Services Comprehensive Care for Joint Replacement Program (CJR).

- No billing codes are available to discriminate approaches to THA, thus a unique method was required for retrospective identification of AA patients.

Study Objectives

- To assess 90-day medical resource utilization and costs for a cohort of ANTERIOR ADVANTAGE™ MATTA METHOD™ patients, including:
 - **Proportion of patients discharged to home (primary endpoint),**
 - **Post acute care costs (primary endpoint),**
 - Hospital length of stay,
 - Days/costs of Skilled Nursing Facility (SNF) care,
 - Days/costs of home health care, and
 - Days/costs of hospital outpatient care
- To benchmark this performance against that for *similar THA patients receiving care at similar institutions*

Data Source

- The Centers for Medicare and Medicaid Services (CMS) 100% Standard Analytic File was used to quantify episode costs:
 - Part A claims (Inpatient, home health, skilled nursing, hospital outpatient) for patients who received elective (non-fracture), primary total hip arthroplasty (THA) between Q1 2012 and Q3 2014.
 - All claims were wage-adjusted prior to analysis.

- All Medicare Part A (facility) payments from hospitalization through 90-days after the day of discharge were eligible for inclusion:
 - Hospitalization for chronic conditions, as stipulated by CMS under the Comprehensive Care for Joint Replacement (CJR) program, were excluded
- All cell counts <11 are hidden, per CMS requirements

Study Methods

- Six surgeons agreed to participate in this analysis, all of whom used the ANTERIOR ADVANTAGE™ MATTa METHOD™.
 - Patients at least 65 years of age or older, implanted with THA between January 1st, 2012 and October 1st, 2014.
 - The CORAIL® Hip System and PINNACLE® Acetabular Cup System were the most commonly used implants for these procedures; other systems were used in a minority of cases.
- A two-stage analytical approach (matching and regression) sought to maximize similarity between patients/hospitals/surgeons in the ANTERIOR ADVANTAGE™ MATTa METHOD™ cohort and those in the control group.
 - After patient matching was completed, regression analysis with generalized estimating equations (GEE) was applied to control for remaining imbalances and clustering of outcomes within hospitals.

Regression Analysis

- Multivariate regression using the GEE technique was used to compare ANTERIOR ADVANTAGE™ MATTa METHOD™ versus the control cohort on the following primary outcomes:
 - Wage-adjusted Medicare payments from index discharge through 90-days post-discharge, and the proportion of patients discharged to home or home health agency versus other settings (e.g., skilled nursing facility [SNF]).
- This model sought to account for patient clustering within hospitals and to control for all baseline patient characteristics.*
- Predicted adjusted means and 95% confidence intervals (marginal outcomes) were estimated based on GEE model results using the method of recycled predictions.

*Age category, sex, race, year of surgery, Charlson Comorbidity Index (CCI), obesity, morbid obesity, diabetes, OA, RA, osteoporosis, dual-eligible (Medicare + Medicaid), physician hip arthroplasty volume, hospital resident-to-bed ratio (teaching status), disproportionate share percentage (DSH), hospital volume, number of hospital beds.

Demographics for Matched Cohorts

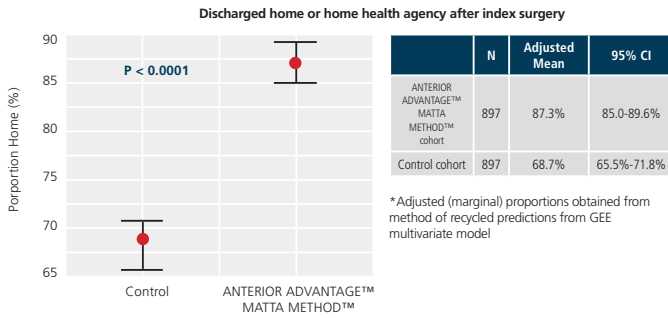
Variable	Control Cohort	ANTERIOR ADVANTAGE™ MATTa METHOD™ Cohort	p-value	Standardized difference
Post-match/Pre-match counts	897/287,916	897/923		
Mean (SD) Age	72.11 (7.88)	72.12 (8.46)	0.968	0.002
Sex	%	%		
Female	59.5	59.4	0.962	-0.002
Race	%	%		
White	94.7	94.8		
Black	3.5	2.9	0.699	0.082
Other	1.8	2.3		
Dual Eligible Status	7.8	8.5	0.604	0.025
Year of Surgery	%	%		
2012	25.5	26.4		
2013	37.1	37.4	0.863	0.026
2014	37.4	36.2		

Provider & Surgeon Characteristics for Matched Cohorts

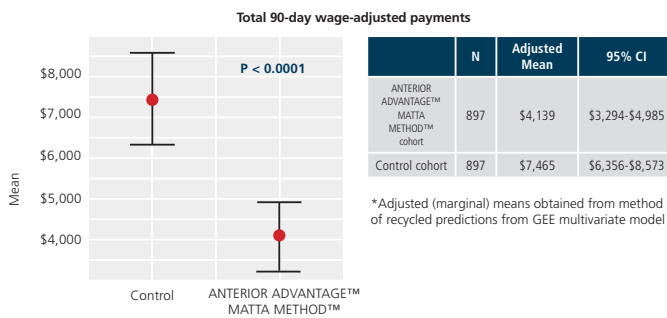
Variable	Control Cohort %	ANTERIOR ADVANTAGE™ MATTa METHOD™ Cohort %	p-value	Standardized difference
Teaching Hospital (Yes)	27.0	20.0	0.0004	-0.166
Large Urban	52.6	40.6		
Other Urban	46.4	59.4	<0.0001	0.292
Mean (SD) Surgeon THA volume (2012-2014)	172.44 (198.08)	273.90 (145.69)	<0.0001	0.584

Results

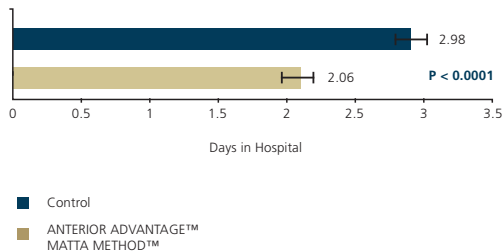
Proportion of Patients Discharged Home*



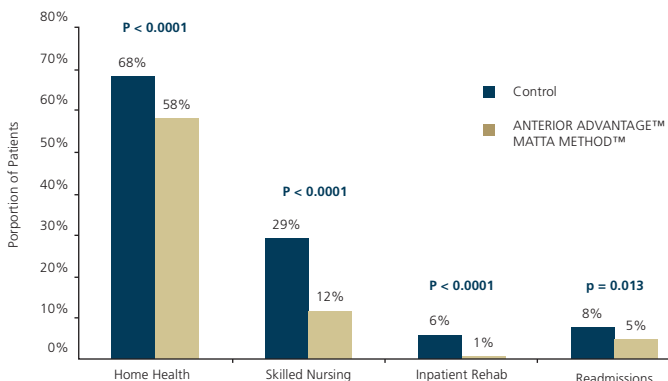
Post-Acute Total Claim Payments*



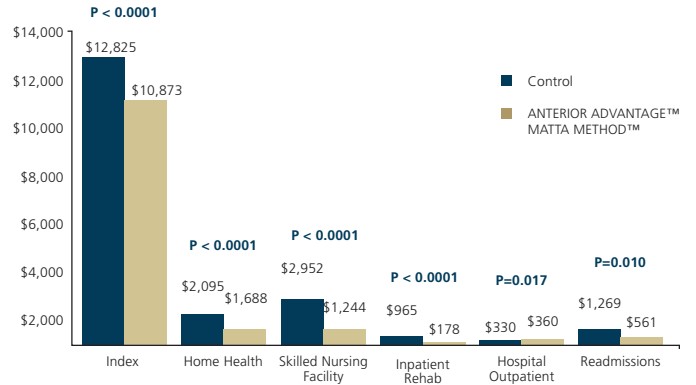
Hospital Length of Stay



Matched, Unadjusted Proportion of Patients Receiving any 90-day Post-acute Care in Each Setting



Matched, Unadjusted Payments 90-day Episode, by Setting



Conclusions

- After control for variables spanning multiple patient and provider domains:
 - Patients who received ANTERIOR ADVANTAGE™ MATTA METHOD™ from the participating surgeons had lower in-hospital length of stay than those in the control cohort (2.07 vs. 2.98 days);
 - Patients who received ANTERIOR ADVANTAGE™ MATTA METHOD™ from the participating surgeons were significantly more likely than those in the control arm to be discharged home (87% vs. 69%); and
 - Patients incurred nearly 50% lower post-acute costs: (\$4,139 vs. \$7,465, for per-patient 90-day savings of \$3,326) compared to the control.
- These differences represent a large proportion of post-acute care resource use after THA, and are highly relevant for the transition to value-based care.

Limitations

- This is not a purely comparative study, given mixed surgical approaches within control cohort.
- The participating surgeons were not a random, independent sample, and may not be representative of the broader population of surgeons who use the ANTERIOR ADVANTAGE™ MATTA METHOD™.
 - In particular, all surgeons were highly experienced with the ANTERIOR ADVANTAGE™ MATTA METHOD™ prior to the observation period.
- All limitations and biases inherent to analysis of retrospective administrative data apply; principally, relationships cannot be considered causal.

MATTA METHOD™ is a trademark of Joel Matta, M.D., Inc.

The Hana™ table is not a DePuy Synthes Joint Reconstruction product, nor is it the only table that can be used for this approach. This surgical technique still applies when using other tables.

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1. Kamath A, Chitnis A, Holy C, et al. Medical resource utilization and costs for total hip arthroplasty: benchmarking an anterior approach technique in the Medicare population. *J Med Econ.* 2017; 1-7.
2. Matta, Joel M., Cambize Shahrdar, and Tania Ferguson. "Single-incision anterior approach for total hip arthroplasty on an orthopaedic table." *Clinical orthopaedics and related research* 441 (2005): 115-124
3. Martin, Christopher T., et al. "A comparison of hospital length of stay and short-term morbidity between the anterior and the posterior approaches to total hip arthroplasty." *The Journal of arthroplasty* 28.5 (2013): 849-854.
4. Zawadsky, Mark W., et al. "Early outcome comparison between the direct anterior approach and the mini-incision posterior approach for primary total hip arthroplasty: 150 consecutive cases." *The Journal of arthroplasty* 29.6 (2014): 1256-1260.



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