

Time-Driven Activity-Based Costs for Manipulation under Anesthesia after Total Knee Arthroplasty

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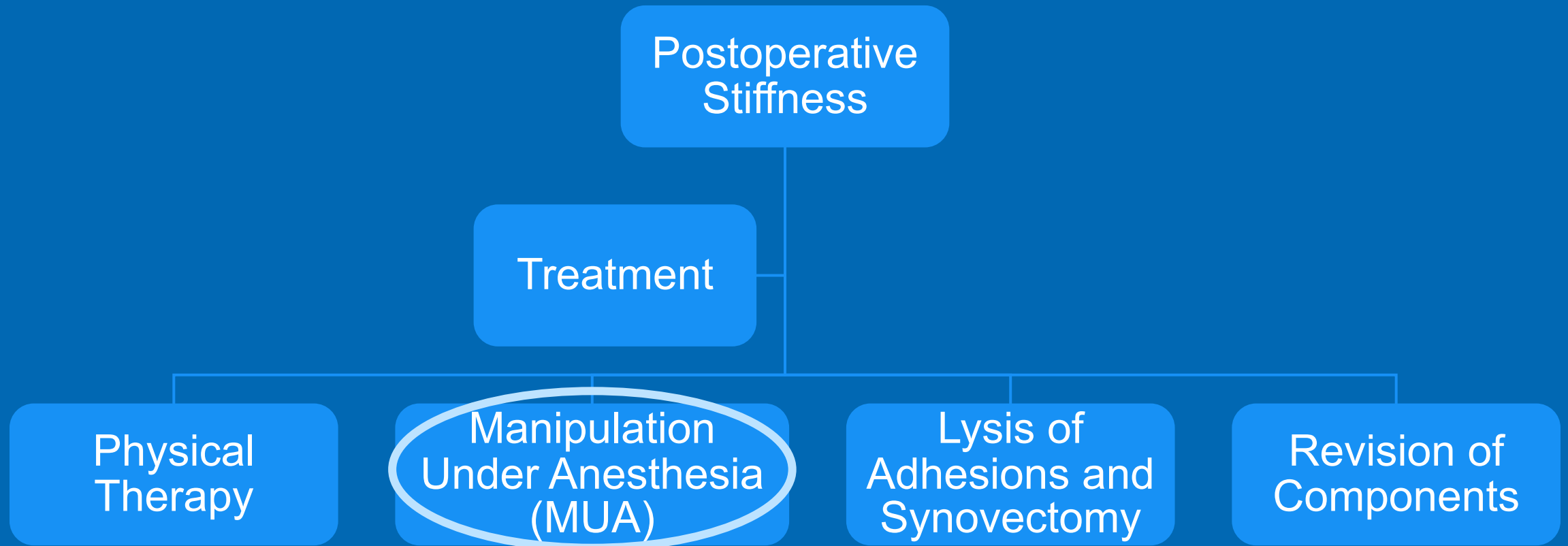
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Introduction

- Stiffness after Total Knee Arthroplasty (TKA) ¹⁻⁵
 - Occurs ~20% of patients
 - Associated with Increased Patient Dissatisfaction and Cost



Study Purpose

- Time-Driven Activity-Based Costing (TDABC) ⁶
 - Bottom-up cost-accounting strategy
 - Calculates costs of resources in a care process
- **Goal:** To use TDABC to accurately determine MUA hospital costs as a treatment for stiffness following TKA.

Preoperative Testing



Before Procedure Day
of Surgery



MUA



Post-Anesthesia
Care Unit



After Post-
Anesthesia Care Unit

- Retrospective review of financial data at a single institution from 2016 to 2020
 - 133 knees in 129 patients who underwent MUA after TKA

Table 1. Demographics

	n=133
Age (years), mean (range)	62.6 (34-86)
Female , n (%)	87 (65.4)
Height (cm), mean (range)	166.1 (147.3-190.5)
Weight (kg), mean (range)	87.3 (45.4-131.1)
BMI (kg/m ²), mean (range)	31.6 (19.5-45.3)
ASA Score , mean (range)	2.2 (1-3)

cm=centimeters, kg=kilograms, BMI=Body Mass Index, m=meters, ASA=American Society of Anesthesiologists

Figure 1. Mean Overall Cost by Phase of MUA

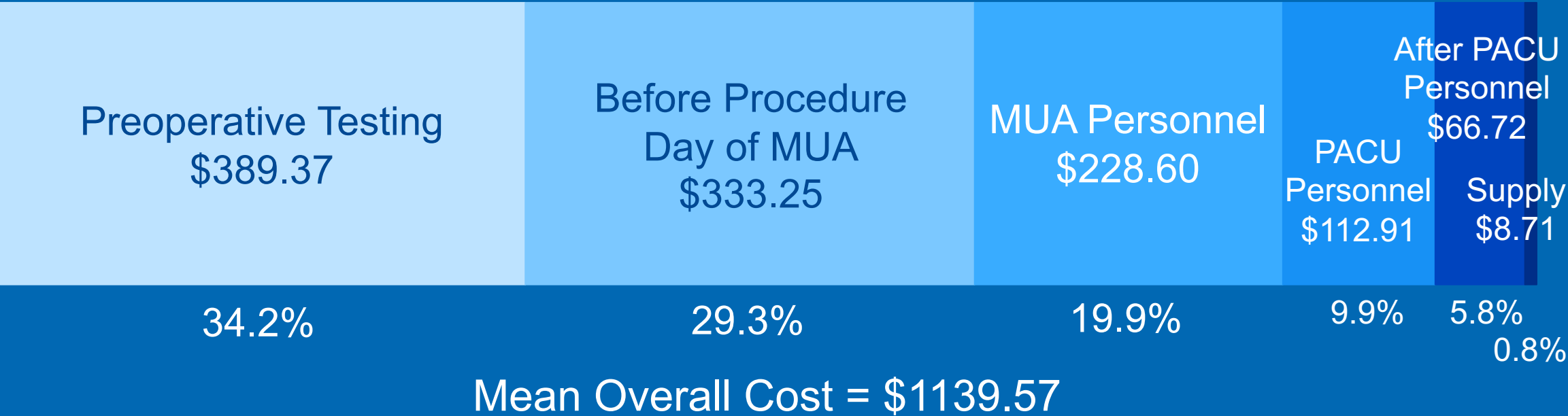


Table 2. Cost per Minute

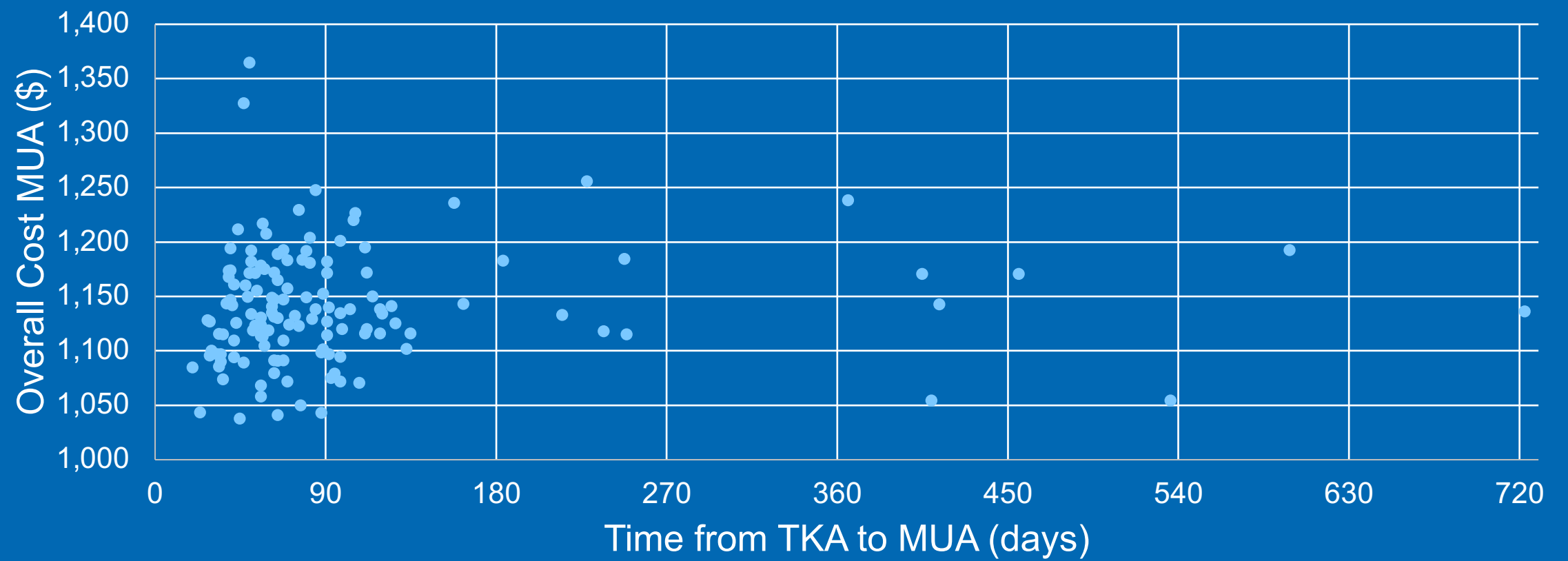
	Cost Per Minute
Preoperative Testing, mean (range)	N/A
Before Procedure on Day of Surgery, mean (range)	N/A
MUA Personnel, mean (range)	\$13.10 (\$9.01-\$19.58)
PACU Personnel, mean (range)	\$2.19 (\$1.32-\$15.20)
After PACU Personnel, mean (range)	\$0.70 (\$0.58-\$0.90)
Total Supply, mean (range)	\$0.03 (\$0.01-\$0.16)
Total Procedure, mean (range)	\$4.11 (\$2.35-\$5.48)

MUA=Manipulation Under Anesthesia, PACU=Post-Anesthesia Care Unit

Results

Figure 2. Time from TKA to MUA is Not a Risk Factor for Increased Total Cost (Odds Ratio=1.02, 95% Confidence Interval=0.9-1.1, p=0.5)

Cost of MUA versus Days from TKA to MUA



Results

- No Complications

Table 3. Multiple Linear Regression demonstrating that lower body mass index was associated with a higher cost of MUA, but not age, gender, American Society of Anesthesiologists score, or Time between TKA and MUA.

	Odds Ratio (95% CI)	p-value
BMI (kg/m²)	0.1 (0.02-0.6)	p= 0.01
Age (years)	0.7 (0.2-2.1)	p=0.5
Gender	0.05 (1.5x10 ⁻¹⁰ -1.4x10 ⁷)	p=0.8
ASA Score	1.1x10 ⁷ (0.02-6.1x10 ¹⁵)	p=0.1
Days from TKA to MUA	1.04 (0.96-1.1)	p=0.4

BMI=Body Mass Index, kg=kilograms, m=meters, ASA=American Society of Anesthesiologists, TKA=Total Knee Arthroplasty, MUA=Manipulation Under Anesthesia, CI= Confidence Interval

Summary

- Average TDABC of MUA is \$1139.57 per patient
 - 63.4% of cost attributed to pre-procedure personnel costs
- No Complications
 - Recommend MUA performed at Low-Cost Facility
- Interesting, lower BMI was the only patient-specific risk factor associated with increased MUA costs
- TDABC allows hospital systems to identify potential areas of cost savings



Thank You



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