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Cumulative Medical Costs of Prepectoral versus Subpectoral Implant-Based Breast Reconstruction: A Retrospective Analysis of a Single Academic Center

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Introduction

Why Compare Costs of Prepectoral and Subpectoral Breast Reconstruction?

Breast cancer → high post-mastectomy reconstruction rates.

Prepectoral: improved aesthetics and function, but increased use of costly acellular dermal matrix (ADM).

Subpectoral: traditional approach, may be less expensive but with potential of poorer aesthetic and functional outcomes.

Key Question and Hypothesis

Key Question:

Do newer prepectoral techniques translate into cost savings or added value?

Hypothesis:

Prepectoral breast reconstruction leads to higher total medical costs (including surgery and post-op care) than subpectoral reconstruction, mainly due to greater use of acellular dermal matrix (ADM).

Methods

- Retrospective cohort of a single academic center (2017–2022).
- 185 women post-mastectomy, immediate implant-based reconstruction (Prepectoral (N=86) vs. Subpectoral (N=99) Implant Reconstruction).
- CPT codes could not distinguish between prepectoral and subpectoral procedures, requiring chart review for confirmation.
- Direct and indirect costs were obtained for index surgery + downstream post-operative costs, up to 6 months post-op.
- Log-transformed linear regression models assessed total index, downstream, and cumulative (index plus downstream) costs, adjusting for age, BMI, and race.

Results

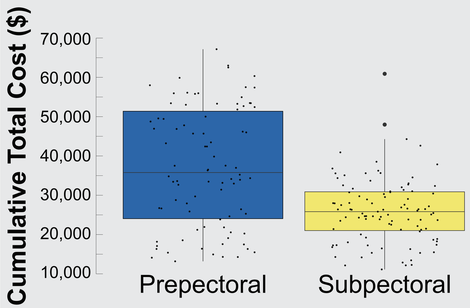


Figure 1: Cumulative total medical costs ($USD, index surgery + downstream costs up to six months) for patients undergoing prepectoral (N = 86, blue) or subpectoral (N = 99, yellow) implant-based breast reconstruction. The boxplots represent the median and interquartile range for each group, with zero outliers in the prepectoral group and two outliers in the subpectoral group. Individual cost data are overlaid as black jittered dots, illustrating the distribution of values within each group.

Table 1: Demographic, treatment and medical history of patients included in cost analysis. Age, BMI, and intraoperative time are reported in mean (SD) while all other factors are reported as % of applicable patients.

		Prepectoral (N = 86)	Subpectoral (N = 99)	t value	p-value
Age (yrs)		52.5 (11.6)	54.7 (13.4)	1.2	0.23
BMI (kg/m^2)		27.2 (5.7)	26.9 (6.9)	0.33	0.75
Intraoperative Time (min)		256 (67)	260 (74)	0.35	0.73
				Odds ratio	p-value
Race (%)	Caucasian	87.4	84.2	1.48	0.4
	Non-Caucasian	12.6	15.8		
Immediate (%)	Immediate	95.3	86	3.83	0.034
	Delayed	4.7	14		
Stages (%)	Direct-to-Implant	21.8	23.8	0.88	0.73
	Two-Stage	78.2	76.2		
Reconstruction Laterality (%)	Right Side	11.5	12.9	---	0.19
	Left Side	6.9	14.9		
	Bilateral	81.6	72.3		
Cancer Laterality (%)	Prophylactic	17.2	29	---	0.009
	Right Side	34.5	36		
	Left Side	41.4	35		
	Bilateral	6.9	0		
Receipt of Neoadjuvant Chemo (%)	Yes	17.4	14.3	0.81	0.68
	No	82.6	85.7		
Receipt of Radiation Therapy (%)	Yes	26.4	14.4	0.48	0.064
	No	73.6	85.6		
History of Tobacco Use (%)	Never	78.2	78.8	---	0.93
	Current	2.3	3		
	Former	19.5	18.2		
History of Diabetes mellitus (%)	Yes	4.6	4	0.86	1
	No	95.4	96		
History of Obesity (%)	Yes	26.4	21.8	0.83	0.61
	No	73.6	78.2		
History of Coagulative Episode (%)	Yes	11.5	3.1	0.28	0.071
	No	88.5	96.9		
Anticoagulated State at Time of Surgery (%)	Yes	6.9	2	0.35	0.26
	No	93.1	98		
History of Hypertension (%)	Yes	19.5	15.8	0.85	0.7
	No	80.5	84.2		
History of COPD (%)	Yes	9.2	5.9	0.74	0.77
	No	90.8	94.1		
Prior Breast Cancer (%)	Yes	2.3	12.9	6.37	0.007
	No	97.7	87.1		
Prior Breast Surgery (%)	Yes	21.8	38.6	2.28	0.016
	No	78.2	61.4		
ADM Use (%)	Yes	67.4	76.8	1.75	0.13
	No	32.6	23.2		

Table 2: Log-transformed cost model predicting the total cost of the index surgery as a function of reconstruction surgery type, race, body mass index (BMI) and age.

Predictor	Estimate	Std. Error	t value	p-value
(Intercept)	10.913	0.222717	49.026	<0.001 ***
Subpectoral	-0.306	0.076254	-4.011	<0.001 ***
Race (Non-Caucasian)	-0.101	0.11326	-0.89	0.38
BMI	-0.022	0.006026	-3.6	<0.001 ***
Age	-0.003	0.003	-1.08	0.28

Table 3: Cost model predicting the downstream costs of post-operative care up to six months as a function of reconstruction surgery type, race, body mass index (BMI) and age.

Predictor	Estimate	Std. Error	t value	p-value
(Intercept)	7.776	0.358521	21.691	<0.001 ***
Subpectoral	-0.207	0.12275	-1.682	0.094
Race (Non-Caucasian)	-0.220	0.182322	-1.208	0.23
BMI	0.027	0.0097	2.828	0.005 **
Age	0.002	0.004829	0.43	0.67

Table 4: Log-transformed cost model predicting the cumulative total cost of the index surgery and post-operative care up to six months as a function of reconstruction surgery type, race, body mass index (BMI) and age.

Predictor	Estimate	Std. Error	t value	p-value
(Intercept)	10.945	0.172283	63.531	<0.001 ***
CategorySubpectoral	-0.292	0.058986	-4.947	<0.001 ***
RaceOther	-0.101	0.087613	-1.156	0.25
BMI	-0.013	0.004661	-2.85	0.005 **
Age	-0.003	0.002321	-1.234	0.22

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Reference category: Prepectoral surgery, Caucasian Race

Key Findings

Subpectoral implant-based reconstruction was associated with 30% lower index surgical costs ($p < 0.001$) and 29% lower cumulative costs ($p < 0.001$) compared to prepectoral reconstruction.

No significant difference in downstream/post-op costs, complications, ER visits, hospital readmissions, and physical/occupational therapy services.

BMI correlates with higher downstream costs for both groups.

Discussion & Conclusions

Prepectoral techniques offer functional/aesthetic benefits, but at higher upfront cost.

Complications during the first six months did not alter post-operative costs between the two cohorts.

Cost transparency is critical for patient-centered decision making.

Costs could be reduced by using alternative meshes or techniques (e.g. Vicryl mesh)

Analysis did not account for long-term complications or costs beyond six months post-op.

The sample size limited the ability to explore certain cost-influencing variables (e.g., direct-to-implant vs. two-stage reconstructions)

Future studies should explore long-term costs and outcomes to better inform value-based reconstruction decisions.

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