

Postoperative Physical Therapy Utilization for Cervical Disc Replacement: An Analysis of Practice Patterns, Predictors, and Comparison to Anterior Cervical Discectomy and Fusion

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INTRODUCTION: Cervical disc replacement (CDR) is increasingly used as an alternative to anterior cervical discectomy and fusion (ACDF) for managing cervical degenerative disease. It provides potential benefit, particularly in younger patients with 1-2 level disease and good bone quality, with its motion-preserving properties. While postoperative physical therapy (PT) is commonly employed following ACDF and has been linked to improved patient-reported outcomes, PT utilization patterns after CDR remain poorly understood due to limited research and absence of established guidelines. This study aimed to identify patterns and predictors of postoperative PT utilization after CDR and compare to its usage following ACDF.

METHODS: Patients who underwent one- to two-level CDR from 2010 to April 2023 were identified in the PearlDiver national database via CPT codes. Patients with trauma, malignancy, infection, or revisions within one year were excluded. PT utilization was assessed between 1 week to 1 year postoperatively. Multivariable logistic regression was performed to identify independent predictors of PT utilization following CDR, controlling for age, gender, Elixhauser Comorbidity Index (ECI). Patients who underwent one- to two-level ACDF were identified and acted as a control group. Chi-squared and independent T-tests compared proportion of patients who attended PT, time to first PT visit, and number of total PT visits between the CDR and ACDF cohorts.

RESULTS SECTION: Among 33,558 patients who underwent one- to two-level CDR, 7,115 (21.2%) patients utilized PT in the first year postoperatively. Patients who engaged in PT were older (47.34 vs 47.06 years, p=0.036), had more comorbidities (ECI 3.48 vs 3.0, p<0.001), more likely female (41.4% vs 53.8%, p<0.001), and had higher mean family income (\$85,187 vs \$82,686, p<0.001). The strongest predictors of PT utilization included diagnosis of radiculopathy (OR: 1.64), myelopathy (OR: 1.51), fibromyalgia (1.50), mean family income >\$75,000 (OR: 1.44), education status >75%ile (OR: 1.43), and Midwest region (OR: 1.39) (all p<0.001). Factors associated with decreased PT utilization included Medicare insurance (OR: 0.65), age >70+ (OR: 0.73), Southeast region (OR: 0.80), male gender (OR: 0.85), education status <25%ile (OR: 0.88), and outpatient surgery (OR: 0.89) (Figure 1). When compared to one- to two-level ACDF, a similar number of CDR patients utilized postoperative PT (21.2% vs 21.7%, p=0.161), but they initiated PT earlier (75.2 vs 90.6 days, p<0.001) and attended less PT visits (10.14 vs 10.93 visits, p<0.001) (Table 1).

DISCUSSION: Less than one-quarter of patients engaged in postoperative physical therapy usage following one- to two-level CDR. These patients tend to have a higher comorbidity index and higher socioeconomic status. Preoperative diagnoses, comorbidities, education status, and insurance type predicted PT utilization. Compared to ACDF patients, CDR patients initiated PT earlier and required fewer visits, despite utilizing PT at a similar rate.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): Identifying predictors of PT use and differences compared to ACDF highlights the absence of standardized rehabilitation protocols. These findings emphasize the need for evidence-based guidelines to optimize recovery and reduce variability in postoperative care.

Figure 1. Predictors of PT utilization following CDR.

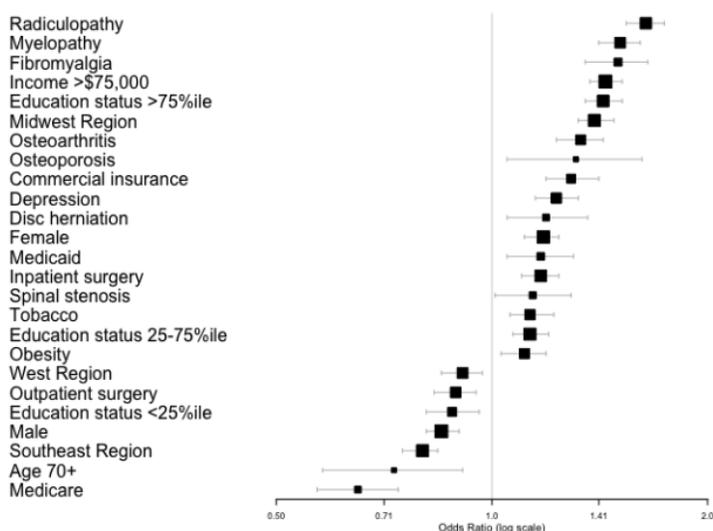


Table 1. CDR vs ACDF PT Utilization

	ACDF (N=287,315)	CDR (N=33,558)	P-value
Attended Post-op PT, N (%)	62256 (21.67%)	7,115 (21.20%)	0.1605
Time to First PT	90.64 ± 93.14	75.17 ± 88.09	<0.001
# of Visits	10.93 ± 11.21	10.14 ± 10.25	<0.001