

The Preoperative Diagnosis and Management of Cubital Tunnel: Assessing Variance in Costs and Utilization Trends

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INTRODUCTION: In the realm of evolving medicine and technology, physicians now have access to cutting-edge resources for diagnosing prevalent pathologies. Regrettably, specific resources are frequently employed without accounting for the expenses linked to their use. In the diagnosis of cubital tunnel syndrome (CuTS), a range of medical examinations may be employed. This study aimed to define the expenses and usage of distinct diagnostic instruments for CuTS.

METHODS: We conducted a search within the IBM MarketScan database to identify individuals who had undergone CuTS surgery between 2010 and 2017 by using the Current Procedural Terminology (CPT) codes. Patients < 18 years of age, patients enrolled continuously in MarketScan for less than one year, and any patient with claims related to carpal tunnel syndrome were excluded. Outpatient healthcare claims were then assessed in the year preceding their CuTS surgical treatment via International Classification of Disease (ICD)-9 and -10 codes. Sociodemographic information was collected for each patient and included age, biological sex, and geographic region of the United States. Categorical variables were assessed with either Chi-Square or Fischer's Exact Test. Continuous parametric data was assessed via one-way ANOVA with post-hoc comparisons. All statistical analysis was carried out using SPSS.

RESULTS SECTION: We examined a total of 51,851 patients, who had an average age of 52.8 years and were predominantly male (53.7%). In addition, we identified total costs of \$32.14 million associated with the patients in our cohort. Among these patients, 56.3% underwent EDX, 22.7% received an X-Ray, 1.6% received ultrasounds, and 1.4% underwent MRI scans. The predominant conservative measures were orthotic devices, accounting for the highest proportion at 11.2%, followed by corticosteroid injections at 8.9%. The overall per-patient average cost (PPAC) was \$623.28, while the PPAC for EDX was \$312.55. Ultrasound procedures had a PPAC of \$2.89, although they only contributed to 0.5% of the overall charges (Table 1). Patients aged 65 and above exhibited the lowest PPAC at \$545.28, in contrast to patients under 65, whose PPAC exceeded \$634.17 (Table 2).

DISCUSSION: Efficient diagnosis of CuTS presents challenges due to the array of available diagnostic methods and the absence of established algorithms to direct their application. Our findings indicate that less invasive and cost-effective alternatives are not fully utilized, as American healthcare professionals continue to prioritize traditional, pricier tests. There are limitations to our study, as our findings rely on accurate coding of procedures and diagnosis, and such accuracy cannot be definitively assured. Future investigations seek to delineate patient-specific factors that impact cost disparities and resource utilization, aiming to establish more uniform diagnostic guidelines.

SIGNIFICANCE/CLINICAL RELEVANCE: There is no current gold-standard diagnostic test for CuTS, thus leading to variability in the clinician-specific protocols that are used to select such diagnostic testing modalities. The results of this study set the foundation for future studies to elucidate better diagnostic algorithms that focus on both cost efficacy and efficient CuTS diagnosis.

IMAGES AND TABLES:

Table 1 Healthcare Service Charges, Percentage of Total Charges, and Per-Patient Average Cost

Tests	Total Charges (millions \$)	% of Total	PPAC* (\$)
EDX*	16.12	50.2	312.55
Office Visits	11.02	34.3	213.56
Preoperative Labs & Studies	1.33	4.1	25.85
XR*	0.74	2.3	14.39
MRI*	0.61	1.9	11.87
Ultrasound	0.15	0.5	2.89
Treatments			
Physical Therapy	1.14	3.5	22.06
Orthotic Devices	0.52	1.6	10.14
Steroid Injections	0.51	1.6	9.97
Total Preoperative Cost	32.14	100	623.28
*PPAC = Per-Patient Average Cost, EDX = Electrodiagnostic Study, XR = X-ray, MRI = Magnetic Resonance Imaging			

Table 2. Comparison of PPAC and Cost Breakdown of Conservative Treatment by Age Groups

	Age Group				P-Value
	18-34	35-49	50-64	65+	
PPAC* (\$)	634.17	637.93	635.31	545.28	<0.001
PPAC* of Conservative Treatments¹					
Injection	429 (9.4)	1,418 (10.0)	2,191 (8.6)	545 (7.5)	<0.001
Physical Therapy	359 (7.8)	739 (5.2)	1,094 (4.3)	252 (3.5)	<0.001
Orthotic Devices	648 (14.1)	1,900 (13.3)	2,750 (10.8)	466 (6.4)	<0.001
¹ Number of patients with at least one claim in listed procedure group (% of cohort total)					
*PPAC = Per Patient Average Cost					