Differences in Medicare Coding and Reimbursement Among Orthopedic Surgeons by Gender

Annika Narendra Hiredesai, Joyce Zhuang, Pooja Dhupati, Megan Lanelle Anderson, Conrad F Li, Jasmine K Lopez, Brooke Halpin, Sunny Vansdadia, Shelley Noland

INTRODUCTION: While gender-based discrepancies in physician income and Medicare reimbursement have been documented broadly, few studies have examined procedural and billing-level differences across surgical specialties. Orthopedic surgery, among other surgical subspecialties, boasts one of the lowest rates of female representation. This cross-sectional analysis evaluates what disparities exist among orthopedic surgeon Medicare reimbursements.

METHODS: Publicly available Medicare Fee-for-Service data from 2013 to 2021 were used to evaluate reimbursement patterns, service composition, and procedural billing. Bivariate comparisons between male and female surgeons were conducted using t-tests for continuous variables and χ^2 tests for categorical variables.

RESULTS:

Among 202,707 orthopedic surgeons, 11,562 (5.7%) were women. Although the number of female surgeons increased by 40.4% during the study period, female surgeons submitted 48.3% fewer total charges ($386,389.34[3,684.22] vs. $770,592.17[2,043.06], p<0.001) and received 44.1% less in Medicare payments ($87,054.36[775.94] vs. $159,848.86[331.61], p<0.001) annually compared with their male counterparts. These differences persisted after controlling for years in practice and excluding top 2.5% earners.

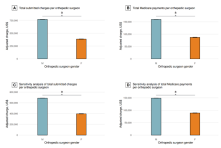
Female surgeons also billed for fewer services, treated fewer beneficiaries, and submitted fewer unique CPT codes (all p<0.001). Discrepancies in charges and payments persisted in a sensitivity analysis matching male and female surgeons by total services, number of beneficiaries, and years in practice. Multivariable linear regression showed that female orthopedic surgeons receive significantly lower payments even when controlling for practice volume and surgeon years of practice (95% CI: [-$70,222.21, -$64,187.89], p<0.001).When stratified by years of practice, gender disparities in total payments persisted across nearly all groups, with the largest adjusted disparity in surgeons with >20 years in practice (95% CI: [-$85,443, -$73,549], p<0.001).

Only 1.85% of services billed by female surgeons fell within the top Medicare reimbursement quartile, compared to 2.39% for male surgeons (p<0.001). When comparing matched procedures by CPT code, female surgeons submitted significantly lower charges and received lower payment per service. For the top 10 largest discrepancies in payments, female surgeons were reimbursed at 20.8% to 70.3% the rate of male surgeons for the same CPT code.

DISCUSSION AND CONCLUSION:

This analysis is unique in its use of service-level billing data: Aside from identifying the magnitude and significance of reimbursement disparity in orthopedics, we characterize it within differential procedural and coding patterns. These findings align with broader literature documenting income disparities between male and female physicians across specialties. Female orthopedic surgeons charge less and submit fewer charges overall. They do not participate in high-reimbursement procedures as often as male colleagues. They receive lower Medicare payments, regardless of experience or practice volume. And for each CPT code, they submit and receive less.

These results suggest differences in coding behavior and billing practices, rather than differences in clinical output, are the reason for differences in reimbursement. Such structural differences accumulate throughout a surgeon's career, resulting in an adjusted annual payment disparity exceeding $85,000 in surgeons with 20+ years of experience. Further research is warranted to ascertain the specific structural factors that contribute to this relationship – factors like referral patterns and payer bias.



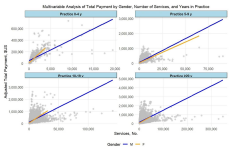


Table 1. Orthopedic Hand Surgeon Medicare Charges, Payments, and Practice Volume Metrics by Gender From 2013 to 2021

Characteristic	Female, N = 11,562[1]	Male, N = 191,145[1]	p-value[2]
Charges and payments, mean (SE)			
Total submitted charges, $	386,389.34 (3,684.22)	770,592.17 (2,043.06)	**<0.001**
Total payments, $	87,054.36 (775.94)	159,848.86 (331.61)	**<0.001**
Total standardized payments	86,983.61 (773.82)	161,299.21 (330.92)	**<0.001**
Payment-to-charge ratio	0.25 (0.00)	0.25 (0.00)	**<0.001**
Charge per service, $	584.27 (7.7)	594.34 (2.08)	0.2
Payment per service, $	112.10 (0.80)	109.41 (0.20)	**<0.001**
Geographic practice cost index	-70.75 (72.76)	1,459.36 (56.06)	**<0.001**
Practice volume, median (IQR)			
Total Services, No.	682 (254, 1,536)	1,401 (581, 2,776)	**<0.001**
Unique codes, No.	50 (33, 90)	68 (44, 94)	**<0.001**
Total Beneficiaries, No.	177 (66, 398)	290 (107, 454)	**<0.001**
Beneficiary Risk Score, mean (SE)	1.34 (0.00)	1.35 (0.00)	**<0.001**

[1] Mean (SE)
[2] Wilcoxon rank sum test

Procedure	Mean (SE), $ Female (N = 27,659)	Male (N = 715,589)	Difference, $	p-value
CPT				
Charges	1,349.46 (14.47)	2,655.52 (4.49)	−1,301.06	<0.001
Payments	295.12 (2.33)	444.84 (0.99)	−150.71	<0.001
Largest varying, CPT code (name)				
23515 (Percutaneous osteotomy(ies))	497.50 (10.00)	1812.54 (50.24)	−1,314.41	
23514 (Percutaneous osteotomy(ies))	438.46 (8.94)	1704.34 (71.50)	−1,265.87	
23470 (Arthroplasty, elbow)	1,349.46 (14.47)	2,655.52 (4.49)	−1,301.06	
22524 (Vertebroplasty)	525.76 (5)	1314.17 (88.98)	−814.39	
24430 (Open reduction & internal fixation, humerus)	73.60 (1.46)	350.99 (11.08)	−277.39	
24685 (Open treatment of ulnar fracture, proximal)	86.17 (1.72)	363.42 (11.47)	−277.25	
23505 (Open reduction & internal fixation, acromion)	236.17 (14.05)	760.65 (17.71)	−296.44	
26450 (Graft tendon transfer, hand)	395.46 (5)	619.07 (25.53)	−224.22	
22899 (Spine procedure)	225.37 (26.81)	413.29 (99.43)	−192.99	
26119 (Tissue removal, hand)	70.17 (12.31)	261.06 (12.06)	−190.91	

	Female (N = 8[illegible])	Male (N = 8[illegible])	P-value
Charges and Payments		***Mean (SD)***	
Total Submitted Charges	$ 471,181.00 (5,312.64)	$ 645,342.10 (10,791.34)	**<0.0001**
Total Payments	$ 106,744.10 (1,111.17)	$ 126,047.40 (1428.18)	**<0.0001**
Total Standardized Payments	$106,647.90 (1,108.93)	$127,699.20 (1,428.00)	**<0.0001**
Payment-to-Charge Ratio	0.251 (0.001)	0.241 (0.001)	**<0.0001**
Average Charge Per Service	$ 580.44 (8.45)	$ 703.06 (11.34)	**<0.0001**
Average Payment Per Service	$ 110.03 (1.08)	$ 124.48 (1.33)	**<0.0001**
Practice Volume		***Median (IQR)***	
Total No. of Services	979.5 (1537.75)	564 (1024.00)	0.5337
No. of Unique Codes	65 (46)	66 (48)	**0.0001**
Total No. of Beneficiaries	230 (202)	233 (214)	0.1884
Beneficiary Risk Score	1.22 (0.406)	1.233 (0.361)	0.2252