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# Declining trends in Medicare physician reimbursements for shoulder surgery from 2002 to 2018



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**Background:** As the current health care system evolves toward cost-containment and value-based approaches, evaluating trends in physician reimbursements will be critical for assessing and ensuring the financial stability of shoulder surgery as a subspecialty.

**Methods:** The Medicare Physician Fee Schedule Look-up Tool was used to retrieve average reimbursement rates for 39 shoulder surgical procedures (arthroscopy with or without repair, arthroplasty, acromioclavicular or clavicular open reduction–internal fixation, fixation for proximal humeral fracture and/or shoulder dislocation, open rotator cuff repair or tendon release and/or repair, and open shoulder stabilization) from 2002 to 2018. All reimbursement data were adjusted for inflation to 2018 dollars.

**Results:** After adjusting for inflation to 2018 dollars, average reimbursement for all included procedures decreased by 26.9% from 2002 to 2018. After stratifying the analysis by 3 distinct time groups, we observed that reimbursement decreases were the most significant prior to 2010. However, reimbursement rates still declined by an average of 2.9% from 2010 to 2014 and 7.2% from 2014 to 2018. Arthroscopic rotator cuff repair, capsulorrhaphy, and biceps tenodesis experienced smaller declines in reimbursement than their open-surgery counterparts.

**Conclusion:** Medicare physician reimbursements for shoulder surgical procedures have decreased over time. Health care policy makers need to understand the impact of decreasing reimbursements to develop agreeable financial policies that will not only ensure provider satisfaction but also maintain access to care for patients.

**Level of evidence:** Level IV; Economic Analysis

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**Keywords:** Shoulder surgery; physician reimbursements; Medicare; Physician Fee Schedule; arthroscopies; fractures; open shoulder stabilization

Medicare provides health care coverage for the elderly and individuals with known disability in the United States by reimbursing hospitals and physicians for a variety of

This economic analysis did not require ethical committee approval. Because data in the Medicare Physician Fee Schedule database are presented in a deidentified format, this study was exempt from institutional review board approval.

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services.<sup>1</sup> Owing to the country's increasing aging population, Medicare has recently been a target for rapidly changing national health care reform, sparking reimbursement models to transform from fee-for-service toward value-based approaches.<sup>19</sup> Historically, the Balanced Budget Act of 1997 and the establishment of the sustainable growth rate (SGR) resulted in significant cuts in reimbursements to all specialties. In 2002, physicians experienced an almost 5% cut as a result of the SGR formula.<sup>19</sup> More cuts followed until Congress repealed the SGR formula in favor of the Medicare Access and

CHIP Reauthorization Act (MACRA) in 2015.<sup>12</sup> MACRA aimed to increase reimbursements for potentially misvalued codes, avoided scheduled cuts to reimbursements, and provided a 0.5% increase in Medicare reimbursements through 2019.<sup>12</sup> Currently, the United States is in the beginning stages of this health care reform, so there is minimal existing literature investigating the effects that these new policies have had on physician and hospital reimbursement rates.

Rising health care costs,<sup>7</sup> increasing Medicare spending,<sup>23</sup> and rapidly changing policies spark a high level of financial uncertainty in the United States. Physician payment rates are projected to increase 13% by 2030, but this is still well below the projected 41% rate of inflation increase. Furthermore, Medicare policy changes exert substantial influence over the rates private insurers pay, impacting a broad range of health care providers.<sup>6</sup> Evaluating trends in Medicare's procedure reimbursements will be critical for assessing and ensuring the financial stability of numerous subspecialties.

The standardized and annually updated Centers for Medicare & Medicaid Services (CMS) reimbursement system can be used to analyze trends in recent years. Several recent studies have used these data to show Medicare reimbursement trends in various subspecialties including general surgery,<sup>9</sup> neurosurgery,<sup>10</sup> and orthopedics<sup>8</sup>; however, Medicare reimbursement data for shoulder surgery are poorly explored. Understanding as well as reporting on these trends is essential for the continued financial stability of surgeons and hospitals performing shoulder surgery. This study aimed to evaluate trends in Medicare physician reimbursements for 39 shoulder surgical procedures from 2002 to 2018. We also aimed to assess whether there was a significant difference in the average percentage change in reimbursement over time, reflecting the launch of health care reforms and policies.

## Materials and methods

This study was a retrospective review carried out using the Medicare Physician Fee Schedule (MPFS) database (<https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeeSchedule/index.html>). The MPFS is a comprehensive data set containing reimbursement and payment data for more than 10,000 physician services and procedures from nearly 100 Medicare payment localities across the United States. Each Current Procedural Terminology (CPT) code for a procedure has a predefined number of relative value units reflective of the physician work intensity, practice expenses, and malpractice liability associated with provision of that service. The total number of relative value units is then multiplied by a CMS conversion factor, after adjusting for the geographic practice cost index of each payment locality, to determine the final reimbursement rate. Further details about the MPFS database can be found on <https://www.cms.gov/apps/physician-fee-schedule/overview.aspx>.

The MPFS database was queried using CPT codes to retrieve average reimbursements from 2002 to 2018 for 39 shoulder surgical procedures categorized into the following groups: (1) shoulder arthroscopy without repair, (2) shoulder arthroscopy with

repair, (3) shoulder arthroplasty (hemiarthroplasty or total shoulder arthroplasty), (4) clavicular or acromioclavicular open reduction–internal fixation, (5) fixation for proximal humeral fracture and/or shoulder dislocation, (6) open rotator cuff repair (RCR) and/or tendon surgery or release, and (7) open shoulder stabilization. The choice of these procedures was based on a consensus reached by the senior authors and reflect the procedure performed or encountered by a shoulder surgeon. A complete description of included codes is shown in [Table I](#). All codes had complete reimbursement data available from 2002 to 2018, with the exception of CPT codes 29827 and 29828 (because these codes were introduced by the CMS later). For CPT code 29827, trends were evaluated from 2004–2018, and for CPT code 29828, trends were evaluated from 2008–2018. Data were gathered in 2-year intervals (2002, 2004, 2006, 2010, and so on) for ease of analysis. All reimbursement data were adjusted for inflation to 2018 dollars, using the general Consumer Price Index from the US Bureau of Labor Statistics, US Department of Labor (<https://data.bls.gov/cgi-bin/cpicalc.pl>).

## Statistical analysis

Descriptive analysis was used to report yearly changes in reimbursements (adjusted for 2018 dollars). The average percentage change in reimbursement (adjusted for inflation) from 2002 to 2018 for all 39 procedures was calculated. A linear graph was constructed to depict changes in average reimbursements for each procedure over time. A sensitivity analysis was carried out using Kruskal-Wallis tests to compare percentage changes in average reimbursement for 3 periods (2002–2010, 2010–2014, and 2014–2018). These periods were used to assess differences in reimbursement rate changes based on policy launches (ie, 2014–2018 [period of MACRA launch] and 2010–2014 [period of “Doc Fix” acts]). All statistical analysis was carried out using Microsoft Excel 2010 (Microsoft, Redmond, WA, USA).  $P < .05$  was considered statistically significant.

## Results

On the basis of the included CPT codes, a total of 39 distinct shoulder surgical procedures were retrieved from the MPFS database. After adjusting for inflation to 2018 dollars, average reimbursement for all included procedures decreased by 26.9% from 2002 to 2018 ([Table I](#)). After stratifying the analysis by 3 distinct time groups, we observed that reimbursement decreases were the largest prior to 2010 (21.4% decrease). However, reimbursement rates still declined by an average of 2.9% from 2010 to 2014 and 7.2% from 2014 to 2018 ([Table II](#)).

For shoulder arthroscopies without repair ([Fig. 1](#)), average reimbursements declined by 38.8% from 2002 to 2018. The individual reimbursement decline for each procedure was as follows: decompression of subacromial space with partial acromioplasty, with coracoacromial ligament (ie, arch) release (CPT code 29826), 82.5% decrease; partial synovectomy (CPT code 29820), 37.0% decrease; limited débridement (CPT code 29822), 35.2% decrease;

**Table I** Trends in reimbursements for common shoulder surgical procedures from 2002 to 2018

Description	2002, \$	2004, \$	2006, \$	2008, \$	2010, \$	2012, \$	2014, \$	2016, \$	2018, \$	2002-2018 difference, %
23405 Tenotomy, shoulder area; single tendon	968.84	844.53	798.80	684.32	693.78	692.26	687.26	679.13	650.05	-32.9
23406 Tenotomy, shoulder area; multiple tendons through same incision	1204.60	1058.98	1001.29	855.00	864.61	856.66	843.26	835.94	808.31	-32.9
23410 Repair of ruptured musculotendinous cuff (eg, rotator cuff) open; acute	1350.84	1206.88	1145.20	979.33	912.48	906.74	897.94	894.25	862.14	-36.2
23412 Repair of ruptured musculotendinous cuff (eg, rotator cuff) open; chronic	1426.45	1284.05	1216.66	1041.46	950.96	942.00	932.41	927.53	894.49	-37.3
23415 Coracoacromial ligament release, with or without acromioplasty	1091.03	990.24	939.39	801.87	763.02	765.12	759.79	757.36	731.76	-32.9
23420 Reconstruction of complete shoulder (rotator) cuff avulsion, chronic (including acromioplasty)	1471.37	1328.08	1261.80	1145.84	1076.96	1069.08	1059.58	1054.62	1018.01	-30.8
23430 Tenodesis of long tendon of biceps	1139.50	998.31	945.16	806.82	814.70	822.47	817.62	811.23	781.08	-31.5
23440 Resection or transplantation of long tendon of biceps	1187.97	1036.17	980.34	833.09	838.97	833.50	826.56	821.57	790.88	-33.4
23450 Capsulorrhaphy, anterior; Putti-Platt procedure or Magnuson-type operation	1429.44	1287.10	1219.02	1042.77	1053.24	1043.56	1035.83	1028.24	996.21	-30.3
23455 Capsulorrhaphy, anterior; with labral repair (eg, Bankart procedure)	1516.17	1374.39	1301.93	1109.79	1120.52	1106.23	1096.74	1088.06	1046.18	-31.0
23460 Capsulorrhaphy, anterior, any type; with bone block	1146.32	1481.37	1402.12	1201.19	1215.22	1200.64	1190.93	1187.54	1144.93	-0.1
23465 Capsulorrhaphy, glenohumeral joint, posterior, with or without bone block	1615.04	1469.99	1420.48	1222.90	1242.99	1234.04	1221.56	1211.24	1174.65	-27.3
23466 Capsulorrhaphy, glenohumeral joint, any type, for multidirectional instability	1508.64	1407.80	1338.06	1202.10	1240.80	1237.34	1226.88	1218.01	1181.93	-21.7
23470 Arthroplasty, glenohumeral joint; hemiarthroplasty	1753.66	1622.77	1544.01	1333.52	1352.76	1333.29	1321.43	1311.07	1259.27	-28.2
23472 Arthroplasty, glenohumeral joint; total shoulder (glenoid and proximal humeral replacement [eg, total shoulder])	2065.75	1930.75	1867.46	1643.64	1678.14	1651.03	1602.76	1588.61	1529.19	-26.0
23480 Osteotomy, clavicle, with or without internal fixation	1248.00	1101.32	1044.24	897.16	906.12	901.70	895.49	893.17	862.45	-30.9
23485 Osteotomy, clavicle, with or without internal fixation; with bone graft for nonunion or malunion (including obtaining graft and/or necessary fixation)	1434.09	1289.71	1223.31	1052.67	1068.57	1057.91	1044.68	1038.86	998.22	-30.4
23515 Open treatment of clavicular fracture, including internal fixation, when performed	843.63	765.63	727.41	737.54	787.79	791.71	788.12	783.22	755.55	-10.4
23530 Open treatment of sternoclavicular dislocation, acute or chronic	814.64	725.77	689.28	595.99	601.62	619.86	623.70	598.54	601.12	-26.2
23550 Open treatment of acromioclavicular dislocation, acute or chronic	833.30	744.67	709.28	617.89	627.54	626.70	624.90	612.75	590.24	-29.2
23552 Open treatment of acromioclavicular dislocation, acute or chronic; with fascial graft (including obtaining graft)	932.87	864.58	822.29	712.29	722.77	723.89	715.32	711.72	686.61	-26.4
23615 Open treatment of proximal humeral (surgical or anatomic neck) fracture, including internal fixation, when performed, and tuberosity repair, when performed	1054.41	990.37	945.57	929.87	973.20	974.22	968.02	962.40	928.88	-11.9
23616 Open treatment of proximal humeral (surgical or anatomic neck) fracture, including internal fixation, when performed, and tuberosity repair, when performed; with proximal humeral prosthetic replacement	2045.34	1966.97	1864.00	1430.12	1403.08	1376.93	1360.23	1353.05	1301.88	-36.3
23630 Open treatment of greater humeral tuberosity fracture, including internal fixation, when performed	838.56	766.11	727.94	781.44	845.09	857.30	855.53	849.83	818.69	-2.4
23660 Open treatment of acute shoulder dislocation	848.23	760.65	723.54	625.84	637.30	641.34	636.80	631.58	612.01	-27.8
23670 Open treatment of shoulder dislocation, with fracture of greater humeral tuberosity, including internal fixation, when performed	896.20	810.04	767.93	870.99	951.17	957.22	959.92	952.87	917.86	2.4
23680 Open treatment of shoulder dislocation, with surgical or anatomic neck fracture, including internal fixation, when performed	1078.73	1000.38	949.88	957.73	1017.12	1019.81	1015.78	1009.99	975.48	-9.6

(continued on next page)

**Table I** Trends in reimbursements for common shoulder surgical procedures from 2002 to 2018 (continued)

Description	2002, \$	2004, \$	2006, \$	2008, \$	2010, \$	2012, \$	2014, \$	2016, \$	2018, \$	2002-2018 difference, %
29806 Arthroscopy, shoulder, surgical; capsulorrhaphy	1399.27	1398.72	1336.51	1159.93	1180.12	1172.00	1162.03	1157.20	1114.46	-20.4
29807 Arthroscopy, shoulder, surgical; repair of SLAP lesion	1361.78	1363.38	1302.23	1130.93	1149.43	1141.73	1132.27	1129.22	1088.73	-20.1
29819 Arthroscopy, shoulder, surgical; with removal of loose body or foreign body	936.79	785.79	750.80	639.71	645.72	646.58	640.61	638.18	614.18	-34.4
29820 Arthroscopy, shoulder, surgical; synovectomy, partial	891.44	725.69	692.59	590.46	595.29	595.54	591.14	581.91	561.88	-37.0
29821 Arthroscopy, shoulder, surgical; synovectomy, complete	943.34	792.36	756.51	645.09	651.57	652.91	646.30	635.75	615.74	-34.7
29822 Arthroscopy, shoulder, surgical; débridement, limited	922.20	769.15	735.10	627.70	633.45	634.92	628.70	617.69	597.62	-35.2
29823 Arthroscopy, shoulder, surgical; débridement, extensive	984.69	1363.38	801.84	685.40	692.33	693.49	686.20	674.14	650.99	-33.9
29824 Arthroscopy, shoulder, surgical; distal claviclectomy including distal articular surface (Mumford procedure)	853.41	856.52	821.00	726.48	743.52	747.09	741.01	726.85	701.96	-17.7
29825 Arthroscopy, shoulder, surgical; with lysis and resection of adhesions, with or without manipulation	935.29	784.29	749.35	639.27	645.28	646.19	640.99	629.39	606.71	-35.1
29826 Arthroscopy, shoulder, surgical; decompression of subacromial space with partial acromioplasty, with coracoacromial ligament (ie, arch) release, when performed	1057.35	904.41	862.28	733.13	739.37	196.25	193.98	192.31	184.66	-82.5
29827 Arthroscopy, shoulder, surgical; with rotator cuff repair	—	1460.29	1409.33	1194.41	1203.97	1189.84	1177.55	1151.77	1108.93	-24.1
29828 Arthroscopy, shoulder, surgical; biceps tenodesis	—	—	—	975.29	1016.61	1017.48	1012.62	993.76	956.59	-1.9

SLAP, superior labral tear from anterior to posterior.

adhesion resection or lysis (CPT code 29825), 35.1% decrease; complete synovectomy (CPT code 29821), 34.7% decrease; removal of loose or foreign body (CPT code 29819), 34.4% decrease; extensive débridement (CPT code 29823), 33.9% decrease; and distal claviclectomy (CPT code 29824), 17.7% decrease.

For shoulder arthroscopies with repair (Fig. 2), average reimbursements declined by 16.6% from 2002 to 2018. The individual reimbursement decline for each procedure was as follows: capsulorrhaphy (CPT code 29806), 20.4% decrease; superior labral tear from anterior to posterior (SLAP) repair (CPT code 29807), 20.1% decrease; RCR (CPT code 29827), 24.1% decrease; and biceps tenodesis (CPT code 29828), 1.9% decrease.

For shoulder arthroplasties, average reimbursements declined by 27.1% from 2002 to 2018. The individual reimbursement decline for each procedure was as follows: hemiarthroplasty (CPT code 23470), 28.8% decrease, and total shoulder arthroplasty (CPT code 23472), 26.0% decrease.

For procedures involving clavicular or acromioclavicular joint repair or fixation (Fig. 3), average reimbursements declined by 26.6% from 2002 to 2018. The individual reimbursement decline for each procedure was as follows: clavicular osteotomy with or without internal fixation (CPT code 23480), 28.8% decrease; clavicular osteotomy with or without internal fixation with bone graft for nonunion or malunion (CPT code 23485), 26.0% decrease; open reduction–internal fixation for clavicular fracture (CPT code 23515), 10.4% decrease; open treatment of sternoclavicular dislocation, acute or chronic (CPT code 23530), 26.2% decrease; open treatment of acromioclavicular dislocation, acute or chronic (CPT code 23550), 29.2% decrease; and open treatment of acromioclavicular dislocation, acute or chronic, with fascial graft (CPT code 23552), 26.6% decrease.

For procedures involving fixation of proximal humeral fractures and/or shoulder dislocations (Fig. 4), average reimbursements declined by 14.3% from 2002 to 2018. The individual reimbursement changes for each procedure were as follows: open treatment of proximal humeral (surgical or anatomic neck) fracture, including internal fixation (CPT code 23615), 11.9% decrease; open treatment of greater humeral tuberosity fracture, including internal fixation (CPT code 23630), 2.4% decrease; open treatment of acute shoulder dislocation (CPT code 23660), 27.8% decrease; open treatment of shoulder dislocation, with fracture of greater humeral tuberosity, including internal fixation (CPT code 23670), 2.4% increase; open treatment of shoulder dislocation, with surgical or anatomic neck fracture fixation (CPT code 23680), 9.6% decrease; and hemiarthroplasty for proximal humeral fracture (CPT code 23616), 36.3% decrease.

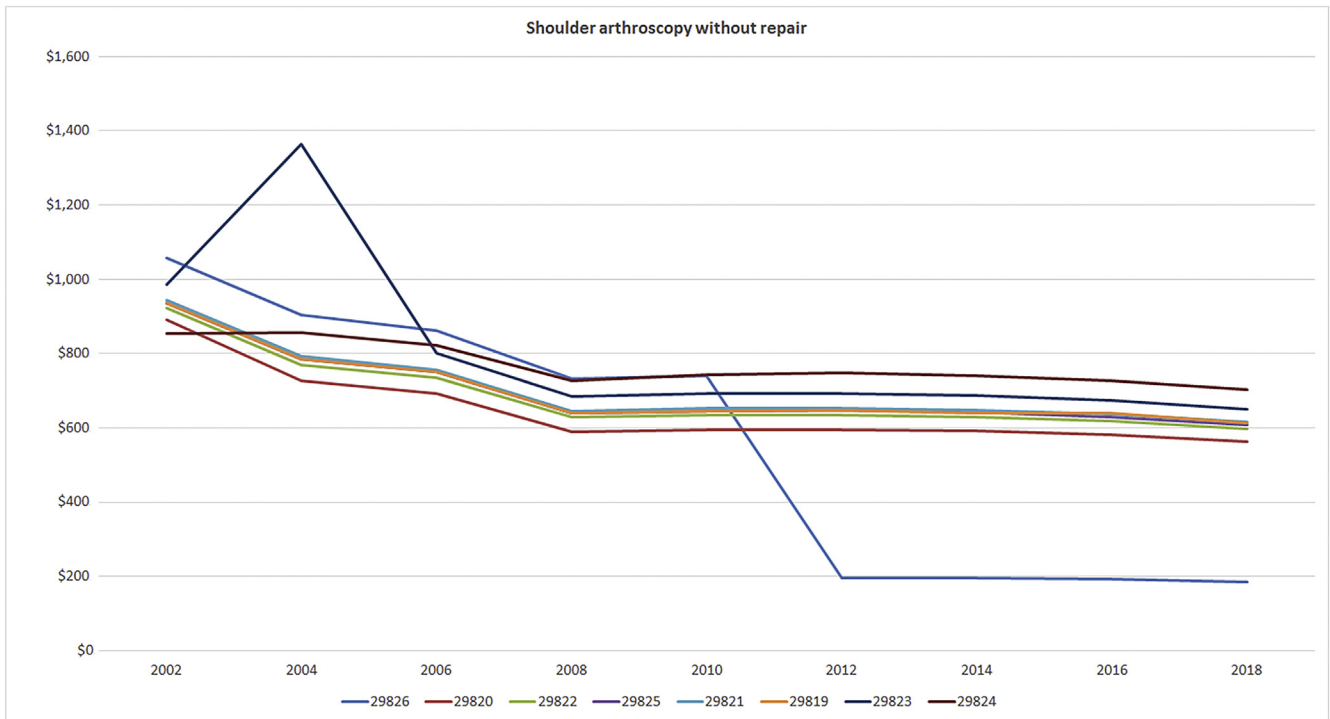
For procedures involving open RCR or open tendon release and/or repair (Fig. 5), average reimbursements declined by 33.5% from 2002 to 2018. The individual



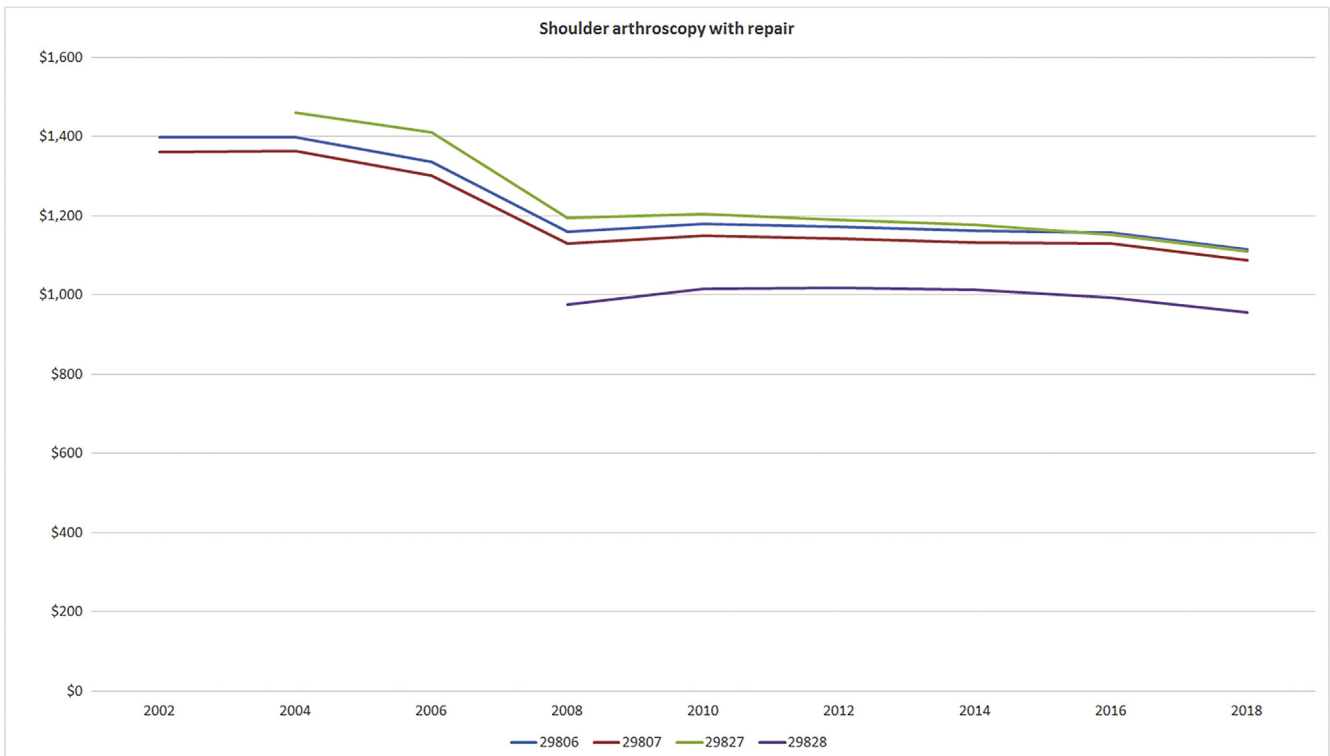
**Table II** Differences in average reimbursement change across different periods

Description	% Change up to 2010	% Change from 2010 to 2014	% Change from 2014 to 2018	P value
29819 Arthroscopy, shoulder, surgical; with removal of loose body or foreign body	-31.1	-0.8	-4.9	<.001
29820 Arthroscopy, shoulder, surgical; synovectomy, partial	-33.2	-0.7	-5.6	<.001
29821 Arthroscopy, shoulder, surgical; synovectomy, complete	-30.9	-0.8	-5.5	<.001
29822 Arthroscopy, shoulder, surgical; débridement, limited	-31.3	-0.7	-5.7	<.001
29823 Arthroscopy, shoulder, surgical; débridement, extensive	-29.7	-0.9	-6.0	<.001
29824 Arthroscopy, shoulder, surgical; distal claviclectomy including distal articular surface (Mumford procedure)	-12.9	-0.3	-5.6	<.001
29825 Arthroscopy, shoulder, surgical; with lysis and resection of adhesions, with or without manipulation	-31.0	-0.7	-6.0	<.001
29826 Arthroscopy, shoulder, surgical; decompression of subacromial space with partial acromioplasty, with coracoacromial ligament (ie, arch) release, when performed	-30.1	-73.8	-75.0	<.001
29806 Arthroscopy, shoulder, surgical; capsulorrhaphy	-15.7	-1.5	-5.6	<.001
29807 Arthroscopy, shoulder, surgical; repair of SLAP lesion	-15.6	-1.5	-5.3	<.001
29827 Arthroscopy, shoulder, surgical; with rotator cuff repair	-17.6	-2.2	-7.9	<.001
29828 Arthroscopy, shoulder, surgical; biceps tenodesis	4.2	-0.4	-5.9	<.001
23470 Arthroplasty, glenohumeral joint; hemiarthroplasty	-22.9	-2.3	-6.9	<.001
23472 Arthroplasty, glenohumeral joint; total shoulder (glenoid and proximal humeral replacement [eg, total shoulder])	-18.8	-4.5	-8.9	<.001
23616 Open treatment of proximal humeral (surgical or anatomic neck) fracture, including internal fixation, when performed, and tuberosity repair, when performed; with proximal humeral prosthetic replacement	-31.4	-3.1	-7.2	<.001
23480 Osteotomy, clavicle, with or without internal fixation	-27.4	-1.2	-4.8	<.001
23485 Osteotomy, clavicle, with or without internal fixation; with bone graft for nonunion or malunion (including obtaining graft and/or necessary fixation)	-25.5	-2.2	-6.6	<.001
23515 Open treatment of clavicular fracture, including internal fixation, when performed	-6.6	0.0	-4.1	<.001
23530 Open treatment of sternoclavicular dislocation, acute or chronic	-26.1	3.7	-0.1	<.001
23550 Open treatment of acromioclavicular dislocation, acute or chronic	-24.7	-0.4	-5.9	<.001
23552 Open treatment of acromioclavicular dislocation, acute or chronic; with fascial graft (including obtaining graft)	-22.5	-1.0	-5.0	<.001
23615 Open treatment of proximal humeral (surgical or anatomic neck) fracture, including internal fixation, when performed, and tuberosity repair, when performed	-7.7	-0.5	-4.6	<.001
23630 Open treatment of greater humeral tuberosity fracture, including internal fixation, when performed	0.8	1.2	-3.1	<.001
23660 Open treatment of acute shoulder dislocation	-24.9	-0.1	-4.0	<.001
23670 Open treatment of shoulder dislocation, with fracture of greater humeral tuberosity, including internal fixation, when performed	6.1	0.9	-3.5	<.001
23680 Open treatment of shoulder dislocation, with surgical or anatomic neck fracture, including internal fixation, when performed	-5.7	-0.1	-4.1	<.001
23410 Repair of ruptured musculotendinous cuff (eg, rotator cuff) open; acute	-32.5	-1.6	-5.5	<.001
23412 Repair of ruptured musculotendinous cuff (eg, rotator cuff) open; chronic	-33.3	-2.0	-5.9	<.001
23415 Coracoacromial ligament release, with or without acromioplasty	-30.1	-0.4	-4.1	<.001
23420 Reconstruction of complete shoulder (rotator) cuff avulsion, chronic (including acromioplasty)	-26.8	-1.6	-5.5	<.001
23430 Tenodesis of long tendon of biceps	-28.5	0.4	-4.1	<.001
23440 Resection or transplantation of long tendon of biceps	-29.4	-1.5	-5.7	<.001
23405 Tenotomy, shoulder area; single tendon	-28.4	-0.9	-6.3	<.001
23406 Tenotomy, shoulder area; multiple tendons through same incision	-28.2	-2.5	-6.5	<.001
23450 Capsulorrhaphy, anterior; Putti-Platt procedure or Magnuson-type operation	-26.3	-1.7	-5.4	<.001
23455 Capsulorrhaphy, anterior; with labral repair (eg, Bankart procedure)	-26.1	-2.1	-6.6	<.001
23466 Capsulorrhaphy, glenohumeral joint, any type, for multidirectional instability	-17.8	-1.1	-4.7	<.001
23465 Capsulorrhaphy, glenohumeral joint, posterior, with or without bone block	-23.0	-1.7	-5.5	<.001
23460 Capsulorrhaphy, anterior, any type; with bone block	6.0	-2.0	-5.8	<.001

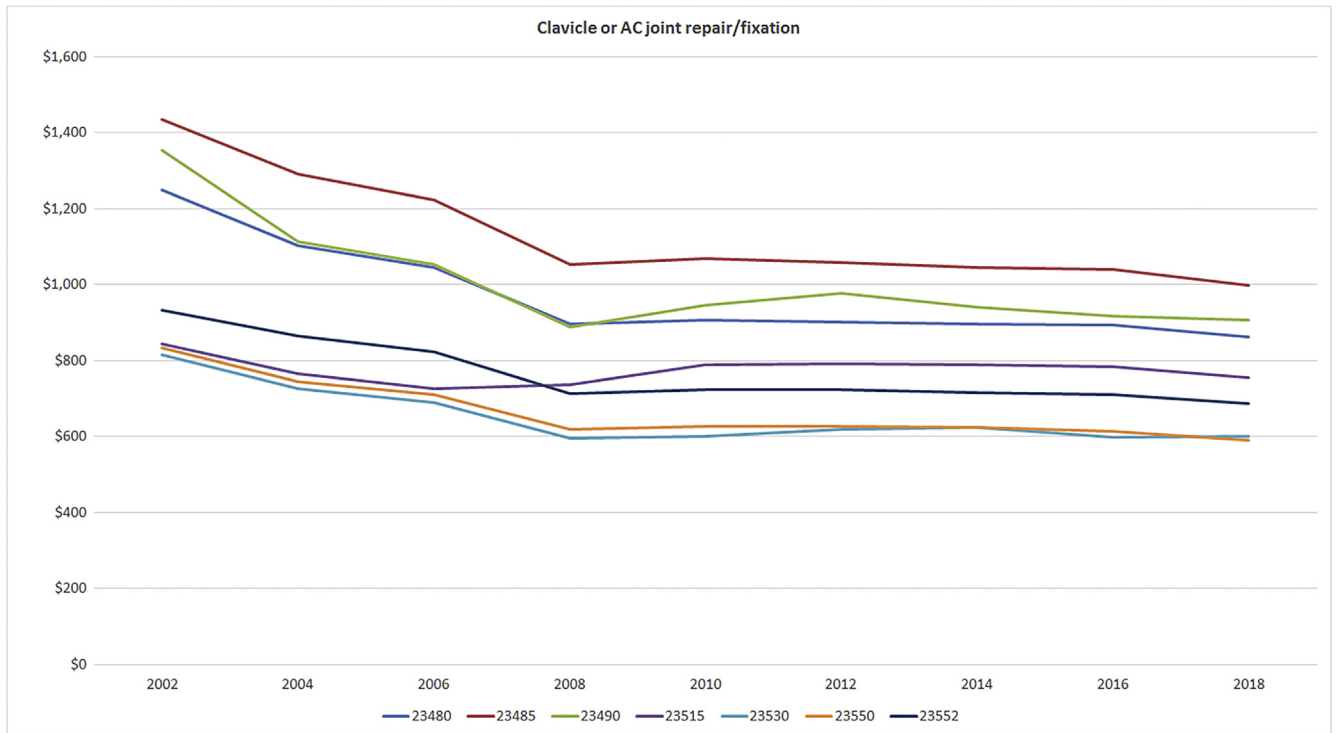
SLAP, superior labral tear from anterior to posterior.



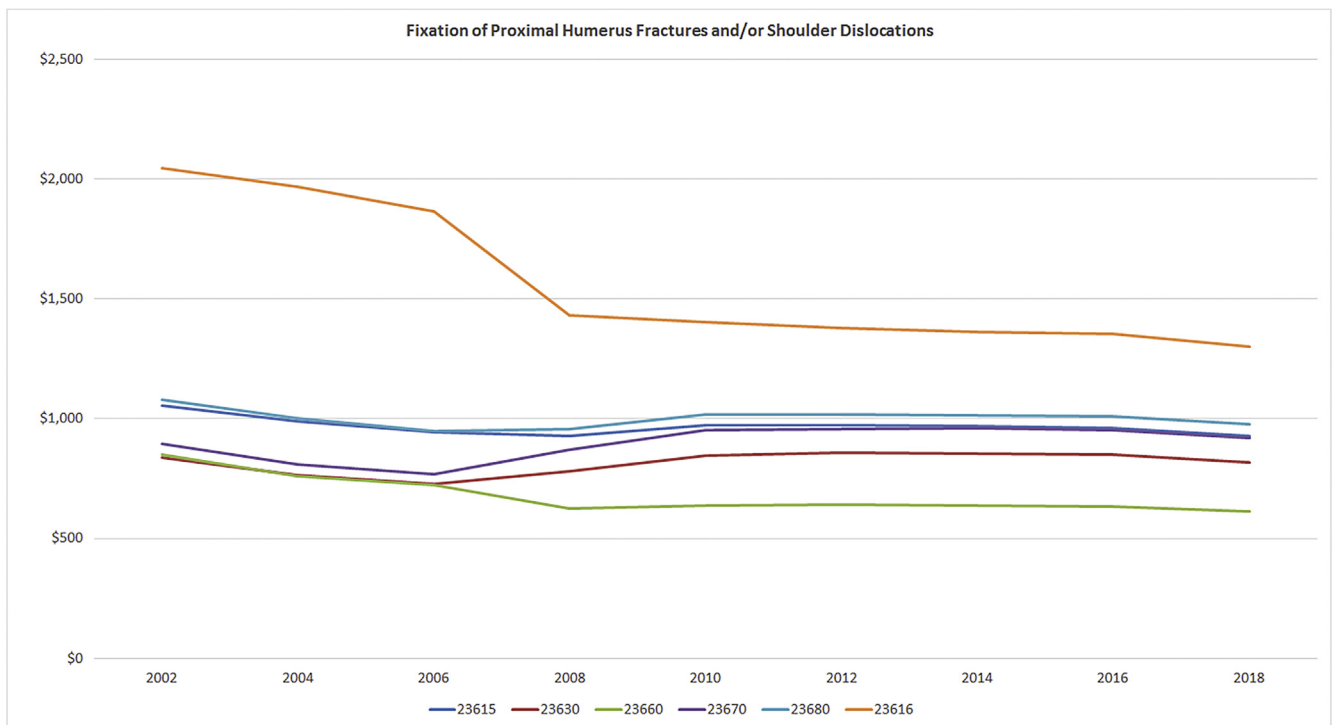
**Figure 1** Trends in average reimbursements for shoulder arthroscopies without repair from 2002 to 2018.



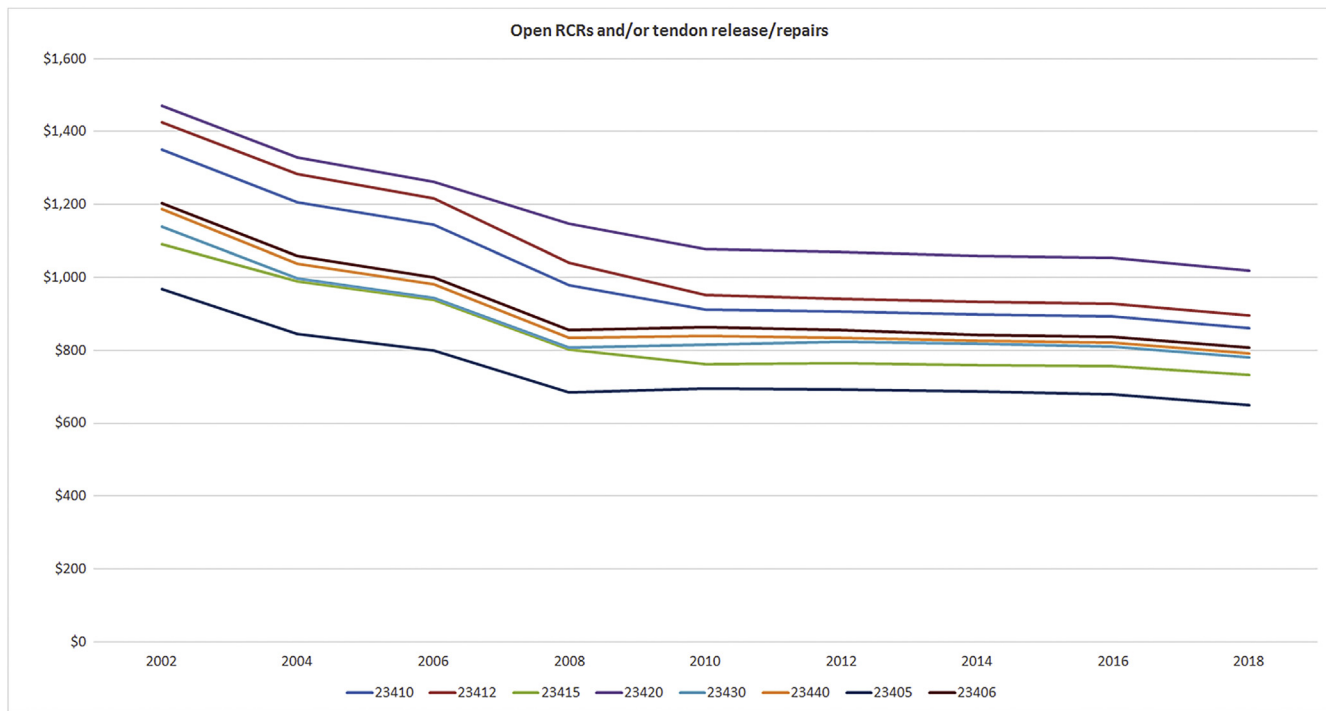
**Figure 2** Trends in average reimbursements for shoulder arthroscopies with repair from 2002 to 2018.



**Figure 3** Trends in average reimbursements for clavicular or acromioclavicular (AC) joint repair or fixation from 2002 to 2018.



**Figure 4** Trends in average reimbursements for fixation of proximal humeral fractures and/or shoulder dislocations from 2002 to 2018.



**Figure 5** Trends in average reimbursements for open rotator cuff repair (RCR) or open tendon release and/or repair from 2002 to 2018.

reimbursement changes for each procedure were as follows: open RCR for acute tear (CPT code 23410), 36.2% decrease; open RCR for chronic tear (CPT code 23412), 37.3% decrease; coracoacromial ligament release, with or without acromioplasty (CPT code 23415), 32.9% decrease; reconstruction of complete shoulder (rotator) cuff avulsion, chronic (including acromioplasty) (CPT code 23420), 30.8% decrease; open biceps tenodesis (CPT code 23430), 31.5% decrease; resection or transplantation of long tendon of biceps (CPT code 23440), 33.4% decrease; tenotomy of single tendon (CPT code 23405), 32.9% decrease; and tenotomy of multiple tendons through same incision (CPT code 23406), 32.9% decrease.

For procedures involving open shoulder stabilization (Fig. 6), average reimbursements declined by 22.1% from 2002 to 2018. The greatest decrease was noted for anterior capsulorrhaphy with the Putti-Platt or Magnuson procedure (CPT code 23450, 30.3% decrease) or anterior capsulorrhaphy with labral repair (eg, Bankart procedure) (CPT code 23455, 31.0% decrease), followed by posterior capsulorrhaphy of the glenohumeral joint (CPT code 23465, 27.3% decrease), capsulorrhaphy of any type for multidirectional instability (CPT code 23466, 21.7% decrease), and anterior capsulorrhaphy with bone block (CPT code 23460, 0.1% decrease).

It is interesting to note that arthroscopic RCRs experienced a 24.1% decrease in reimbursements whereas open RCRs experienced a 36%–37% decrease. Similarly, arthroscopic shoulder capsulorrhaphy experienced a 15.7%

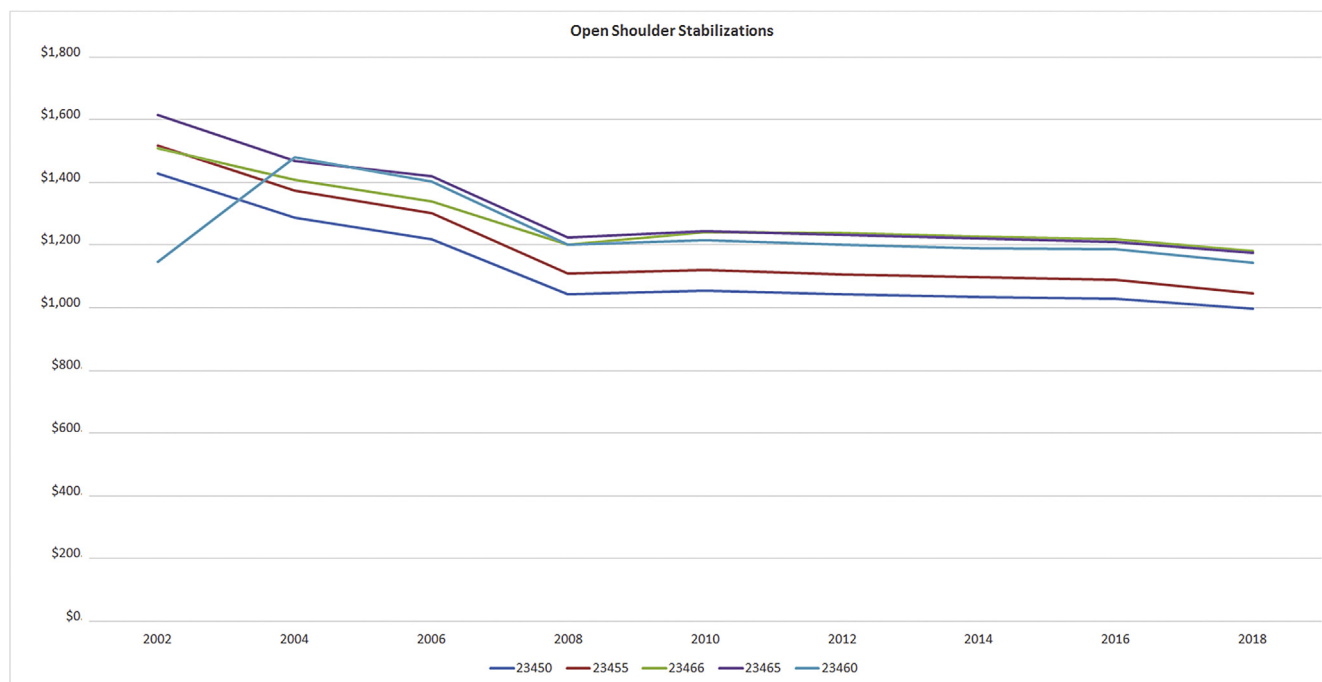
decrease, whereas open shoulder stabilization procedures experienced, on average, a 17.4% decrease. Arthroscopic biceps tenodesis experienced a 1.9% decrease, whereas reimbursements for open biceps tenodesis declined by 31.5%.

## Discussion

Surgical health care delivery costs are rising, pressuring hospitals to improve operational and financial efficiency while maintaining high-quality care.<sup>22</sup> Understanding the relationship between changes in Medicare reimbursement rates, Consumer Price Index increases, and growing physician expenses plays a fundamental part in maintaining the financial success and growth of shoulder surgery looking ahead. Using national MPFS data, our study showed that reimbursement rates for shoulder surgical procedures actually declined by an average of 26.9% from 2002 to 2018. The most significant decline was noted prior to 2010 (average decrease of 21.4%). From 2010 to 2014, reimbursement rates decreased by an average of 2.9%, and after the launch of MACRA in 2015, they fell again, by an average of 7.2%.

Implications of the study results can play an important role moving forward. Federally funded programs such as Medicare continue to comprise a larger portion of the overall health insurance market share each year, especially as the percentage of elderly persons in the United States increases.<sup>14</sup> Changes in Medicare impact policies and





**Figure 6** Trends in average reimbursements for open shoulder stabilization from 2002 to 2018.

reimbursement rates implemented by private insurers,<sup>6</sup> and this impact may propagate alongside Medicare's increasing claim of the market. Declining Medicare physician reimbursement rates for shoulder surgery may signify widespread consequences for orthopedic surgeons across the country.

Historical congressional policies accounted for much of the shoulder surgery reimbursement rate decline throughout the study period. In an attempt to establish an anonymous entity responsible for preventing excessive government expenditures on Medicare, the Balanced Budget Act of 1997 introduced the SGR formula to assist the CMS in determining reimbursement rates for the federally funded program.<sup>3</sup> Adjustments to reimbursement rates were set based on the prior year's expenditure. For example, when spending surpassed the yearly budget, reimbursement rates would decrease the following year. The SGR initially provided physician payment increases; however, in 2002, the SGR resulted in a significant 5% cut to Medicare reimbursements, which sparked controversy in the health care industry.<sup>19</sup> Because of the fear that physician participation in Medicare and participant access to care would both decline, numerous other scheduled cuts were overridden by Congress, referred to as "Doc Fix" acts.<sup>21</sup> The Doc Fix acts served as yearly solutions to temporarily ensure that physician payments did not decline rapidly without having to pass expensive new legislation through Congress. The lasting effects of the SGR cuts may explain the more rapid decline in shoulder surgery rates seen in our study from 2002 through 2010.

To repeal and replace the SGR, President Obama signed MACRA into action in 2015, which avoided massive cuts and stabilized reimbursements.<sup>12</sup> From the bill's initiation until 2019, a yearly 0.5% increase in reimbursement rates was set to take place, which halted rapid declines brought forth by the SGR. Despite the bill's attempt to prevent the drop, our preliminary results show an average 7.2% decline in reimbursement rates between 2014 and 2018 (during the period of implementation of MACRA). To understand the long-term impacts of this legislation, more data are required. The enactment of MACRA, nonetheless, contributed to the relative stabilization of reimbursement rates seen in the latter half of our analysis. Moreover, MACRA provided flexible payment options for physicians taking care of Medicare beneficiaries. Financial incentives are offered to physicians to join alternative payment models or to score well using the Merit-based Incentive Payment System.<sup>24</sup> Looking forward, it is less clear how Medicare reimbursement rates will adjust over time, but hospitals and physicians must understand the new policy to deliver high-value care and maximize revenue.

Other investigators have identified similar monetary trends to our results. Two studies by Haglin et al<sup>9,10</sup> described similar reimbursement declines in general surgery and neurosurgery, with a more rapid decline in the early 2000s. An analysis of orthopedic surgery rates also indicated Medicare payout declines throughout the field, with shoulder arthroscopy experiencing one of the largest reimbursement declines of any orthopedic procedure.<sup>8</sup> In addition, Hasty et al<sup>11</sup> identified an increasing

charge-to-reimbursement ratio regarding surgical management of proximal humeral fractures; however, other elective shoulder procedures not analyzed. Despite the increasing prevalence of shoulder procedures,<sup>13,25</sup> there is a paucity of studies that specifically look at Medicare reimbursement trends for major shoulder surgical procedures performed in the United States.

Our study demonstrated the first Medicare reimbursement trend analysis for shoulder operations, corrected for inflation. The large decline in rates for all 39 shoulder procedures over the 17-year period highlights the importance of paying attention to these trends over time. With increasing surgical expenses, a further decline in Medicare reimbursement rates may warrant additional policy changes to ensure the financial success of practices and hospitals performing shoulder operations, especially if private payers follow Medicare's lead. One must also consider the possibility that the decreasing reimbursement rates were necessary to correct for previous overpaying,<sup>9</sup> but such claims require further investigation.

Despite the large impact of MACRA on Medicare reimbursement rates, shoulder surgeons must adapt to the new policy. Many institutions developed methods for improving operating-room efficiency prior to MACRA.<sup>2,16,20</sup> One such method includes a framework for operational analysis and financial improvement to account for the new alternative payment models. This approach by Tayne et al<sup>22</sup> targets improvements in ambulatory surgery centers as a source of financial stability for surgical subspecialties such as orthopedics at academic medical centers. However, different approaches may be necessary in different practice settings. Specifically, regarding shoulder surgery, there is considerable room to minimize costs and maximize the value of health care delivery. Although the value of some shoulder procedures since the enactment of MACRA has been studied,<sup>4,15,18</sup> more shoulder procedures must be investigated under the context of current policies. Black et al<sup>5</sup> stated that shoulder surgeons can advance value-based practices through 3 actions: universally reporting outcomes and costs, integrating shoulder care across provider specialties, and critically analyzing data to formulate best practices. Some groups have even started to take initiative; the American Shoulder and Elbow Surgeons recently incorporated a value-based shoulder and elbow care committee to help adapt to the modern climate.

The reorganization of Medicare payment models is in its beginning stages, so further research is needed to better understand the financial state of shoulder surgery in the future. It is worth noting that many different payers exist in the health care market today and, therefore, analysis of the private market is also necessary to achieve a broader understanding of reimbursement trends for shoulder procedures. Enrollment in private health insurance plans continues to rise among Medicare beneficiaries.<sup>17</sup> Nevertheless, Medicare plays a critical and influential role in the finances of the US health care system, so the findings reported in this study will be advantageous to policy makers, hospital

leaders, and shoulder surgeons to understand and address the decreasing reimbursement rates.

This study comes with limitations. First, only Medicare reimbursement rates were included in the analysis, and any trends in private insurer reimbursements were not identified. However, changes to federally funded programs such as Medicare do have a substantial influence on the private market. Second, reimbursement rates were accessed through the CMS website and reported as an average; therefore, differences in trends based geographic location could not be evaluated. However, averaging reimbursements across the country allows for a large-scale analysis that may help influence health care policy at the national level. Finally, data were only collected from 2002 to 2018. As previously described, the trends identified within this time range were largely determined by policies such as the SGR and MACRA. Uncertainty in the political changes to come complicates the ability to predict future trends in physician reimbursements for shoulder surgery.

## Conclusion

After adjusting for inflation, Medicare physician reimbursements for shoulder surgical procedures have decreased over time. Health care policy makers need to understand the impact of decreasing reimbursements and develop agreeable reimbursement policies that will not only ensure provider satisfaction but also maintain access to care for patients.

## Disclaimer

The authors, their immediate families, and any research foundations with which they are affiliated have not received any financial payments or other benefits from any commercial entity related to the subject of this article.

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