JOINTS 2026; 4: e1898

Category: Original Article

PATIENTS WITH MEDICARE OR MEDICAID INSURANCE HAVE SIMILAR OUTCOMES COMPARED WITH PRIVATE INSURANCE FOLLOWING REVERSE TOTAL SHOULDER ARTHROPLASTY

G.R. JACKSON[1], D.J. KAPLAN[2], C.M. BRUSALIS[3], C.M. MOWERS[1], F. FAMILIARI[4,5], C. DONLEY[6], R. SAAD BERRETA[1], N.N. VERMA[1]

• • •

[1]Department of Orthopedic Surgery, Rush University Medical Center, Chicago, IL, USA
[2]Department of Orthopedic Surgery, New York University Langone Health, New York, NY, USA
[3]Hospital for Special Surgery, New York, NY, USA
[4]Department of Orthopedic and Trauma Surgery, Magna Graecia University, Catanzaro, Italy
[5]Research Center on Musculoskeletal Health, MusculoSkeletalHealth@UMG, Magna Graecia University, Catanzaro, Italy
[6]Department of Orthopedic Surgery, HCA JFK/University of Miami, Miami, FL, USA

Corresponding Author
Nikhil N. Verma, MD; e-mail: nikhil.verma@rushortho.com

ABSTRACT – *Objective:* In recent years, reverse total shoulder arthroplasty (rTSA) has been increasingly indicated for a variety of shoulder pathologies. Multiple factors have been identified in the previous literature as influencing outcomes following RSA; however, it is uncertain whether patients with Medicare/Medicaid have suboptimal outcomes following rTSA. Disparities in outcomes for patients with Medicare/Medicaid have been identified across several other orthopedic conditions; therefore, the purpose of this study was to examine patient-reported outcomes (PROs) and range of motion (ROM) following rTSA.

Patients and Methods: All patients who underwent rTSA for rotator cuff arthropathy from 2011 to 2020 were retrospectively identified through an institutional database. Patients with Medicaid/Medicare were propensity-matched to patients with private insurance. PROs, including the Functional Outcome Score, Visual Analog Pain Scale (VAS), Simple Shoulder Test (SST), American Shoulder and Elbow Surgeon score (ASES), and ROM, were measured preoperatively, and at a minimum of 2 years postoperatively. Appropriate statistical analyses were conducted with an alpha value of 0.05 set as a significance level.

Results: Sixty-one Medicare/Medicaid and sixty-one privately insured patients (n = 122) were analyzed. Mean duration of follow-up for patients with Medicare/Medicaid and private insurance was 42.4 ± 15.7 months and 44.6 ± 17.6 months, respectively (p = 0.524). No difference in PROs or ROM was found between the two groups. Additionally, no significant differences in revision rates were observed between the two cohorts (p = 0.648).

Conclusions: Patients who underwent rTSA with Medicare/Medicaid insurance had similar two-year postoperative clinical outcomes scores, shoulder range of motion, and revision rates compared to a propensity-matched group of patients with private insurance.

KEYWORDS: Reverse total shoulder arthroplasty, Insurance type, Patient-reported outcomes, Functional outcomes, Complications, Medicaid, Medicare, Private insurance.

INTRODUCTION

Reverse total shoulder arthroplasty (rTSA) has substantially increased in popularity in recent years, due in part to its advantageous biomechanics allowing for treatment of challenging conditions that anatomic TSA (aTSA) could not address[1]. Such conditions include rotator cuff tear arthropathy, proximal humerus fracture, and glenohumeral arthritis with significant deformity; all of which may be more common in an older population[2-5]. While a myriad of factors have been found to affect outcomes following rTSA[6-11], the role of insurance type (private *vs.* Medicare/Medicaid) may play an underappreciated part.

Insurance status is an essential consideration in healthcare, as it may influence access to care, quality of care, and financial burden on patients and healthcare providers alike[12,13]. This is particularly relevant in patients indicated for rTSA, given their relatively older age and their commensurate higher probability of being on Medicare. Prior studies[14,15] have demonstrated a disparity in outcomes for several surgical procedures between those with public and those with private insurance; however, the role of insurance type in affecting outcomes, including patient-reported outcomes (PROs), range of motion (ROM), and revision rate, following rTSA has not been fully elucidated. One previous study[16] did assess the role of insurance type on shoulder arthroplasty outcomes, but this was based on a heterogeneous sample, including several shoulder arthroplasty procedures, including hemi, aTSA, rTSA, and revisions, as well as multiple surgeons.

Therefore, the purpose of this study was to compare patient-reported outcomes and range of motion following reverse total shoulder arthroplasty in patients with Medicare/Medicaid *vs.* patients with private insurance. The hypothesis was that patients with private insurance would have significantly higher PROs and better ROM, with lower rates of revision relative to those with public insurance.

PATIENTS AND METHODS

Patient Selection

With Institutional Review Board approval (#21070602), all patients who underwent rTSA for rotator cuff arthropathy from February 2008 to November 2020 at a single institution were retrospectively identified through a prospectively collected database. Patients were separated into two cohorts based on insurance status: (1) Medicare or Medicaid insured, or (2) privately insured. Patients with Medicaid or Medicare were propensity-matched based on sex and body mass index (BMI) to patients with private insurance. Inclusion criteria involved patients who were 18 years or older and had undergone primary rTSA and completed PRO data at a minimum 2-year follow-up. Patients were excluded if their medical records reported any of the following: (1) history of ipsilateral humerus fractures, (2) ipsilateral humeral head avascular necrosis, (3) active infections, (4) history of cancer or systemic inflammatory diseases, (5) patients less than 18 years of age, or (6) patients with less than a 2-year follow-up.

Patient Evaluation and Data Analysis

Patient demographics included age, sex, body mass index (BMI), laterality of affected shoulder, time to follow-up, and comorbidities, including smoking and diabetes, which were collected from electronic patient medical records. Patient-reported outcomes, including the Functional Outcome Score, Visual Analogue Pain Scale (VAS), Simple Shoulder Test (SST), American Shoulder and Elbow Surgeons score (ASES), and active shoulder range of motion (ROM) with forward elevation and external rotation, were measured preoperatively and at a minimum of 2 years postoperatively.

Surgical Procedure and Patient Follow-Up

Two fellowship-trained orthopedic shoulder surgeons performed all rTSA procedures. The surgeons followed the techniques recommended by the manufacturers of the specific implants they used. Tranexamic acid was administered to each patient who did not possess contraindications. A standard deltopectoral approach was performed in each case, and subscapularis management varied according to surgeon preference, including use of a lesser tuberosity osteotomy and subscapularis peel. Prior literature[17,18] has shown equivalent clinical outcomes regardless of the specific method of subscapularis management.

Following surgery, patients were placed in an abduction shoulder immobilizer for 4-6 weeks, followed by an individualized rehabilitation protocol that allowed for a progressive return to functional activities. Patients were followed with routine in-office visits at 2 weeks, 6 weeks, 3 months, 6 months, 1 year, and 2 years postoperatively. PROs were collected preoperatively, at 6 months, 1 year, and 2 years postoperatively.

Statistical Analysis

Descriptive statistics were employed to present the demographic characteristics of the patient cohorts. Categorical variables were expressed as counts accompanied by percentages, while continuous variables were presented as mean ± standard deviation. To assess differences between the cohorts in terms of continuous and categorical variables, two-sided Student's *t*-tests and Chi-squared tests were utilized, respectively. The significance level was set at a two-sided alpha level of $p < 0.05$. All statistical analyses were conducted using R software (Vienna, Austria).

RESULTS

Patient Demographics

A total of 609 patients were initially identified through the retrospective database. 242 patients were excluded for prior ipsilateral shoulder surgery, 140 for a follow-up less than 2 years, 88 with a history of cancer, and 17 with a history of systemic inflammatory disease. A total of 122 patients (n=61 Medicare/Medicaid, n=61 private insurance) ultimately met the inclusion/exclusion criteria and were included in the final analysis. Each group consisted of 22 males and 39 females (Table 1). In the Medicare/Medicaid insured cohort, the mean age of patients was 74.1 ± 6.2 years (range, 63-86 years), and the privately insured patients had a mean age of 64.6 ± 8 years (range 50-86 years) ($p < 0.0001$). Mean duration of follow-up for Medicare/Medicaid and privately insured patients was 42.4 ± 15.7 months (range 24.1-98.7 months) and 44.6 ± 17.6 months (range 24-99.2 months), respectively. The mean BMI in the Medicare/Medicaid group was 30.9 ± 6.5 (range, 19-52.3) and 30.4 ± 7.1 (18.5 ± 48.9) in the privately insured group. No significant differences were found with respect to mean follow-up, BMI, laterality of the affected shoulder, or comorbidities[19,20].

Table 1. Patient demographics.

	Medicare/Medicaid (N=61)	Private (N=61)	*p*
Sex (M/F)	22/39	22/39	—
Age, yr	74.1 ± 6.2 (63-86)	64.6 ± 8 (50-86)	**< 0.0001**
Mean follow-up, mo	42.4 ± 15.7 (24.1-98.7)	44.6 ± 17.6 (24-99.2)	0.524
BMI	30.9 ± 6.5 (19-52.3)	30.4 ± 7.1 (18.5 ± 48.9)	0.674
Dominant side affected, (%)	37 (60.7)	33 (54.1)	0.464
Diabetes, (%)	7 (11.5)	6 (9.8)	0.769
History of smoking, (%)	8 (13.1)	8 (13.1)	—

M, male; F, female; BMI, body mass index; yr, year; mo, month.

Patient-Reported Outcome Scores

Forward elevation and external rotation improved postoperatively in both groups (all, $p < 0.0001$) (Table 2). No difference in PROs or ROM was found between the two groups, including functional outcome score ($p = 0.436$), VAS ($p = 0.605$), SST ($p = 0.48$), ASES ($p = 0.746$), active forward elevation ($p = 0.73$), and active external rotation ($p = 0.923$) (Table 3).

Table 2. Preoperative and postoperative patient-reported outcomes and range of motion.

Outcome	Medicare/Medicaid (N = 61)			Private (N = 61)		
	Pre-operative	Post-operative	*p*	Pre-operative	Post-operative	*p*
Functional outcome score	8.9 ± 5.9	21.1 ± 7.2	**< 0.0001**	8.9 ± 4.4	20 ± 7.3	**< 0.0001**
VAS	5.1 ± 2.8	0.9 ± 1.7	**< 0.0001**	5.4 ± 2.5	1.4 ± 2	**< 0.0001**
SST	2.8 ± 2.7	8.3 ± 2.9	**< 0.0001**	3 ± 2.2	8.1 ± 3.3	**< 0.0001**
ASES	39.1 ± 19.8	79 ± 17.5	**< 0.0001**	38.1 ± 15.9	76.5 ± 19.5	**< 0.0001**
Forward elevation	73.5° ± 29.4°	139.4° ± 22.4°	**< 0.0001**	80.5° ± 32.6°	130.5° ± 35.5°	**< 0.0001**
External rotation	21.5° ± 17.9°	44.3° ± 15.3°	**< 0.0001**	23.7° ± 22.1°	46.5° ± 17.7°	**< 0.0001**

VAS, Visual Analogue pain Scale, SST, Simple Shoulder Test; ASES, American Shoulder and Elbow Surgeons.

Table 3. Change in preoperative to postoperative patient-reported outcomes and range of motion.

Outcome	Medicare/Medicaid (N=61)	Private (N=61)	*p*
Δ Functional outcome score	12.1 ± 9.5	11.1 ± 7.4	0.436
Δ VAS	-4.3 ± 3.1	-4 ± 2.9	0.605
Δ SST	5.5 ± 3.9	5 ± 3.9	0.48
Δ ASES	39.9 ± 26.6	38.4 ± 23	0.746
Δ Forward elevation	66° ± 37.3°	53.4° ± 36.2°	0.073
Δ External rotation	22.4° ± 17.7°	21.9° ± 24.8°	0.923

VAS, Visual Analogue pain Scale, SST, Simple Shoulder Test; ASES, American Shoulder and Elbow Surgeon.

Revision Rate

Two patients (3.3%) with Medicare/Medicaid required revision rTSA compared to three patients (4.9%) with private insurance ($p = 0.648$).

DISCUSSION

The most important findings from the current study include that patients with Medicare or Medicaid insurance had comparable two-year clinical postoperative outcomes scores, shoulder range of motion, and revision rate when measured against a propensity-matched group of patients with private insurance that underwent rTSA. Therefore, the study hypothesis was rejected. Results of this study suggest insurance type may not be a significant factor influencing rTSA outcomes and that patients with Medicare or Medicaid insurance may expect similar postoperative improvements in pain relief, functional capacity, and range of motion compared to their privately insured counterparts.

Results of the present study suggest patients with public insurance can have similar PROs to those with private insurance following rTSA. Interestingly, while this did not reach significance, patients with public insurance did as well or slightly better in each PRO category and had a lower revision rate than the private cohort. This is similar to results found in a 2021 study by Sabesan et al[16], which also found that insurance type did not affect PROs in a heterogeneous cohort of patients undergoing several types of shoulder arthroplasty procedures, including hemi, aTSA, rTSA, and revisions. The current study's larger and more homogenous population further supports the principle that, in rTSA specifically, insurance type does not

affect outcomes. Conversely, several prior studies have found discrepancies in healthcare outcomes between patients with public and private insurance following surgical procedures. LaPar et al[14] compared outcomes based on insurance type for several types of major surgical procedures (not including shoulder arthroplasty) and found that patients with Medicaid coverage had significantly worse PROs and increased mortality compared to patients with Medicare or private insurance. The separation of Medicare and Medicaid-insured patients into two distinct groups in this study may explain the difference between their results and those of the current study. Based on the available evidence, it does appear that PROs following rTSA are unaffected by insurance type, but this does not necessarily extend to other surgical procedures.

Range of motion was also found not to be significantly affected by insurance type. Both private and publicly-insured patients made significant improvement in both forward elevation and external rotation. Interestingly, despite starting with worse preoperative forward elevation, the publicly-insured patients had non-significantly higher forward elevation at final follow-up. Postoperative range of motion based on insurance type has not been previously reported, so unfortunately, the results of the current study cannot be placed in the context of existing literature. However, 2-year postoperative ROM of the current study is similar to those reported in other investigations[21,22] of rTSA, providing validity to the present findings.

Revision rates were also similar between public and privately insured cohorts; however, due to the low rate of revision, the study is likely underpowered to detect a difference. Despite this, the publicly insured group did have a lower absolute revision rate. Similar to ROM, no prior evidence exists comparing revision rates by insurance type, precluding direct comparisons; however, the overall revision rates reported in the current study are similar to those reported in other rTSA investigations[23]. Though not looking at rTSA, a study by Feng et al[24] evaluating the effects of insurance type on total knee arthroplasty outcomes similarly found that insurance type did not significantly affect complication or revision rates. Though follow-up is limited to two years in the current study, these results do suggest that revision rates may not be affected by insurance type, at least in the short term.

In contrast to the study's hypothesis, insurance type did not affect any of the outcomes assessed, including PROs, ROM, and revision rate. Concern about potentially worse outcomes in publicly insured patients is based on both access to care and the quality of care. In the current study, the same physician performed all procedures, limiting variability in the quality of the procedure; however, this does not necessarily extend to perioperative care. Patients with public insurance may have more difficulty initially receiving care, and then may have more difficulty with postoperative management, including attending routine physical therapy. One potential explanation for the lack of difference between groups in outcomes could be due to the lesser postoperative care required by rTSA patients compared to other surgical procedures. Unlike rotator cuff repair or anterior cruciate ligament reconstruction, physical therapy (PT) is not as paramount following rTSA. A recent multi-center randomized controlled trial by Chalmers et al[25] found that supervised PT did not improve outcomes following rTSA. It is therefore reasonable that if the surgeon and surgery are similar, and the postoperative rehabilitation can be performed unsupervised (e.g., a home exercise program), then the type of insurance would not affect outcomes.

As the aging population grows and the occurrence of these debilitating shoulder conditions increases, it becomes increasingly important to understand the role of insurance providers and how they contribute to rTSA outcomes. By examining potential disparities in rTSA outcomes between Medicare/Medicaid-insured and privately insured patients, the study aimed to provide valuable insights for medical professionals, legislators, and patients alike. Based on the results of the current study, providers and patients may expect similarly strong outcomes whether they have public or private insurance.

Limitations

The results of this study must be understood through the context of its limitations. While similar in nature, insurance type is not completely analogous to socioeconomic status (SES). Importantly, SES has been shown to play an integral role in how patients may access, including preoperative interventions and postoperative rehabilitation services. These can have a direct impact on the patient's recovery and overall functional capacity following rTSA[26-28]. This data was not available for analysis in this study, but could certainly impact results. Further studies should aim to explore the underlying ways through which SES specifically affects patient outcomes and develop strategies for mitigating disparities to optimize care for negatively affected patients, regardless of their insurance status[29].

Additionally, the retrospective design may introduce selection bias, as patients who underwent rTSA at our single institution may not be representative of the broad population, which may limit the generalizability of our results to other geographical regions and patient populations, respectively. Future research involving

multiple hospitals, utilizing a diverse group of surgeons, could help address these aforementioned limitations. Although our study did not identify any statistically significant differences in PROs or ROM between the two insurance groups, it is worth considering the potential impact of a Type 2 beta error due to our relatively smaller sample size (n=122). A larger sample size might provide more power in order to detect minor discrepancies between the groups, if they exist. However, the propensity-matching approach utilized through our study helps to curtail potential confounding factors and bias, and thus increases the validity of our findings.

CONCLUSIONS

Patients who underwent RTSA with Medicare/Medicaid insurance had similar two-year postoperative clinical outcomes scores, shoulder range of motion, and revision rates compared to a propensity-matched group of patients with private insurance.

Informed Consent:

Not applicable due to the retrospective nature of the article.

Ethics Approval:

The study was approved by the institutional review board of Rush University Medical Center with protocol number #21070602 on 08/27/2021.

ORCID ID:

Garrett R. Jackson: 0000-0002-7018-8382
Colton M. Mowers: 0000-0003-1507-9201
Filippo Familiari: 0000-0002-3453-2043
Rodrigo Saad Berreta: 0000-0002-6019-7509
Nikhil N. Verma: 0000-0001-9875-2769

Conflict of Interest:

The authors declare no conflict of interest in relation to this article.

Authors' Contributions:

All authors have read and approved the final submitted manuscript. Substantial conception/design of work: Garrett R. Jackson and Nikhil N. Verma. Data collection: Daniel J. Kaplan, Christopher M. Brusalis, Colton M. Mowers, Filippo Familiari, Connor Donley, and Rodrigo Saad Berreta. Data analysis: Daniel J. Kaplan, Christopher M. Brusalis, Colton M. Mowers, Filippo Familiari, Connor Donley, and Rodrigo Saad Berreta. Interpretation of data: Garrett R. Jackson, Daniel J. Kaplan, and Christopher M. Brusalis. Drafting the work: Colton M. Mowers, Connor Donley, and Rodrigo Saad Berreta. Critically revising the work: Garrett R. Jackson, Filippo Familiari, and Nikhil N. Verma. Manuscript preparation: Garrett R. Jackson and Daniel J. Kaplan. Approving final version for publication: all authors. Agreement for accountability of all aspects of work: all authors.

Funding:

None.

AI Disclosure:

During the preparation of the manuscript, no iterations or forms of artificial intelligence were utilized. All work included in this article is original and not aided by assistive artificial intelligence.

REFERENCES

1. Day MS, Epstein DM, Young BH, Jazrawi LM. Irreducible anterior and posterior dislocation of the shoulder due to incarceration of the biceps tendon. Int J Shoulder Surg 2010; 4: 83-85.
2. Saini SS, Pettit R, Puzzitiello RN, Hart PA, Shah SS, Jawa A, Kirsch JM. Clinical Outcomes After Reverse Total Shoulder Arthroplasty in Patients With Primary Glenohumeral Osteoarthritis Compared With Rotator Cuff Tear Arthropathy: Does Preoperative Diagnosis Make a Difference? J Am Acad Orthop Surg 2022; 30: e415-e422.

3. Mizuno N, Denard PJ, Raiss P, Walch G. Reverse total shoulder arthroplasty for primary glenohumeral osteoarthritis in patients with a biconcave glenoid. J Bone Joint Surg Am 2013; 95: 1297-1304.
4. Muh SJ, Streit JJ, Wanner JP, Lenarz CJ, Shishani Y, Rowland DY, Riley C, Nowinski RJ, Edwards TB, Gobezie R. Early follow-up of reverse total shoulder arthroplasty in patients sixty years of age or younger. J Bone Joint Surg Am 2013; 95: 1877-1883.
5. Raiss P, Edwards TB, da Silva MR, Bruckner T, Loew M, Walch G. Reverse shoulder arthroplasty for the treatment of nonunions of the surgical neck of the proximal part of the humerus (type-3 fracture sequelae). J Bone Joint Surg Am 2014; 96: 2070-2076.
6. Hochreiter B, Hasler A, Hasler J, Kriechling P, Borbas P, Gerber C. Factors influencing functional internal rotation after reverse total shoulder arthroplasty. JSES Int 2021; 5: 679-687.
7. Werner BC, Wong AC, Mahony GT, Craig EV, Dines DM, Warren RF, Gulotta LV. Causes of poor postoperative improvement after reverse total shoulder arthroplasty. J Shoulder Elbow Surg 2016; 25: e217-e222.
8. Mollon B, Mahure SA, Roche CP, Zuckerman JD. Impact of scapular notching on clinical outcomes after reverse total shoulder arthroplasty: an analysis of 476 shoulders. J Shoulder Elbow Surg 2017; 26: 1253-1261.
9. Stenquist DS, Barger J, Mohamadi A, Weaver MJ, Suneja N, Dyer GSM, Von Keudell A. Impact of Age on Functional Outcome After Reverse Shoulder Arthroplasty Performed for Proximal Humerus Fractures or Their Sequelae. Arch Bone Jt Surg 2023; 11: 29-38.
10. Frankle M, Siegal S, Pupello D, Saleem A, Mighell M, Vasey M. The Reverse Shoulder Prosthesis for glenohumeral arthritis associated with severe rotator cuff deficiency. A minimum two-year follow-up study of sixty patients. J Bone Joint Surg Am 2005; 87: 1697-1705.
11. Boileau P, Gonzalez JF, Chuinard C, Bicknell R, Walch G. Reverse total shoulder arthroplasty after failed rotator cuff surgery. J Shoulder Elbow Surg 2009; 18: 600-606.
12. Patel AS, Bergman A, Moore BW, Haglund U. The economic burden of complications occurring in major surgical procedures: a systematic review. Appl Health Econ Health Policy 2013; 11: 577-592.
13. Hinman A, Bozic KJ. Impact of payer type on resource utilization, outcomes and access to care in total hip arthroplasty. J Arthroplasty 2008; 23: 9-14.
14. LaPar DJ, Bhamidipati CM, Mery CM, Stukenborg GJ, Jones DR, Schirmer BD, Kron IL, Ailawadi G. Primary payer status affects mortality for major surgical operations. Ann Surg 2010; 252: 544-550; 550-551.
15. Stone ML, LaPar DJ, Mulloy DP, Rasmussen SK, Kane BJ, McGahren ED, Rodgers BM. Primary payer status is significantly associated with postoperative mortality, morbidity, and hospital resource utilization in pediatric surgical patients within the United States. J Pediatr Surg 2013; 48: 81-87.
16. Sabesan V, Chatha K, Lima DJ, Yawman JP, Khoury L, Routman H. Equal care for all? Do surgical outcomes in shoulder arthroplasty depend on insurance type? JSES Int 2021; 5: 900-904.
17. Mohan H, Smith G, Khan A, Singh B. Managing Subscapularis in Shoulder arthroplasty. J Clin Orthop Trauma 2024; 57: 102559.
18. Shields E, Ho A, Wiater JM. Management of the subscapularis tendon during total shoulder arthroplasty. J Shoulder Elbow Surg 2017; 26: 723-731.
19. Virk MS, Aiyash SS, Frank RM, Mellano CS, Shewman EF, Wang VM, Romeo AA. Biomechanical comparison of subscapularis peel and lesser tuberosity osteotomy for double-row subscapularis repair technique in a cadaveric arthroplasty model. J Orthop Surg Res 2019; 14: 391.
20. Louie PK, Levy DM, Bach BR, Nicholson GP, Romeo AA. Subscapularis Tenotomy Versus Lesser Tuberosity Osteotomy for Total Shoulder Arthroplasty: A Systematic Review. Am J Orthop 2017; 46: E131-E138.
21. Werner BC, Lederman E, Gobezie R, Denard PJ. Glenoid lateralization influences active internal rotation after reverse shoulder arthroplasty. J Shoulder Elbow Surg 2021; 30: 2498-2505.
22. Oak SR, Kobayashi E, Gagnier J, Denard PJ, Sears BW, Gobezie R, Lederman E, Werner BC, Bedi A, Miller BS. Patient reported outcomes and ranges of motion after reverse total shoulder arthroplasty with and without subscapularis repair. JSES Int 2022; 6: 923-928.
23. Gill DRJ, Page BMedSci RS, Graves SE, Rainbird S, Hatton A. A Comparison of Revision Rates for Osteoarthritis of Primary Reverse Total Shoulder Arthroplasty to Primary Anatomic Shoulder Arthroplasty with a Cemented All-polyethylene Glenoid: Analysis from the Australian Orthopaedic Association National Joint Replacement Registry. Clin Orthop Relat Res 2021; 479: 2216-2224.
24. Feng JE, Gabor JA, Anoushiravani AA, Long WJ, Vigdorchik JM, Meere PA, Iorio R, Schwarzkopf R, Macaulay W. Payer type does not impact patient-reported outcomes after primary total knee arthroplasty. Arthroplast Today 2019; 5: 113-118.
25. Chalmers PN, Tashjian RZ, Keener JD, Sefko JA, Da Silva A, Morrissey C, Presson AP, Zhang C, Chamberlain AM. Active physical therapy does not improve outcomes after reverse total shoulder arthroplasty: a multi-center, randomized clinical trial. J Shoulder Elbow Surg 2023; 32: 760-770.
26. Waldrop LD, King JJ, Mayfield J, Farmer KW, Struk AM, Wright TW, Schoch BS. The effect of lower socioeconomic status insurance on outcomes after primary shoulder arthroplasty. J Shoulder Elbow Surg 2018; 27: S35-S42.
27. Kearney M, Jennrich MK, Lyons S, Robinson R, Berger B. Effects of preoperative education on patient outcomes after joint replacement surgery. Orthop Nurs 2011; 30: 391-396.
28. Ziedas AC, Castle JP, Abed V, Swantek AJ, Rahman TM, Chaides S, Makhni EC. Race and Socioeconomic Status Are Associated With Inferior Patient-Reported Outcome Measures Following Rotator Cuff Repair. Arthroscopy 2023; 39: 234-242.
29. Froelich JM, Beck R, Novicoff WM, Saleh KJ. Effect of health insurance type on access to care. Orthopedics 2013; 36: e1272-e1276.