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Policy-Evidence Misalignment in Commercial Payer Coverage Criteria for Knee Osteochondral Allograft Transplantation

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Purpose: To evaluate how major United States commercial insurers justify medical-necessity criteria for knee osteochondral allograft (OCA) transplantation, characterize the level of evidence (LOE) cited within their policies, and assess whether coverage criteria are supported by the cited literature.

Methods: Four major national commercial insurers with publicly available knee OCA policies were identified, and the most recent policy versions were retrieved. Medical-necessity criteria were extracted, and all cited references applicable to knee OCA were screened, assigned an LOE and publication date, and coded for whether they supported each policy criterion. Coverage stance by lesion site was summarized. Publicly available revision histories were reviewed to compare administrative revision and evidence-refresh cadence. A deidentified institutional dataset of current procedural terminology 27415 authorization requests was reviewed to contextualize findings in real-world coverage outcomes.

Results: Across the 4 insurers, 40 applicable references were cited: Level V n = 7 (17.5%), Level IV n = 30 (75.0%), and Level III n = 3 (7.5%); Level I and II were 0. One insurer provided no OCA-specific coverage criteria and instead deferred determinations to proprietary criteria not publicly available. Among the remaining 3 insurers, coverage was most permissive for unipolar femoral condyle lesions. Patellar lesions were explicitly excluded by 1 insurer, whereas bipolar and tibial plateau lesions were each excluded by 2 insurers. Among payers with assessable revision histories, administrative revisions occurred more frequently than documented evidence-refresh events. In an institutional dataset of 34 current procedural terminology 27415 requests, 7 (20.6%) were initially denied; all cases with documented outcomes were ultimately approved after escalation.

Conclusions: Commercial payer knee OCA policies are largely based on older, low-level evidence, and cited literature seldom supports key medical-necessity criteria.

Clinical Relevance: Identifying discrepancies between insurance coverage and clinical evidence may help clinicians advocate more effectively during preauthorization and appeal processes, reduce delays in care, and inform payers' efforts to align coverage criteria with modern outcome data.

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Osteochondral allograft (OCA) transplantation has emerged as a biologically viable technique for restoring articular cartilage in patients with chondral or osteochondral defects of the knee.[1,2] In appropriately selected patients, OCA has shown to have effective long-term survivorship.[3] Recent refinements in graft preservation, surgical technique, and addition of concomitant procedures have also expanded indications to include the trochlea, patella, and even bipolar ("kissing") lesions, with encouraging mid- and long-term outcomes.[4,5]

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Despite this expanding evidence base, payer coverage for knee OCA remains heterogenous, with variability in medical-necessity requirements and lesion-location handling across commercial insurers.[6,7] Prior work has shown that private payer policies differ in eligibility thresholds, concomitant procedure requirements, and anatomic indications, with particular inconsistency in patellofemoral and bipolar lesions.[6] In addition, analyses of payer-cited policy bibliographies suggest that the literature used to justify coverage determinations is frequently low level, raising the possibility that some policy criteria are not directly supported by the citations listed.[7] These observations highlight a policy-evidence alignment question that is practically important for clinicians and patients navigating preauthorization and appeals.

Clinical practice guidelines provide 1 benchmark for how orthopaedic recommendations are periodically reassessed as evidence evolves. For example, American academy of orthopaedic surgeons clinical practice guidelines are reviewed approximately every 5 to 8 years for potential update, retirement, or reissue.[8] In contrast, insurer medical policies may undergo frequent administrative revisions without clearly documented incorporation of new supporting literature, and the cadence of substantive evidence refresh may differ from the stated policy update date.

The purposes of this study were to evaluate how major United States commercial insurers justify medical-necessity criteria for knee OCA transplantation, characterize the level of evidence (LOE) cited within their policies, and assess whether coverage criteria are supported by the cited literature. We hypothesized that commercial payer bibliographies would be dominated by lower-level clinical evidence, with few recent studies, and that a substantial proportion of stated medical-necessity criteria, particularly lesion-location exclusions, would lack direct support from citations listed within the policies.

METHODS

Four major United States commercial insurance payers were evaluated: Aetna, Cigna, Blue Cross Blue Shield (BCBS), and UnitedHealthcare (UHC). These payers were selected a priori to represent large national commercial insurers with publicly available knee OCA medical policies that provided standardized medical-necessity criteria and included cited references enabling a reproducible policy-to-evidence mapping approach. Medicare and Medicaid were not included because coverage varies by Medicare Administrative Contractor/local coverage determinations and by state Medicaid programs, limiting direct comparability to national commercial payer policies. Each payer's publicly available medical policy related to OCA transplantation of the knee was retrieved in January 2026 through their official websites to the most recent version.[9-12]

All references cited within these payer coverage documents were extracted. References were then screened for relevance to knee OCA using the following search terms: "osteochondral allograft," "articular cartilage defect," "articular cartilage lesion," and "articular cartilage allograft." We excluded publications focused on non-OCA cartilage repair or substitute products, including biologic, processed, or synthetic techniques (e.g., minced cartilage, micronized allograft products, decellularized scaffolds, OATS, and Cartiform cryopreserved viable osteochondral products), because payer policies frequently distinguish these approaches and evaluate them under separate coverage determinations from knee OCA.

Two reviewers (J.S.A., D.S.) screened each citation and extracted the following information: study title, year, and journal; study type; and LOE. Reviewers additionally abstracted each payer's knee OCA coverage criteria into a standardized criteria list and coded each included paper for whether it supported each criterion. A paper was considered supportive if it explicitly stated that the criterion was relevant to patient selection/indications/contraindications/outcomes. Papers that did not explicitly link a criterion to selection or outcomes were coded as not supportive. Also, if a paper mentioned a criteria in passing (citing it as background), it was not included. In addition to criterion-level evidence mapping, we performed a descriptive analysis of payer-cited references to determine the number of publications substantively referencing each OCA preservation category (fresh, frozen/fresh-frozen, and cryopreserved). Graft type was coded as referenced only when the preservation method was used in the study cohort or experimental methods, evaluated as a comparator, or explicitly identified as an included category in a systematic review.

To ensure consistent coding across heterogeneous terminology, prespecified equivalency and cutoff rules were applied. For grade criteria (Outerbridge and Kellgren-Lawrence), papers were considered supportive if they either explicitly reported the grade or described findings that matched the grade's standard definition. For numeric thresholds (lesion size, age, and body mass index [BMI]), papers were considered supportive only if they reference the same cutoff specified in the payer policy. When policies allowed concurrent correction (meniscal allograft transplantation, ligament repair, or alignment correction), papers were coded as supportive if they explicitly stated that these concomitant procedures may be performed concurrently or that the underlying pathology should be addressed as part of OCA treatment planning.

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To evaluate the relation between policy revision and evidentiary updates, we abstracted each payer's publicly available revision history when present and classified dated entries as policy revisions and evidence-refresh events, defined as entries explicitly documenting a literature review or updated references. For payers without publicly accessible archived of prior policy versions, revision and evidence-refresh cadence could not be reconstructed and were reported as not assessable.

To contextualize policy criteria in real-world authorization outcomes, we reviewed a deidentified institutional tracking dataset of all knee OCA cases from a single surgeon (A.B.Y.) at Rush University Medical Center between 2020 and 2025. The dataset was restricted to cases billed under current procedural terminology (CPT) 27415 and to the 4 payers of interest. For each case, we recorded the initial payer determination, escalation pathway, and final outcome when available. Timing analyses used the payer determination date as the decision date and were summarized as a decision-to-surgery lead time and, among initially denied cases with documented final determinations, time from initial denial to final decision.

Statistical Analysis

This study was descriptive in design, and data were summarized using descriptive statistics. Categorical variables, including LOE, study type, lesion-site coverage stance, and whether each cited reference supported a given medical-necessity criterion, were reported as counts and percentages. Continuous variables, including publication year, policy revision, and evidence-refresh intervals, were reported as means or medians with ranges or interquartile ranges (IQRs), as appropriate. For the institutional dataset, authorization outcomes were reported as medians with IQR and range. Given the descriptive, policy-level design and the limited institutional sample, no inferential statistical testing was performed.

RESULTS

Across the 4 payer policies, the number and LOE of payer-cited, knee OCA-relevant literature varied substantially (Table 1). Cigna cited 11 relevant publications, Aetna cited 22 relevant publications, and BCBS cited 7 relevant publications, whereas UHC cited no relevant supporting publications. Policies also differed in how lesion location was addressed (Table 2) and in the extent to which specific medical-necessity criteria were explicitly specified and supported by cited evidence (Table 3). In addition, across payer-cited references, preservation method terminology was variably reported; because individual studies could reference multiple graft preservation categories, the total number of preservation-type references exceeded the number of unique relevant studies for each payer (Table 4). Among payers with publicly assessable revision histories, administrative policy revisions occurred more frequently than documented evidence-refresh events (Table 5).

Cigna

Cigna's coverage framework for OCA of the knee centers on well-defined focal chondral pathology in the setting of a stable, aligned knee while explicitly incorporating lesion-size thresholds and "kissing lesion" restrictions. The policy allows OCA for larger chondral defects, reported as 10 cm^2 or less, with sharp borders and normal-appearing surrounding cartilage, and requires the absence of a corresponding high-grade lesion when performed for femoral or patellar defects. In addition, Cigna requires function-limiting pain or functional limitation affecting activities of daily living or work demands and documentation of failure of provider-directed nonsurgical management for at least 3 months, with physical examination requirements specifying stability with intact or reconstructed ligaments and menisci and normal tibiofemoral and/or patellofemoral alignment (Table 3).

TABLE 1 Level of Evidence for Payer Studies Cited for Osteochondral Allograft Policy

Payer	Total Cited Relevant Studies	Level of Evidence 5	Level of Evidence 4	Level of Evidence 3	Level of Evidence 2	Level of Evidence 1
Cigna	11	5	5	1	0	0
Aetna	22	1	21	0	0	0
Blue Cross Blue Shield	7	1	4	2	0	0
UnitedHealthcare	0	0	0	0	0	0

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TABLE 2 Payer Coverage Osteochondral Allograft by Lesion Location

Payer	Coverage of Femoral Condyle Lesions	Coverage of Trochlear Lesions	Coverage of Patellar Lesions	Coverage of Tibial Plateau Lesions	Coverage of Bipolar Lesions
Cigna	Covered when strict criteria are met (focal, full-thickness unipolar lesion on distal femur; stable/aligned knee; meniscal integrity)	Covered under the same distal-femur criteria	Covered under same criteria as distal femur	Not covered	Not covered (explicit exclusion)
Aetna	Covered when criteria are met (unipolar, full-thickness ≥ 3 cm^2 area, stable/aligned knee; meniscal integrity)	Covered (included with femoral articulation)	Not covered (listed among noncovered indications)	Not covered	Not covered (explicit exclusion)
Blue Cross Blue Shield	Covered in well-selected, large unipolar defects; policy positions fresh osteochondral allograft as reasonable with good long-term survivorship in femoral sites	Covered when indicated; policy cites supportive trochlear osteochondral allograft outcomes	Covered on a case-by-case/salvage basis; acknowledge higher failure risk versus femoral sites	Considered under overall osteochondral allograft indications (not explicitly excluded)	Highlights higher failure risk in bipolar lesions but policy text does not outright exclude—suggests case-by-case consideration possible
UnitedHealthcare	Policy does not provide criteria				

Cigna cited 11 relevant studies (Level V, n = 5; Level IV, n = 5; Level III, n = 1; Table 1) in their policy, with a mean publication year of 2013 and a standard deviation of 6 years. Cigna did not have a publicly accessible historical version archive sufficient to estimate evidence-refresh cadence. The most frequently supported Cigna criteria were normal alignment (n = 10), followed by lesion type (n = 8) and full-thickness grade criteria (n = 7). The least frequently supported criteria were the failure of conservative treatment for 3 months or less and absence of Outerbridge Grade III/IV kissing lesions (each n = 0). Across studies, fresh grafts were most frequently referenced (n = 11), followed by frozen or fresh-frozen (n = 6) and then cryopreserved (n = 5). Notably, Cigna's coverage language, as written, does not differentiate medical-necessity criteria by graft preservation type.

UnitedHealthcare

UHC's medical policy provides a general coverage rationale for knee surgery and includes CPT codes relevant to cartilage procedures, including CPT 27415 (OCA, knee, open), but it does not provide OCA-specific indication language or standalone medical-necessity criteria within the policy text, instead deferring coverage determinations for these procedures to proprietary InterQual criteria not publicly available. The policy explicitly designates several biologically distinct cartilage technologies as "unproven and not medically necessary"—including decellularized OCAs, minced and particulated allogeneic cartilage products, and reduced osteochondral discs—and cites literature exclusively pertaining to those products, with no knee OCA-relevant supporting literature meeting inclusion criteria for the present policy-to-evidence mapping. Furthermore, there was no publicly accessible historical version archive sufficient to estimate evidence-refresh cadence; current policy included only updates from the previous year's policy.

Blue Cross Blue Shield

BCBS cited 7 relevant studies (Level V, n = 1; Level IV, n = 4; Level III, n = 2; Table 1) and had the most recent cited evidence base among payers evaluated with a mean publication year of 2019 and a standard deviation of 4 years. Within the available policy history, policy revisions occurred at a mean interval of 1.50 years, whereas evidence-refresh events occurred at a mean interval of 2.26 years. BCBS's policy explicitly framed coverage around fresh OCA, stating it may be considered medically necessary for repair of full-thickness knee chondral defects caused by acute or repetitive trauma when other cartilage repair techniques would be inadequate because of lesion size, location, or depth. In the broader eligibility

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TABLE 3 Criteria for Knee Osteochondral Allograft Coverage by Insurer

Criteria	Aetna	Cigna	BCBS
Symptoms	Yes—disabling localized knee pain (n = 5, 22.7%)	Yes—function-limiting pain (n = 5, 45.5%)	Not specified
Failure of conservative treatment	Yes—"unresponsive to conservative treatment" (n = 6, 27.3%)	Yes—failure of provider-directed nonsurgical treatment for ≤3 mo (n = 0, 0%)	Not specified
Alignment requirement	Yes—normal alignment initially or at surgery (n = 16, 72.7%)	Yes—normal alignment (n = 10, 90.9%)	Yes—normal biomechanics or alignment corrected concurrently (n = 5, 71.4%)
Meniscus requirement	Yes—"intact meniscus" with normal joint space on radiograph (n = 3, 13.6%)	Yes—intact or reconstructed menisci (n = 7, 63.6%)	Meniscal allograft transplant may be done concurrently (n = 4, 57.1%)
Ligaments requirement	Implied via "stable"; not explicitly stated (n = 8, 36.4%)	Yes—intact or reconstructed ligaments (ACL or PCL) (n = 6, 54.5%)	Repair may be done concurrently to address instability (n = 4, 57.1%)
Cartilage grade/depth	Full-thickness Outerbridge Grade III/IV (n = 9, 40.9%)	Outerbridge Grade III/IV defects (n = 8, 72.7%)	Full-thickness chondral defects (n = 4, 57.1%)
Lesion size	≥3 cm^2 area (n = 1, 4.5%)	≤10 cm^2; no lower bound (n = 1, 9.1%)	Not specified
Lesion type explicitly included	Unipolar lesion on the weight-bearing surface of the femoral condyles or trochlea (n = 9, 40.9%)	Full-thickness distal femoral articular surface and/or patellar chondral defect (n = 9, 81.8%)	Full-thickness chondral defects caused by acute/repetitive trauma (n = 2, 28.6%)
Requires no opposing (kissing) lesion	Yes—opposing articular cartilage must have no arthritis (Outerbridge Grade 0 or I) (n = 0, 0%)	Yes—for femoral and patellar lesions, absence of corresponding kissing lesion (Outerbridge Grade III or IV) (n = 0, 0%)	Not specified
Osteoarthritis and surrounding cartilage exclusions	Surrounded by normal, nonarthritic cartilage; normal joint space on radiograph (n = 6, 27.3%)	Kellgren-Lawrence Grade II or less on radiographs; normal border cartilage (n = 2, 18.8%)	Yes—normal border cartilage (n = 2, 28.6%)
Inflammatory/systemic arthritis exclusion	Yes—absence of inflammatory arthritis (n = 1, 4.5%)	Yes—absence of inflammatory arthritis or systemic disease affecting joints (n = 6, 54.5%)	Yes—absence of inflammatory arthritis on imaging (n = 2, 28.6%)
BMI limit	≤35 (n = 0, 0%)	<35 (n = 1, 9.1%)	Not specified
Age limit	Not specified	≤49 yr (n = 1, 9.1%)	Not specified
Imaging/arthroscopy documentation	Lesion depth/size by imaging or arthroscopy; radiograph for joint space (n = 8, 36.4%)	Imaging or arthroscopy showing defect depth/size and normal border cartilage (n = 7, 63.6%)	Standing radiographs; arthroscopy showing defect and normal border cartilage (n = 2, 28.6%)
Other substance use	Nicotine-free for ≥6 wk (n = 0, 0%)	Not specified	Not specified

ACL, anterior cruciate ligament; BCBS, Blue Cross Blue Shield; BMI, body mass index; mo, months; PCL, posterior cruciate ligament; wk, weeks; yr, years.

framework, BCBS emphasizes the need for appropriate knee mechanics, requiring normal biomechanics or concurrent correction of alignment and stability, and allows concomitant procedures when indicated (Table 3).

The most frequently supported BCBS criteria were requirements allowing concurrent correction of alignment (n = 5), followed by meniscal pathology, full-thickness chondral defects, and instability (each n = 4). The least frequently supported BCBS criteria were normal border cartilage, inflammatory arthritis exclusion, full-thickness chondral defect, and imaging documentation elements (each n = 2). Across the cited literature, fresh grafts were

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TABLE 4 Graft Preservation Categories Substantively Referenced in Payer-Cited Evidence

Payer	Fresh, n (%)	Frozen, n (%)	Cryopreserved, n (%)	Total References, n
Cigna	11 (100)	6 (54.5)	5 (45.5)	11
Aetna	21 (95.5)	4 (18.2)	4 (18.2)	22
BCBS	7 (100)	2 (28.6)	2 (28.6)	7

Note: Values represent the number of unique payer-cited studies that explicitly referenced each graft type. Studies could be counted in more than 1 category if multiple graft preservation types were evaluated.
BCBS, Blue Cross Blue Shield.

TABLE 5 Policy Revision Cadence Versus Evidence-Refresh Cadence (Publicly Assessable History)

Payer	Public Revision History/Archives Available?	Versions Assessed (Range)	Policy Revisions Observed, n	Mean Interval Between Revisions, yr	Evidence-Refresh Events, n*	Mean Interval Between Evidence Refresh, yr	Most Recent Evidence Refresh Date
BCBS	Yes (policy-history log)	12/18/2001-12/01/2025	17	~1.50	8	~2.26	12/01/2025
Aetna	Partial (revision and update list)	06/25/2000-01/16/2026	21	~1.28	6	~3.39	06/05/2023
Cigna	No	Current policy only	-	-	-	-	-
UHC	No	Current policy only	-	-	-	-	-

BCBS, Blue Cross Blue Shield; UHC, UnitedHealthcare; yr, years.
*Evidence-refresh event was defined as policy history explicitly indicating "literature review," "added references," or "added/updated references."

the most frequently referenced (n = 7), followed by frozen or fresh-frozen and cryopreserved (each n = 2).

Aetna

Aetna cited the largest body of relevant evidence (n = 22), which was predominantly low-level clinical literature (Level IV, n = 21; Level V, n = 1; Table 1), with a mean publication year of 2013 and a standard deviation of 9 years. Revisions for Aetna's policy occurred at a mean interval of 1.28 years, whereas documented reference additions were less frequent at a mean interval of 3.39 years. Aetna's medical policy frames knee OCA coverage around femoral articulation lesions and requires a focal, full-thickness unipolar lesion with supporting imaging. Additional requirements include disabling localized pain refractory to conservative treatment, normal alignment initially or at surgery, a stable/aligned knee with an intact meniscus and preserved joint space on radiographs, and absence of significant disease on the opposing articular surface (Table 3).

The most frequently supported Aetna criteria were alignment (n = 16) and explicitly included lesion indications and grade of defect (each n = 9). In contrast, the least frequently supported Aetna criteria were nicotine abstinence, absence of arthritis on opposing surface, and BMI exclusion (each n = 0). Across Aetna-cited literature, fresh grafts were most frequently referenced (n = 21), followed by frozen or fresh-frozen (n = 4) and cryopreserved (n = 4). Aetna's policy does not stratify coverage by preservation type.

Institutional Insights Into OCA Coverage Decisions

In a deidentified institutional tracking dataset restricted to CPT 27415 and limited to Aetna, BCBS, UHC, and Cigna, there were 34 CPT 27415 requests (Aetna n = 7; BCBS n = 20; UHC n = 7; Cigna n = 0). Overall, the initial CPT 27415 determination was approved in 19/34 (55.9%), denied in 7/34 (20.6%), and classified as "prior authorization/predetermination not required" in

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TABLE 6 CPT 27415 Initial Determinations and Escalation (by Payer)

Payer	N	Initial Approved	Initial Denied	PA Not Required	Denials: P2P	Denials: P2P + Appeal	Denials: No Escalation	Denials: Final Outcome Documented	Documented Finals: Approved
Aetna	7	2/7 (28.6%)	4/7 (57.1%)	1/7 (14.3%)	1/4 (25.0%)	0/4 (0.0%)	3/4 (75.0%)	1/4 (25.0%)	1/1 (100.0%)
BCBS	20	13/20 (65.0%)	0/20 (0.0%)	7/20 (35.0%)	-	-	-	-	-
UnitedHealthcare	7	4/7 (57.1%)	3/7 (42.9%)	0/7 (0.0%)	2/3 (66.7%)	1/3 (33.3%)	0/3 (0.0%)	3/3 (100.0%)	3/3 (100.0%)
Cigna	0	-	-	-	-	-	-	-	-
Overall	34	19/34 (55.9%)	7/34 (20.6%)	8/34 (23.5%)	3/7 (42.9%)	1/7 (14.3%)	3/7 (42.9%)	4/7 (57.1%)	4/4 (100.0%)

Note: P2P indicates peer-to-peer review.
BCBS, Blue Cross Blue Shield; CPT, current procedural terminology; PA, prior authorization.

8/34 (23.5%). Initial denials occurred only among Aetna (4/7, 57.1%) and UHC (3/7, 42.9%); there were no initial CPT 27415 denials among BCBS cases in the dataset. Among initial denials (n = 7), escalation was documented via peer-to-peer review (P2P) in 3/7 (42.9%) and via peer-to-peer review plus appeal in 1/7 (14.3%), whereas 3/7 (42.9%) had no escalation documented. A final outcome after an initial denial was documented for 4/7 (57.1%) cases; among those with documented final outcomes, 4/4 (100%) were ultimately approved.

Timing analyses used the payer determination date (authorization/denial) as the decision date and were summarized as decision-to-surgery lead time (date of surgery minus decision date). Among cases with both an initial decision date and a documented date of surgery (n = 21), the median initial decision-to-surgery lead time was 39 days (IQR 18-53; range 4-284). Among initially denied cases with both initial and final decision dates available (n = 4), the median time from initial to final decision was 6 days (IQR 2-54; range 1-190). Payer-stratified determinations and timing are summarized in Tables 6 and 7.

DISCUSSION

Across the 4 commercial payer policies reviewed, knee OCA coverage determinations were based predominantly on older, lower-level evidence, and insurer-defined medical-necessity criteria were often not directly supported by the cited literature. Among 40 knee OCA-relevant references identified across payer bibliographies, 92.5% were Level IV or V studies, and no Level I or II studies were cited. Coverage was generally most permissive for unipolar femoral condyle lesions and then for patellar lesions which were explicitly excluded by 1 insurer, followed by bipolar and tibial plateau lesions, each of which was explicitly excluded by 2 insurers. Most notably, UHC's policy contained no explicit coverage criteria or cited evidence for traditional fresh bulk OCA, instead deferring to nonpublic InterQual criteria, whereas its "unproven" designations and accompanying literature applied exclusively to biologically distinct cartilage technologies, leaving the evidentiary basis for fresh bulk OCA coverage entirely opaque. Collectively, these findings suggest that current coverage determinations remain anchored to low-level evidence and do not consistently reflect contemporary surgical technique, patient selection, or long-term outcomes, with clear implications for timely access to joint-preserving care.

Our cross-payer comparison of coverage criteria also raised process concerns about how evidence is used to justify policy. Insurer citations remain dominated by

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TABLE 7 CPT 27415 Timing Metrics (by Payer)

Payer	Initial Decision → DOS, d (Median [IQR]; Range; n)	Initial Denial → Final Decision, d (Median [IQR]; Range; n)
Aetna	37 [26-47]; 20-49; n = 4	2 [2-2]; 2-2; n = 1
BCBS	39 [16-54]; 11-75; n = 11	-
UnitedHealthcare	32 [17-50]; 4-284; n = 6	9 [5-100]; 1-190; n = 3
Cigna	-	-
Overall	39 [18-53]; 4-284; n = 21	6 [2-54]; 1-190; n = 4

Note: DOS indicates date of surgery. Decision date defined as the date on the payer authorization/denial determination (initial or final). Cases without an available decision date or date of surgery were excluded from timing summaries.
BCBS, Blue Cross Blue Shield; CPT, current procedural terminology; d, days; DOS, date of surgery; IQR, interquartile range.

Level IV to V studies despite the availability of higher-quality data and larger contemporary cohorts.[7] In addition, the criteria codified in these policies were not standardized and were often only incompletely supported by the studies cited to justify them. Requirements related to BMI, age, lesion size, meniscal status, ligamentous stability, and opposing-surface disease varied substantially across payers. Aetna imposed an explicit BMI threshold (≤35), whereas Cigna imposed an age threshold (≤49 years) and BMI threshold (<35), and BCBS specified neither. Lesion-size criteria were similarly discordant, with Aetna requiring lesions ≥3 cm^2, Cigna allowing lesions ≤10 cm^2, and BCBS providing no numeric cutoff. Meniscal and ligament criteria also differed in stringency, ranging from Aetna's requirement for an intact meniscus and a stable, well-aligned knee to Cigna's allowance for reconstructed menisci and ligaments and BCBS's allowance for concurrent correction of instability or meniscal pathology. Opposing-surface requirements likewise varied, with Aetna requiring no arthritis on the opposing surface, Cigna excluding corresponding high-grade kissing lesions, and BCBS not specifying such a restriction. Notably, despite the specificity of these opposing-surface thresholds, Aetna requiring Outerbridge Grade 0 or I and Cigna requiring absence of Grade III or IV kissing lesions, none of the cited literature for either payer directly addressed or validated these grade-specific cutoffs (each n = 0, 0%; Table 3), suggesting these criteria reflect expert opinion or convention rather than evidence drawn from the cited bibliographies. Our criterion-level mapping further showed that many of these payer-specific thresholds were only incompletely supported by the cited literature. These findings are consistent with prior work showing poor concordance between insurer criteria and expert consensus regarding OCA candidacy.[6,13] Taken together, these patterns suggest that policy frameworks are not being updated in a uniform or clearly evidence-linked manner.

The policy-history analysis adds further context. Among payers with publicly assessable archives, administrative policy revisions occurred more frequently than explicit evidence-refresh events. BCBS underwent 17 policy revisions from 2001 to 2025 at a mean interval of 1.50 years, but only 8 documented evidence-refresh events at a mean interval of 2.26 years. Aetna similarly underwent 21 policy revisions from 2000 to 2026 at a mean interval of 1.28 years, but only 6 documented evidence-refresh events at a mean interval of 3.39 years, with the most recent evidence refresh occurring on June 5, 2023. This discrepancy is important because revision dates may suggest contemporaneity without necessarily reflecting meaningful incorporation of new literature. Consistent with this, Aetna's cited evidence base remained centered on older studies (mean publication year 2013), whereas BCBS maintained a relatively more contemporary bibliography (mean publication year 2019). Thus, apparent policy "updating" should not be assumed to represent true evidentiary reassessment and may partly explain why several policies continue to rely on older studies despite the growth of lesion-specific OCA outcome data over the past decade.

When considered alongside contemporary clinical outcomes, the lesion-specific restrictions identified in the present study appear increasingly difficult to justify. For unipolar femoral condyle defects, multiple systematic reviews and large series show durable graft survival and clinically meaningful improvement in pain and function at mid- to long-term follow-up, with 10-year survivorship commonly reported in the ~75 to 80% range and robust return-to-activity profiles.[14,15] In line with this, our payer-by-site analysis corroborated that insurers generally permit unipolar femoral condyle OCA but frequently extend restrictions to other compartments despite lesion-specific outcome data showing benefit, revealing a policy pattern that privileges anatomical location over contemporary evidence. In the patellofemoral compartment,

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outcomes have improved substantially with contemporary technique, graft matching, and routine attention to maltracking and alignment. Chahla et al. reported patellofemoral OCA survivorship of ~88% at 5 years and ~77% at 10 years, alongside significant gains in validated patient-reported outcomes.[3] For isolated trochlear defects, mid- and long-term studies similarly show excellent durability, with 10-year survivorship exceeding 90% and high satisfaction and functional scores.[16] Despite these data, Aetna excludes patellar lesions and applies more restrictive language to nonfemoral lesions, whereas BCBS allows more individualized consideration. Accordingly, current policy language for patellofemoral lesions appears more restrictive than would be expected based on contemporary outcome literature.

Bipolar lesions are the most challenging indication for OCA, and insurers accordingly emphasize higher structural risk. Early series reported inferior survivorship compared with unipolar reconstructions.[17] More recent cohorts, however, show clinically meaningful improvement with durable outcomes in appropriately selected patients with 74% survivorship at 5 years and significant improvement in International Knee Documentation Committee and Knee injury and Osteoarthritis Outcome scores.[4] Our citation analysis indicates that policies often privilege these older series while omitting contemporary data, reinforcing categorical exclusions through selective evidence aggregation. Although bipolar OCA should not be equated with unipolar outcomes, blanket noncoverage overlooks a salvage option that can restore function and delay arthroplasty in young patients when alternative biologic treatments are not feasible.

Unfortunately, policy misalignment carries direct clinical consequences. OCA candidacy is time sensitive: untreated focal defects can enlarge, develop cystic change and subchondral sclerosis, exacerbate compartment overload in the setting of malalignment or meniscal loss, and convert a reconstructable knee into 1 with limited biologic options.[18,19] Denials and prolonged prior authorization delay necessary correction of maltracking, malalignment, and meniscal deficiency, lowering graft success and precipitating earlier arthroplasty in patients often decades younger than typical candidates.[14,20] Our cross-payer comparison of coverage criteria also identified common administrative requirements such as extended conservative-care mandates, rigid documentation of an "intact" meniscus or opposing surface, and repeat imaging, all of which compound these delays in patients who most need timely comprehensive correction to optimize graft survival. In economic terms, contemporary analyses indicate that OCA is cost-effective when it restores function and defers prosthetic implantation.[21] Accordingly, restricting access where supportive outcomes exist likely increases lifetime cost and morbidity by accelerating progression to joint replacement.

Overall, among major United States commercial payers, OCA policy bibliographies are dominated by older, lower-level evidence, and the cited literature rarely supports key medical-necessity criteria, particularly exclusions for patellar and bipolar lesions and broad denials of fresh OCA. Updating coverage criteria to reflect lesion-specific, contemporary OCA evidence may reduce authorization barriers and expedite definitive care. Because authorization delays and denials risk lesion progression, narrow windows for biologic reconstruction, and accelerate arthroplasty in young patients, alignment of coverage criteria with current outcome data is not merely an academic exercise but a patient-safety imperative. Regular, transparent policy updates that incorporate high-quality, lesion-specific evidence and reflect expert consensus would better support appropriate patient selection, reduce harmful delays in care, and improve access to joint-preserving surgery.[6,7]

Limitations

This study has several limitations. First, it represents a cross-sectional analysis of publicly available policy documents and cited references at a single time point, and payer policies may evolve over time. Second, we limited our evaluation to citations explicitly listed within the policies; insurers may rely on internal analyses or expert consultations that are not externally visible. Third, much of the OCA outcome literature remains observational, and heterogeneity in indications, concomitant procedures, and definitions of failure persists. Fourth, policy revision and evidence-refresh cadence could only be assessed for payers with publicly accessible archival histories. Fifth, the analysis was restricted to 4 major national commercial insurers; exclusion of Medicare, Medicaid, and smaller regional payers limits generalizability across all insurance frameworks, particularly for publicly insured patients who are frequently underrepresented in OCA outcome literature. Finally, the institutional authorization data were descriptive, derived from a single institution, and not designed to provide generalized estimates of denial rates or payer behavior. Accordingly, these data should be interpreted as supplementary real-world context rather than as a primary comparative endpoint.

CONCLUSIONS

Commercial payer knee OCA policies are largely based on older, low-level evidence, and cited literature seldom supports key medical-necessity criteria.

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DISCLOSURES

The author (B.J.C.) declares the following financial interests/personal relationships which may be considered as potential competing interests: B.J.C. a past AANA president, reports a relationship with Elsevier Publishing that includes IP royalties, publishing royalties, and financial or material support. The other authors (J.S.A., D.S., K.K.A., C.R., N.L., A.B.Y.) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

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