Overview of the knee arthroscopy episode of care

State of Ohio

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1. CLINICAL OVERVIEW AND RATIONALE FOR DEVELOPMENT OF THE KNEE ARTHROSCOPY EPISODE

1.1 Rationale for development of the knee arthroscopy episode of care

Knee pain is a common symptom affecting approximately 25% of adults globally, which leads to negative impact on daily function and quality of life.[1] Two common etiologies of knee pain are osteoarthritis and trauma. Osteoarthritis of the knee is the most common type of osteoarthritis, prevalent in 6% of all adults with the majority of cases due to aging.[2] Traumatic knee injuries are less common (affecting approximately less than 1% of the population) and largely result from sports injuries (e.g., meniscus tears) among younger populations.[3]

Arthroscopic surgery of the knee is one modality providers may use to assess and address these and other types of knee pain and associated symptoms.[4] However, a subset of arthroscopy procedures are performed for diagnoses in which the procedure is less clearly supported by clinical evidence. For example, arthroscopic debridement is generally not recommended for symptomatic knee osteoarthritis (OA) regardless of meniscal status, yet the procedure is still widely utilized.[5] Even for patients with strong indications for the procedure, non-surgical alternatives (e.g., physical therapy) should often be offered as first-line options prior to performing the arthroscopy.

Surgeons in the United States conduct approximately 980,000 knee arthroscopy procedures per year, twice the rate per patient compared to Canada or England.[6]

1 Nguyen USDT, Zhang Y, et al. Increasing prevalence of knee pain and symptomatic knee osteoarthritis. *Ann Intern Med*. 2011;155(11):725-32.

2 D'Ambrosia RD. Epidemiology of osteoarthritis. *Orthopedics*. 2005;28(Suppl. 2):201–205.

3 Bolllen S. Epidemiology of knee injuries: diagnosis and triage. *Br J Sports Med*. 2000;34(3):227-8.

4 Note that posterior cruciate ligament (PCL) repair or reconstruction procedures are not included in the episode due the greater complexity of injury relative to other triggering procedures.

5 Laupattarakasem W, Laopaiboon M, et al. Arthroscopic debridement for knee osteoarthritis. Cochrane Database of Systematic Reviews 2008, Issue 1. Art. No.: CD005118.

6 Kim S, Bosque J, et al. Increase in outpatient knee arthroscopy in the United States: a comparison of national surveys of ambulatory surgery, 1996 and 2006. *J Bone Joint Surg Am*. 2011;93(11):994-1000.

There has been a 50% increase between 1996 and 2006 in arthroscopies for meniscal tears, potentially due to its use for indications where knee arthroscopy has less clinical evidence of utility.[7] In Ohio, Medicaid beneficiaries between 0-64 years of age received over 5,800 knee arthroscopy procedures in 2014.[8] This represented approximately $20.6 million in spend, with a median cost of $3,300 per episode.

For patients with knee pain, there are many opportunities to apply guideline-concordant care to reduce rates of procedures with no evidence-based clinical backing. The American Academy of Orthopedic Surgeons (AAOS) has a strong recommendation against performing arthroscopy with lavage and/or debridement in patients with a primary diagnosis of symptomatic osteoarthritis of the knee, for example. Instead of the procedure, participation in self-management programs (e.g., aerobic exercises and physical therapy), and the use of acupuncture, non-steroidal anti-inflammatory drugs, and other non-surgical treatment options are strongly recommended for patients with symptomatic osteoarthritis of the knee.[9]

Despite these clinical guidelines, surgical and treatment practices during the pre-operative, operative, and post-operative periods of a knee arthroscopy vary widely from one provider to another. Unique patient needs will necessitate a certain level of variation in surgical and treatment practice; however, practice variation due to reasons not related to the patient may lead to poor patient outcomes, unnecessary costs to the system, or both.

The knee arthroscopy episode will complement other orthopedic episodes (e.g., total joint replacement) and Ohio's Comprehensive Primary Care (CPC) program to help reduce unnecessary practice variation and incentivize evidence-based care. Within the CPC program, providers may help to manage osteoarthritis while in the episodes program orthopedic surgeons may minimize procedural and other complications during the operative and post-operative periods. Illustrative examples of integration include: 1) The CPC program incentivizes providers to focus on adult body mass index (BMI) assessments[10] to help manage knee pain via weight loss, while the

[7] Sihvonen R, Paavola M, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. *N Engl J Med*. 2013;369(26):2515-24.

[8] Analysis of Ohio Medicaid claims data for episodes ending between October 1, 2014 and September 30, 2015.

[9] AAOS. Treatment of osteoarthritis of the knee. Evidence-based guideline, 2nd Ed. May 18, 2013. Available at https://www.aaos.org/research/guidelines/TreatmentofOsteoarthritisoftheKneeGuideline.pdf. Accessed on December 11, 2017.

[10] See, for example, the inclusion of the metric "Adult BMI Assessment" in the quality metrics of the CPC program. Available at http://www.medicaid.ohio.gov/Portals/0/Providers/PaymentInnovation/CPC/qualityMetricSpecs.pdf. Accessed on December 11, 2017.

episode incentivizes providers to offer non-surgical treatments for knee pain (e.g., physical therapy), which reduces potentially unnecessary surgical interventions; and 2) The CPC program quality metrics encourage initiation of alcohol and drug dependence treatments,[11] while quality and utilization metrics in the orthopedic episodes encourage providers to minimize unnecessary opioid prescriptions.

1.2 Clinical overview and typical patient journey for the knee arthroscopy episode

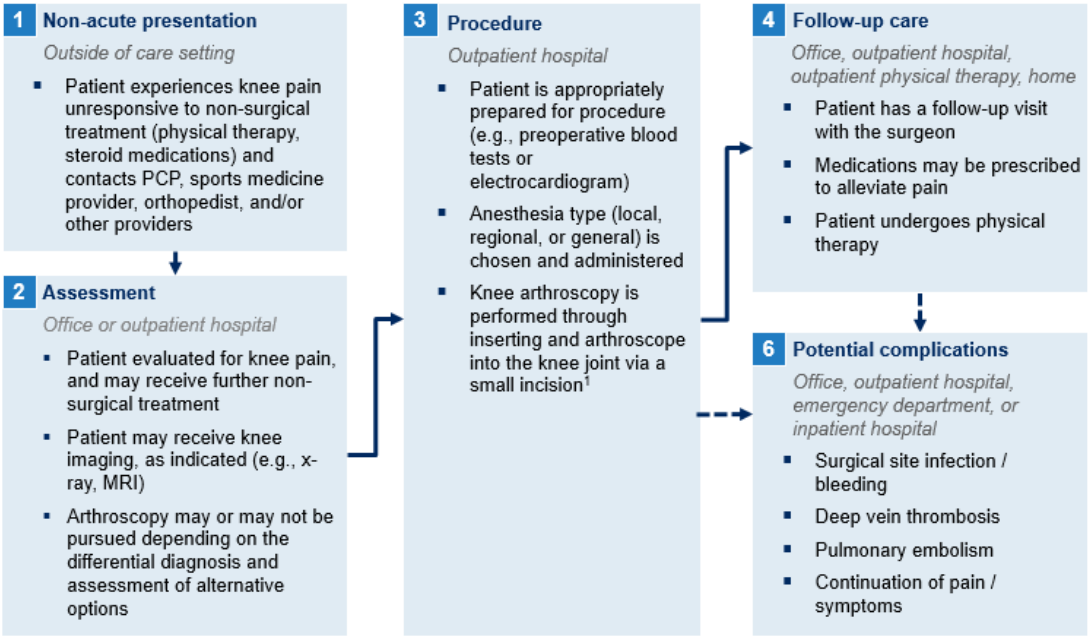
A knee arthroscopy refers to a specific set of surgical procedures that are performed to diagnose and treat various knee conditions. During the procedure, a small camera, the arthroscope, is inserted into the knee joint and the surgeon uses the associated images to help guide small surgical instruments to intervene as necessary. This set of interventions includes the removal or repair of a torn meniscus, reconstruction of an anterior cruciate ligament (ACL) or medial collateral ligament (MCL), removal of loose fragments of bone or cartilage, or debridement for osteochondral defects. Posterior cruciate ligament (PCL) repair and reconstruction procedures are not included in the episode construct due to different patient journeys relative to other procedures. Knee arthroscopies and interventions such as those mentioned above may be performed for both traumatic (e.g., sports injury) and non-traumatic knee conditions (e.g., symptomatic OA of the knee).

As depicted in Exhibit 1, the patient journey begins when a patient experiences knee pain that inadequately responds to nonsurgical treatment (e.g., physical therapy, steroid medication) and seeks consultation with a provider. The patient is evaluated for knee pain and may receive anti-inflammatory medications, a brace or other support, and / or knee imaging (e.g., MRI). The provider assesses whether a surgery is necessary based on unique patient factors and will either refer to surgery or to continued non-surgical management. If the outpatient procedure occurs, anesthesia may be administered and the arthroscopy and associated interventions are performed. Following surgery, the patient typically is sent home and should receive post-surgical follow-up care with the clinical team, as well as physical therapy, as necessary. Pain management may also be required, including the prescription of analgesics.

Patients may develop complications during the procedure and/or afterwards. Potential complications include infection of the surgical site, persistent bleeding, and incomplete or insufficient resolution of pain or symptoms.

[11] See, for example, the inclusion of the metric “Initiation of alcohol and other drug dependence treatment” in the quality metrics of the CPC program. Available at http://www.medicaid.ohio.gov/Portals/0/Providers/PaymentInnovation/CPC/qualityMetricSpecs.pdf. Accessed on December 11, 2017.

EXHIBIT 1 – KNEE ARTHROSCOPY PATIENT JOURNEY

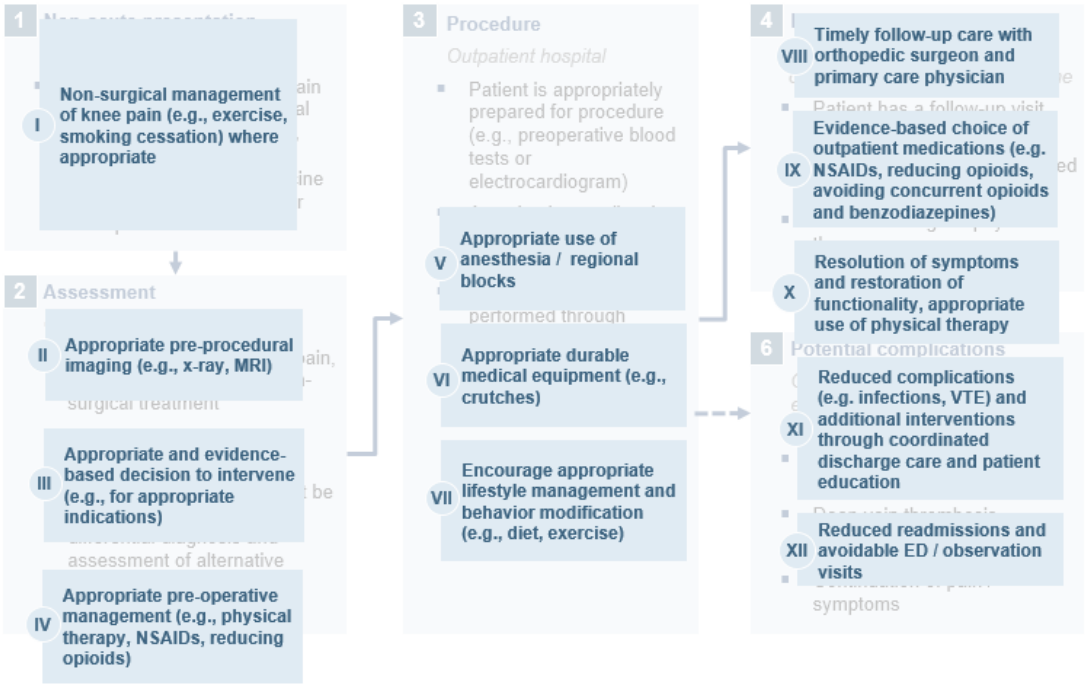


[1] Additional interventions may be considered and recommended (e.g., knee replacement).

1.3 Potential sources of value within the patient journey

Within the knee arthroscopy episode, providers have several opportunities to improve quality of care and reduce unnecessary spend (see Exhibit 2). For example, one key source of value is encouraging appropriate and evidence-based decisions to intervene based on guidelines for unique patient types and clinical presentations. For instance, rather than pursuing surgery, providers may recommend non-surgical management in certain patients. During the post-operative period, providers should offer patients the appropriate durable medical equipment (e.g., bracing, crutches) to address symptoms and prevent further injury. Improvements in care such as these may help to reduce long-term complications, restore functionality, and decrease unnecessary costs while also resolving the symptoms that led to the procedure.

EXHIBIT 2 – KNEE ARTHROSCOPY SOURCES OF VALUE



2. OVERVIEW OF THE KNEE ARTHROSCOPY EPISODE DESIGN

2.1 Episode Trigger

The knee arthroscopy episode is triggered by a professional claim for a knee arthroscopy procedure performed in an outpatient setting. The triggering arthroscopy procedures include both interventional and diagnostic procedures (see Table 1 for the list of triggering CPT codes, and Exhibit 3 in the Appendix for an analysis of triggers).

2.2 Principal Accountable Provider

The principal accountable provider (PAP) is the person or entity best positioned to influence the patient journey and the clinical decisions made throughout the course of the episode. For the knee arthroscopy episode, the PAP is the surgeon who performed the surgery. Because this provider is directly involved in the procedure, he or she is in the best position to promote adherence to guidelines, prevent complications, and influence other sources of value (see Exhibit 4 in the Appendix for the distribution of average risk-adjusted spend by PAP).

2.3 Episode Duration

The knee arthroscopy episode begins 60 days prior to the triggering procedure (called the “pre-trigger window”), includes the day of the procedure and overlapping outpatient claims (called the “trigger window”), and ends 60 days afterwards (called the “post-trigger window”). The 60-day post-procedure period is split into two “post-trigger windows”: a 30-day post-trigger window (called “post-trigger window 1”) followed by a second 30-day post-trigger window (called “post-trigger window 2”). The rationale for the split post-trigger window relates to which services are included and is described in greater detail in section 2.4.

2.4 Included Services

The episode model is designed to address spend for care and services directly related to the diagnosis, treatment, and immediate recovery phase for patients undergoing a knee arthroscopy procedure. Each period of the patient journey, or episode “window,” has a distinct claim inclusion logic derived from two major criteria: 1) that the type of included care and services must correspond to that period of the patient journey and 2) that the included care and services are understood to be directly or indirectly influenced by the PAP during that period.

The knee arthroscopy episode is comprised of four distinct windows for the purpose of spend inclusions: a pre-trigger window, a trigger window, a post-trigger window 1, and a post-trigger window 2. Inclusions in the different episode windows are as follows:

- Pre-trigger window (60 days through 1 day prior to the trigger): visits for workup and assessment as well as related imaging and testing (e.g., x-ray) are included.
- Trigger window (when the procedure and associated outpatient stay occurs): the knee arthroscopy procedure itself, any related procedures, including imaging, anesthesia, and medications as well as care for complications are included.
- Post-trigger window 1 (one through 30 days following discharge from the triggering facility): all immediate post-operative complications (e.g., surgical site infection, bleeding), related follow-up care (e.g., office or clinic follow-up visits, physical therapy, imaging), and related prescriptions are included.
- Post-trigger window 2 (31 through 60 days following discharge from the triggering facility): only spend related to opioid prescriptions is included.

The total episode spend is calculated by adding up the spend amounts on all of the individual claims that were included in the episode window.

2.5 Episode Exclusions and Risk Factors

To ensure that episodes are comparable across patient panels, select risk factors and exclusions are applied before assessing PAP performance. Risk factors are applied to episodes to make spend more comparable across different patient severities, while episode exclusions are applied when a clinical factor deems the patient too severe (and too high spend) for risk adjustment to be possible.

In the context of episode design, risk factors are attributes (e.g., age) or underlying clinical conditions (e.g., heart conditions) that are likely to impact a patient's course of care and the spend associated with a given episode. Risk factors are selected via a standardized and iterative risk-adjustment process which gives due consideration to clinical relevance, statistical significance, and other contextual factors. Based on the selected risk factors, each episode is assigned a risk score. The total episode spend and the risk score are used to arrive at an adjusted episode spend. This value is used to calculate a provider's average risk-adjusted spend across all episodes, which is the measure across which providers are compared to each other.[12] Table 2 in the

12 For a detailed description of the principles and process of risk adjustment for the episode-based payment model see the document, "Supporting documentation on episode risk adjustment." A current

Appendix lists the episode risk factors, and Exhibit 5 presents an analysis of these risk factors.

By contrast, an episode is excluded from a patient panel when the patient has clinical factors that suggest he or she has experienced a distinct or different journey indicative of significant increases in spend relative to the average patient. In addition, there are several "business-related" exclusions regarding reimbursement policy (e.g., whether a patient sought care out of state), the completeness of spend data for that patient (e.g., third-party liability or dual eligibility), and other topics relating to episode design and implementation, such as overlapping episodes, during the comparison period. Episodes with no exclusions are known as "valid" and used for provider comparisons. Episodes that have one of any of the exclusions are known as "invalid" episodes.

For the knee arthroscopy episode, both clinical and business exclusions apply. Several of the business exclusions (e.g., dual Medicare and Medicaid eligibility, patient left against medical advice) are standard across most episodes while clinical exclusions relate to the scope of the episode design. The list of business and clinical exclusions is included in Table 3, and Exhibit 6 presents an analysis of these exclusions in the Appendix.

2.6 Quality and Utilization Metrics

To ensure the episode model incentivizes quality care, the knee arthroscopy episode has seven quality and utilization metrics. One is linked to performance assessment, meaning that performance thresholds on these must be met in order for PAP to be eligible for positive incentive payments. The specific threshold amount will be determined during the informational reporting period. Five of the quality and utilization metrics are for informational purposes only.

The metric tied to positive incentive payments is the average difference in morphine equivalent dose (MED)/day between the post-trigger opioid window (31-60 days after the trigger window) and the pre-trigger opioid window (31-60 days prior to the trigger window), across valid episodes with at least one opioid prescription during the episode window. Informational metrics include the average MED/day during the 31-60 days before the trigger window, the average MED/day during the 31-60 days after the trigger window, the percentage of valid episodes with a non-indicated primary diagnosis on the trigger claim, the percentage of valid episodes with more than one

version of this document is available here: http://www.medicaid.ohio.gov/Portals/0/Providers/PaymentInnovation/Episodes/Episode-Risk-Adjustment.pdf. Accessed on December 11, 2017.

MRI during the episode window, and the percentage of valid episodes with both an opioid prescription and a benzodiazepine prescription filled during the trigger, post-trigger window 1, or post-trigger window 2.

The three opioid metrics above, which are standard across many episodes (orthopedic and other), aim to: 1) raise awareness of prescribing patterns of the PAP and other prescribers; 2) assist in identifying opioid patients at higher risk for misuse.

A complete list of quality and utilization metrics is provided in Table 4, and Exhibit 7 presents an analysis of these quality and utilization metrics in the Appendix.

3. APPENDIX: SUPPORTING INFORMATION AND ANALYSES

Table 1 – Episode triggers for knee arthroscopy

Trigger category	Trigger codes (CPT)	Description
Arthroscopy with ACL procedure	29888	Arthroscopically aided anterior cruciate ligament repair/augmentation or reconstruction
Arthroscopy with foreign body removal	29874	Arthroscopy, knee, surgical; for removal of loose body or foreign body (e.g., osteochondritis dissecans fragmentation, chondral fragmentation)
Arthroscopy with lateral release	29873	Arthroscopy, knee, surgical; with lateral release
Arthroscopy with lysis of adhesions	29884	Arthroscopy, knee, surgical; with lysis of adhesions, with or without manipulation (separate procedure)
Arthroscopy with meniscal procedure	29880	Arthroscopy, knee, surgical; with meniscectomy (medial AND lateral, including any meniscal shaving) including debridement/shaving of articular cartilage (chondroplasty), same or separate compartment(s), when performed
	29881	Arthroscopy, knee, surgical; with meniscectomy (medial OR lateral, including any meniscal shaving) including debridement/shaving of articular cartilage (chondroplasty), same or separate compartment(s), when performed
	29882	Arthroscopy, knee, surgical; with meniscus repair (medial OR lateral)
	29883	Arthroscopy, knee, surgical; with meniscus repair (medial AND lateral)
	29868	Arthroscopy, knee, surgical; meniscal transplantation (includes arthrotomy for meniscal insertion), medial or lateral
Arthroscopy with synovect-omy	29875	Arthroscopy, knee, surgical; synovectomy, limited (e.g., plica or shelf resection) (separate procedure)
	29876	Arthroscopy, knee, surgical; synovectomy, major, 2 or more compartments (e.g., medial or lateral)
Procedure for osteochon-dritis	29885	Arthroscopy, knee, surgical; drilling for osteochondritis dissecans with bone grafting, with or without internal fixation (including debridement of base of lesion)
	29886	Arthroscopy, knee, surgical; drilling for intact osteochondritis dissecans lesion

Trigger category	Trigger codes (CPT)	Description
	29887	Arthroscopy, knee, surgical; drilling for intact osteochondritis dissecans lesion with internal fixation
Arthroscopy for chondral lesion	29877	Arthroscopy, knee, surgical; debridement/shaving of articular cartilage (chondroplasty)
	29879	Arthroscopy, knee, surgical; abrasion arthroplasty (includes chondroplasty where necessary) or multiple drilling or microfracture
	29866	Arthroscopy, knee, surgical; osteochondral autograft(s) (e.g., mosaicplasty) (includes harvesting of the autograft[s])
	29867	Arthroscopy, knee, surgical; osteochondral allograft (e.g., mosaicplasty)
Diagnostic arthroscopy	29870	Arthroscopy, knee, diagnostic, with or without synovial biopsy (separate procedure)

Table 2 – Episode risk factors

Risk factor	Relevant time period
Osteomyelitis	During the 365 days before the episode and the episode window
ACL sprain	During the trigger window
Anemia	During the 365 days before the episode and the episode window
Substance abuse	During the 365 days before the episode and the episode window
Indications for non-ACL repairs / reconstructions (e.g., meniscal tears)	During the trigger window
Other connective disorders	During the 365 days before the episode and the episode window
Pulmonary heart disease	During the 365 days before the episode and the episode window
White blood cells disease	During the 365 days before the episode and the episode window

Table 3 – Episode exclusions

Exclusion type	Episode exclusion	Description	Relevant time period
Business exclusion	Out of state	PAP operates out of state	N/A
	FQHC/RHC	PAP is classified as a federally qualified health center or rural health clinic	N/A
	No PAP	An episode is excluded if the PAP cannot be identified	During the episode window
	Enrollment	Patient is not enrolled in Medicaid	During the episode window
	Third party liability	An episode is excluded if third-party liability charges are present on any claim or claim detail line or if the patient has relevant third-party coverage at any time	During the episode window
	Multi Payer	An episode is excluded if a patient changes enrollment between FFS and an MCP or between MCPs	During the episode window
	Dual	An episode is excluded if the patient had dual coverage by Medicare and Medicaid	During the episode window
	No DRG	An episode is excluded if a DRG-paid inpatient claim is missing the APR-DRG and severity of illness	During the episode window
	Long admission	An episode is excluded if the patient has one or more hospital admissions for a duration greater than 30 days	During the episode window

Exclusion type	Episode exclusion	Description	Relevant time period
	Long term care	An episode is excluded if the patient has one or more long-term care claim detail lines which overlap the episode window	During the episode window
	Incomplete episodes	An episode is excluded if the non-risk-adjusted episode spend is less than the incomplete episode threshold.	During the episode window
Standard clinical exclusion	Left against medical advice	Patient has discharge status of "left against medical advice"	During the episode window
	Death	An episode is excluded if the patient has a discharge status of "expired" on any inpatient or outpatient claim	During the episode window
	Cancer Treatment	Patient has diagnosis of cancer and procedures for active management of cancer	During the episode or up to 90 days before the start of the episode
	ESRD	Patient has diagnosis or procedure for end stage renal disease	During the episode or up to 365 days before the start of the episode
	Cystic Fibrosis	Patient has diagnosis of cystic fibrosis during the episode	During the episode or up to 365 days before the start of the episode
	Multiple Sclerosis	Patient has diagnosis of multiple sclerosis	During the episode window or during 365 days before the start of the episode

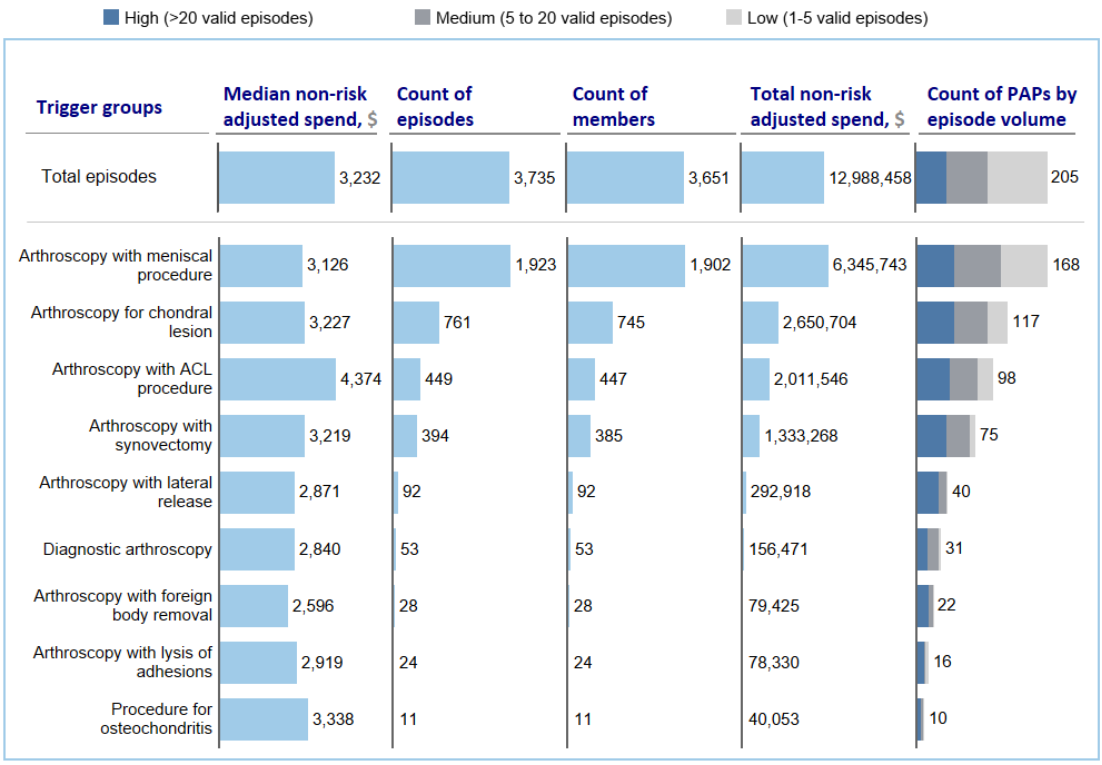
Exclusion type	Episode exclusion	Description	Relevant time period
	Coma	Patient has diagnosis of coma during the episode	During the episode or up to 365 days before the start of the episode
	Transplant	An episode is excluded if a patient has an organ transplant	During the episode or up to 365 days before the start of the episode
	Paralysis	Patient has diagnosis of paralysis	During the episode or up to 365 days before the start of the episode
	HIV	Patient has diagnosis of HIV	During the episode or up to 365 days before the start of the episode
Episode-specific clinical exclusion	Total knee replacement	Patient receives total knee replacement	During the trigger window
	Age above 64 or below 18 years	Patient is ages above 64 years or below 18 years	Episode start date

Table 4 – Episode quality and utilization metrics

Metric type	Quality or utilization metric	Description	Relevant time period
Tied to incentive payments	Difference between average MED / day in the pre-trigger opioid window and the post-trigger opioid window [13]	Difference between average MED / day in the pre-trigger opioid window and the post-trigger opioid window	During the pre-trigger opioid window and post-trigger opioid window
Informational	Average MED / day during the pre-trigger opioid window	Average MED per day during the pre-trigger opioid window among patients with an opioid prescription	During the pre-trigger opioid window
	Average MED / day during the post-trigger opioid window	Average MED per day during the post-trigger opioid window among patients with an opioid prescription	During the post-trigger opioid window
	Non-indicated episodes	Percent of valid episodes where the trigger claim has a non-indicated primary diagnosis	During the trigger window
	Multiple MRIs	Percent of valid episodes that contain more than one MRI	During the episode window
	Concurrent opioid and benzodiazepine	Percent of valid episodes that contain a prescription for an opioid and a benzodiazepine in the episode window	During the episode window

[13] The pre-trigger opioid window and post-trigger opioid window are specific time periods that are defined in the detailed business requirements.

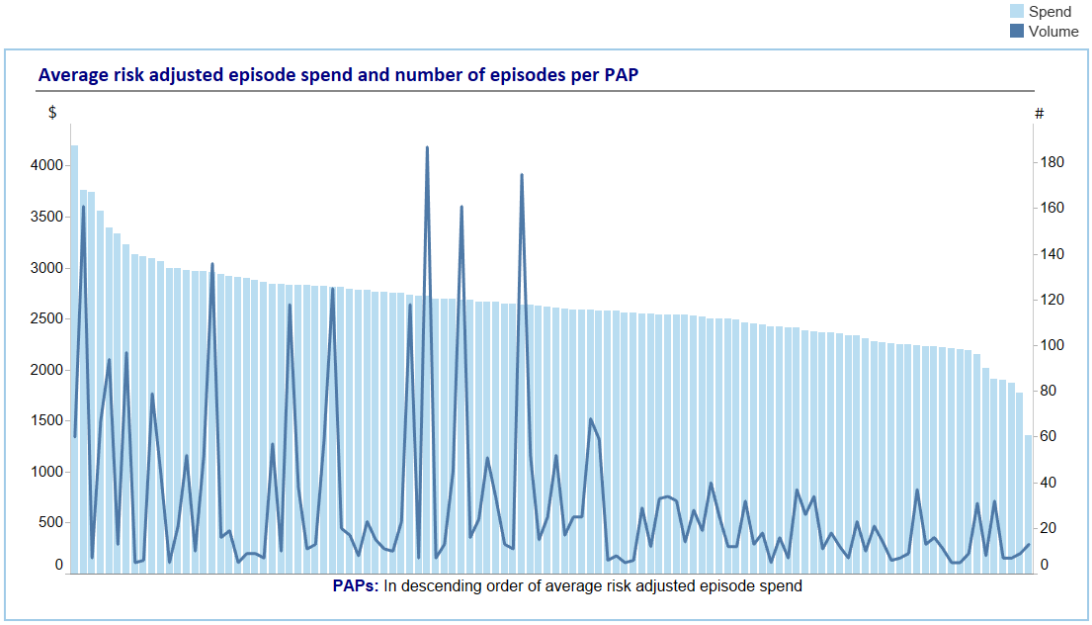
EXHIBIT 3 –TRIGGER GROUPS[1]



1. For valid episodes (3,735 episodes) across 205 PAPs; valid episodes do not include episodes with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., HIV, ESRD); count of PAPs includes valid PAPs (e.g., ≥ 5 valid episodes) and invalid PAPs (e.g., < 5 valid episodes)
2. Low volume is defined as PAPs with less than five valid episodes, Medium volume as PAPs with five to 20 valid episodes and High volume as PAPs with more than 20 valid episodes
3. Median spend based on the current episode algorithm

SOURCE: OH claims data, episodes ending between 10/1/2014 and 9/30/2015

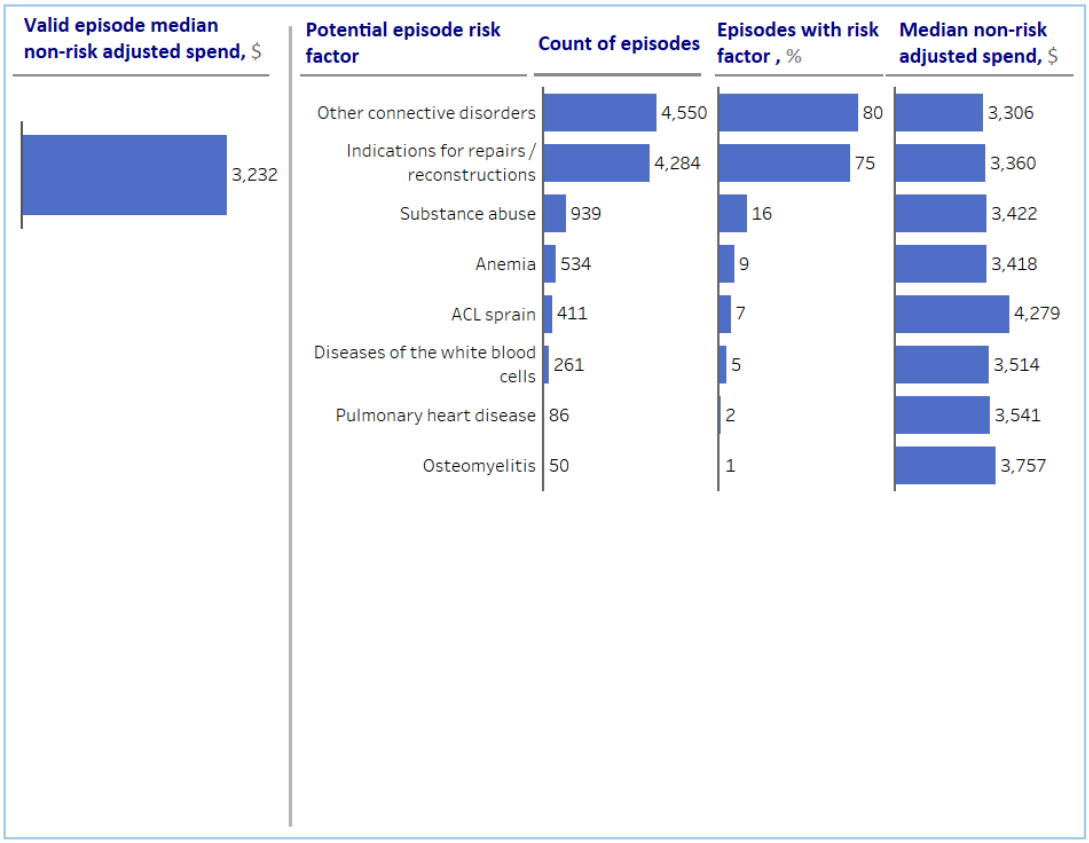
EXHIBIT 4 - DISTRIBUTION OF RISK ADJUSTED AVERAGE EPISODE SPEND AND COUNT BY PAP[1]



1. For valid episodes (3,575) across PAPs with at least 5 valid episodes (112); valid episodes do not include those with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., cancer, ESRD)

SOURCE: OH claims data, episodes ending between 10/1/2014 and 9/30/2015

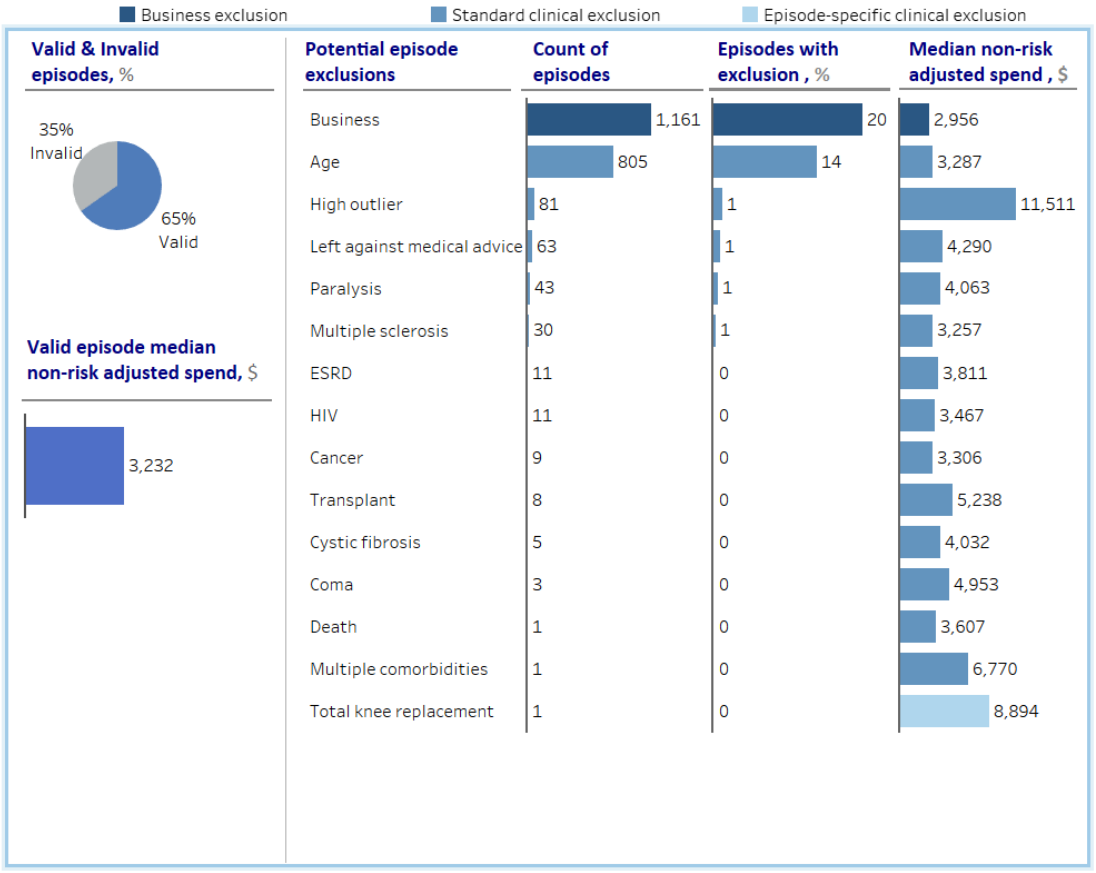
EXHIBIT 5 – EPISODE COUNT AND SPEND BY EPISODE RISK FACTOR[1]



1. For episodes with this risk factor; one episode can have multiple risk factors

SOURCE: OH claims data, episodes ending between 10/1/2014 and 9/30/2015

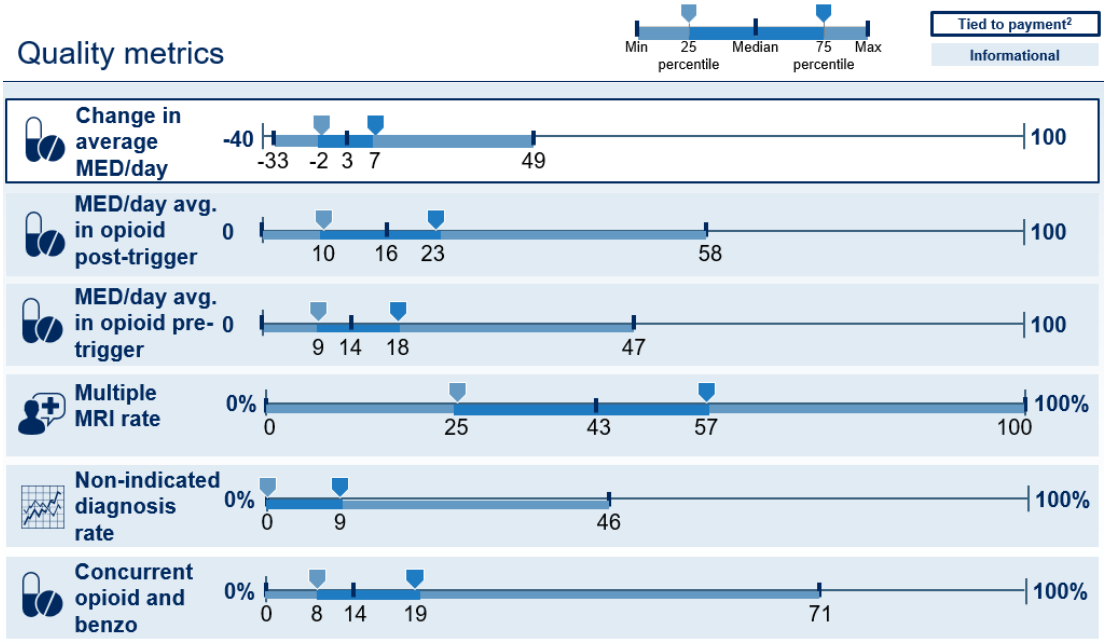
EXHIBIT 6 – EPISODE COUNT AND SPEND BY EPISODE EXCLUSION[1]



1 Individual business exclusions are collapsed into one row
Note: Non-adjusted spend for episodes with this exclusion; one episode can have multiple exclusions

SOURCE: OH claims data, episodes ending between 10/1/2014 and 9/30/2015

EXHIBIT 7 – PAP PERFORMANCE ON EPISODE QUALITY AND UTILIZATION METRICS[1]



1. For valid episodes (3,727) across valid PAPs (112); valid episodes do not include episodes with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., total knee replacement); valid PAPs are physicians with five or more. Valid episodes for invalid PAPs (those with less than five valid episodes) are not included in this analysis.

SOURCE: OH claims data, episodes ending between 10/1/2014 and 9/30/2015