Overview of the spinal fusion and the spinal decompression without fusion episodes of care

State of Ohio

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1. CLINICAL OVERVIEW AND RATIONALE FOR DEVELOPMENT OF THE SPINAL FUSION AND THE SPINAL DECOMPRESSION WITHOUT FUSION EPISODES

1.1 Rationale for development of the spinal fusion and the spinal decompression without fusion episodes of care

Low back pain and neck pain are common ailments and major sources of morbidity in many countries. About 80% of people have at least one episode of low back pain and 50-70% of people have at least one episode of neck pain during their lifetime.[1,2] Spinal surgery is one of the modalities to treat specific types of back or neck pain. Different surgical techniques and approaches can be used based on the patient's underlying condition. Types of surgeries include spinal fusion, total disc arthroplasty, laminoplasty and spinal decompression without fusion (which includes laminectomy, laminotomy, discectomy, facetectomy, and foraminotomy). The rate of spinal surgery as a result of back or neck conditions is increasing, although with significant geographic variation in spinal surgery rates.[3] In 2011, more than 480,000 spinal fusion surgeries were performed in the United States, representing an increase of 70% from 2001 to 2011.[4] During the same time period, more than 490,000 laminectomy procedures (the most common form of spinal decompression) were performed, the rates for which remained relatively stable from 2001 to 2011.[5]

[1] National Institute of Neurological Disorders and Stroke. Low Back Pain Fact Sheet. 2016. Available at www.ninds.nih.gov/disorders/backpain/detail_backpain.htm. Accessed on December 11, 2017.

[2] Croft PR, Lewis M, et al. Risk factors for neck pain: a longitudinal study in the general population. *Pain*. 2001;93(3):317–25.

[3] Weinstein JN, Lurie JD, Olson PR, Bronner KK, Fisher ES. United States' trends and regional variations in lumbar spine surgery: 1992–2003. *Spine*. 2006;31(23):2707–2714.

[4] Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2001-2011.

[5] *Ibid*.

Ohio Medicaid beneficiaries aged 18 and above received over 1,900 spinal fusion, total disc arthroplasty, and laminoplasty procedures and over 1,000 spinal decompression procedures without a spinal fusion in 2014-15.[6] This represents approximately $42 million in spend for these forms of spinal surgeries. The median cost for spinal fusion was around $18,000 per episode; and the median cost for spinal decompression without fusion was around $4,400 per episode.

There is limited evidence in support of spinal surgery when treating degenerative discs with back pain alone.[7] Additionally, there is limited evidence related to significant improvement in health status after spinal surgery.[8] European Cooperation in Science and Technology (COST) guidelines recommend supervised exercise therapy as first-line treatment for chronic low back pain and recommend against fusion surgery unless two years of all other recommended conservative treatments have failed.[9]

When spinal surgery is indicated, there are many opportunities to improve guideline-concordant care in order to support optimal patient outcomes. Evidence-based clinical guidelines recommended by the North American Spine Society (NASS) outline several best practices for clinicians to improve quality of care and outcomes for patients.[10,11] Guidelines suggest the use of preoperative prophylactic antibiotics to decrease infection rates in patients undergoing spinal surgery.[12] Evidence also suggests the use of appropriate prophylactic antithrombotic measures (such as the use of compression stockings, chemoprophylaxis medications) following elective spinal surgery to decrease the rates of clinical symptomatic deep vein thrombosis (DVT) and/or pulmonary embolism (PE).[13]

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

7 Mirza SK, Deyo RA. Systematic review of randomized trials comparing lumbar fusion surgery to nonoperative care for treatment of chronic back pain. *Spine*. 2007;32(7):816-23.

8 Martin BI, Deyo RA, et al. Expenditures and health status among adults with back and neck problems. *JAMA*. 2008;299(6):656-64.

9 Airaksinen O, Brox JI, et al. European guidelines for the management of chronic nonspecific low back pain. *Eur Spine J*. 2006;15(Suppl 2):S192-300.

10 North American Spine Society (NASS). Evidence-based clinical guidelines for multi-disciplinary spine care. Diagnosis and treatment of degenerative lumbar spinal stenosis, Revised 2011

11 NASS. Evidence-based clinical guidelines for multi-disciplinary spine care. Diagnosis and treatment of cervical radiculopathy from degenerative disorders, 2010

12 NASS. Evidence-based clinical guidelines for multi-disciplinary spine care. Antibiotic prophylaxis in spine surgery, Revised 2013

13 NASS. Evidence-based clinical guidelines for multi-disciplinary spine care. Antithrombotic therapies in spine surgery, 2009

Despite these clinical guidelines, surgical and treatment practices during the pre-operative, operative, and perioperative periods of a spinal fusion and spinal decompression without fusion 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 spinal fusion and the spinal decompression without fusion episodes will complement other orthopedic episodes (e.g., low back pain) and Ohio's Comprehensive Primary Care (CPC) program to help reduce unnecessary practice variation and incentivize evidence-based care. For example, within the CPC program, providers may help to manage osteoporosis while in the episodes program orthopedic surgeons may minimize procedural and other complications during the operative and post-operative periods. In addition, CPC program quality metrics encourage initiation of alcohol and drug dependence treatments,[14] 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 spinal fusion and spinal decompression without fusion episodes

Spinal decompression surgery refers to various surgical procedures that are performed to alleviate pain caused by pressure or compression on the spinal cord and/or nerve roots.

The spinal decompression without fusion episode includes procedures such as laminectomy (removal of spinal lamina), laminotomy (removal of a section of lamina), discectomy (removal of a portion of disc), and foraminotomy (removal of bone and/or tissue to expand openings for the nerve roots to exit the spinal cord).

The spinal fusion episode includes procedures such as spinal fusion, total disc arthroplasty, and laminoplasty. Spinal fusion is a surgical procedure to join or fuse two or more spinal vertebrae, eliminating motion between them. Spinal fusion may be done alone or along with other spinal procedures, such as laminectomy, in order to remove the tissue or bone that may be compressing the spinal cord and/or the spinal nerves. Spinal fusion may be performed along with decompression surgery to stabilize the spine, most often in cases of decompression for multiple levels of the spine. Total disc arthroplasty involves inserting an artificial disc into the

[14] 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.

intervertebral space after the natural disc has been removed. The use of a prosthetic device aims to preserve motion in the treated vertebral segment and have protective effect on adjacent levels. Laminoplasty is a surgical procedure to reshape/reposition bone to relieve excess pressure on the spinal nerve(s).

Exhibit 1 addresses the overlaps between low back pain, spinal fusion, and spinal decompression without fusion episodes. Low back pain episodes with evidence of spinal fusion or spinal decompression without fusion either in the trigger or post-trigger windows are excluded. Additionally, the presence of decompression with or without spinal fusion up to 60 days prior to the low back pain trigger excludes the episode. Spinal decompression without fusion contains only decompression procedures (e.g., laminectomy alone, without performance of fusion). Spinal fusion episode includes spinal procedures such as spine fusion, total disc arthroplasty, laminoplasty or combined procedures with spinal fusion (e.g., laminectomy with spinal fusion).

EXHIBIT 1 – ADDRESSING OVERLAP BETWEEN LOW BACK PAIN AND SPINAL SURGERIES

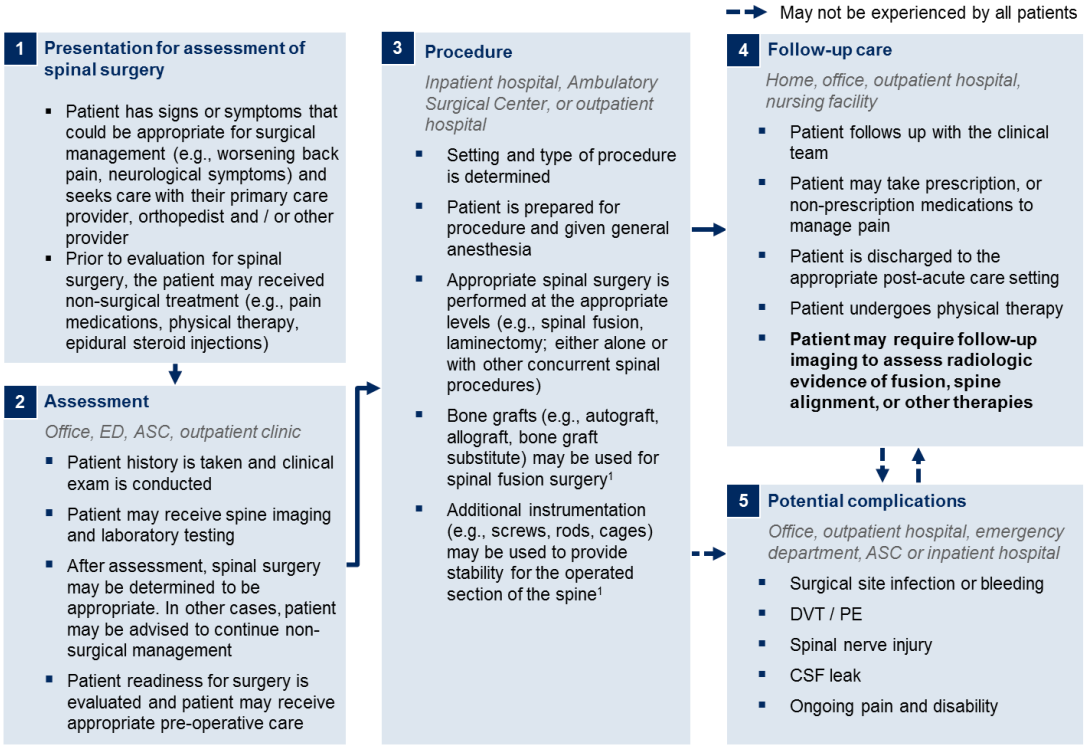
Overlap with / Episode	Low back pain	Spinal decompression without fusion	Spinal fusion
Low back pain	N/A	Low back pain episode is triggered but excluded	Low back pain episode is triggered but excluded
Spinal decompression without fusion	Low back pain episode is triggered but excluded	N/A	Decompression episode is triggered but excluded
Spinal fusion	Low back pain episode is triggered but excluded	Decompression episode is triggered but excluded	N/A

As depicted in Exhibit 2, the patient journey begins when a patient experiences ongoing or worsening pain (e.g., low back pain, neck pain) and/or neurological signs and symptoms. The patient may begin initial non-surgical treatments such as physical therapy, lifestyle modification, epidural steroid injections, and/or pain medications depending on the patient's underlying condition or exposure to previous treatments. The patient's underlying condition or failure of non-surgical management may warrant a spinal surgery (such as spinal decompression with or without fusion). During the procedure, general anesthesia is used and the surgery is performed using either a minimally invasive or an open approach. A bone graft and/or bone graft

substitute is utilized during surgery to create an environment for a solid bridge to form between the two vertebral levels.[15] Additionally, spinal instrumentation (e.g., cages, screws, rods) may be used to provide stability for the section of the spine.[11] After the surgery, the patient will be discharged and should receive post-surgical follow-up care, including care such as follow-up visits, physical therapy, and/or bracing. Patients will receive physical therapy and may require follow-up imaging to assess post-operative status (e.g., radiologic evidence of fusion, spine alignment). Follow-up visits may be necessary to assess resolution of symptoms and restoration of the patient's functionality. Pain management may also be necessary, including the prescription of analgesics.

Patients may develop complications both during the procedure and afterwards. Potential complications include infection of the surgical site, persistent bleeding, spinal nerve injury, complications of anesthesia, non-resolution of symptoms, or failure to recover sufficient functionality

EXHIBIT 2 – SPINAL FUSION AND SPINAL DECOMPRESSION WITHOUT FUSION PATIENT JOURNEY



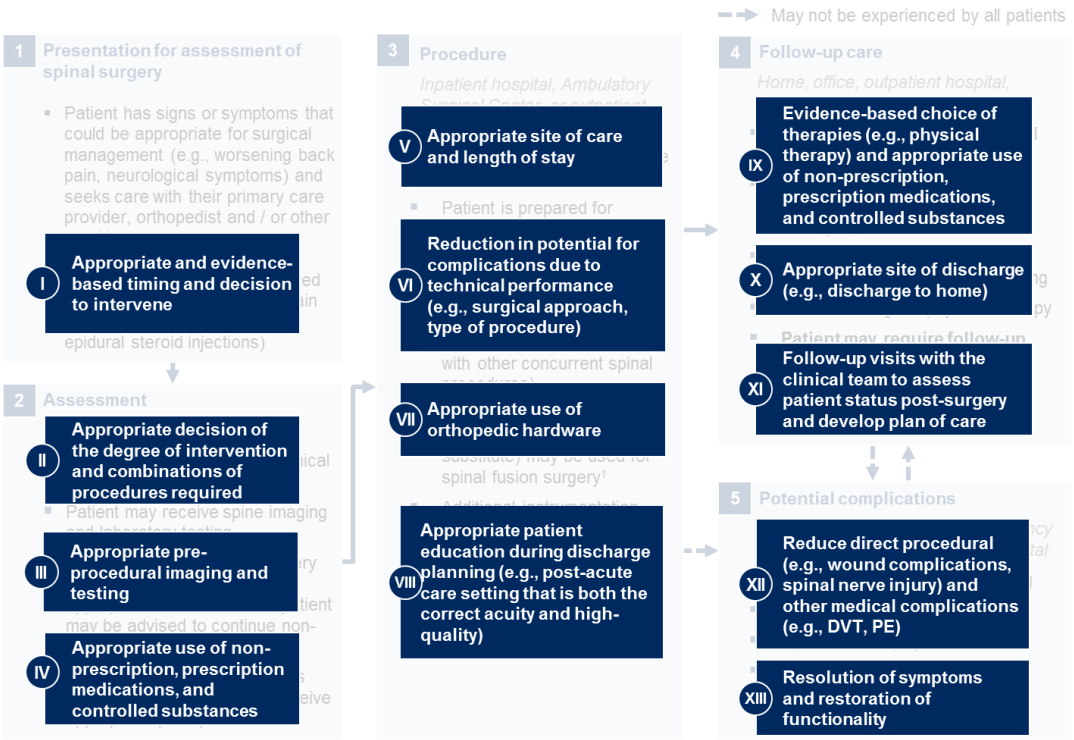
[1] Specific to spinal fusion

[15] Specific to spinal fusion episode

1.3 Potential sources of value within the patient journey

Within the spinal fusion and the spinal decompression without fusion episodes, providers have several opportunities to improve quality of care and reduce unnecessary spend associated with the episode (see Exhibit 3). For example, providers can make use of appropriate evidence-based non-surgical therapies prior to the procedure in order to ensure the appropriateness of the procedure. Additionally, adequate pre-operative preparation (e.g., appropriate use of pre-operative antibiotics) can result in better patient outcomes.[16] There is also an opportunity for the provider to use appropriate pain management strategies, including appropriate tapering off any potentially addictive medication. Improvements in care such as these may help to reduce long term complications, restore functionality, and optimize costs while also resolving the indications for the procedure.

EXHIBIT 3 – SPINAL FUSION AND SPINAL DECOMPRESSION WITHOUT FUSION SOURCES OF VALUE



[16] Barker FG 2nd. Efficacy of prophylactic antibiotic therapy in spinal surgery: a meta-analysis. *Neurosurgery*. 2002;51(2):391-400; discussion 400-1.

2. OVERVIEW OF THE SPINAL FUSION AND SPINAL DECOMPRESSION WITHOUT FUSION EPISODE DESIGN

2.1 Episode Trigger

The spinal fusion episode is triggered by a professional claim including a planned cervical or lumbar spinal fusion, total disc arthroplasty, or laminoplasty procedure performed in an inpatient or outpatient setting.

The spinal decompression without fusion episode is triggered by a professional claim including a planned lumbar or cervical spinal laminectomy, laminotomy, facetectomy, foraminotomy, or discectomy procedure performed in an inpatient or outpatient setting.

Thoracic spinal procedures or cervical procedures above C2 do not trigger episodes for fusion nor decompression, as these procedures are mainly indicated for spine neoplasms, severe deformities, or trauma, which are indicative of different patient journeys (see Tables 1A and 1B for the list of triggering CPT codes, and Exhibit 4 in the Appendix for analyses 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 spinal fusion and the spinal decompression without fusion episodes, 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 5 in the Appendix for the distribution of average non-risk adjusted spend by PAP).

2.3 Episode Duration

The spinal fusion and the spinal decompression without fusion episodes begin 30 days prior to the triggering procedure (called the “pre-trigger window”), includes the day of the procedure and any admission required for recovery from the procedure (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 spinal fusion or decompression without fusion 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 spinal fusion and the spinal decompression without fusion episodes are each 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 (30 days through 1 day prior to the trigger): all specific evaluation and management encounters (e.g., office or clinic visits with the PAP), relevant pre-operative imaging, testing, and pathology (e.g., lumbar spine x-ray, cervical spine x-ray, MRI, CT scan), and specific medications are included.
- Trigger window (when the procedure and potential associated admission occurs): all medical spend and all pharmacy spend for relevant medications (e.g., analgesics, NSAIDs) is included.
- Post-trigger window 1 (one through 30 days following discharge from the triggering facility): post-operative care (e.g. physical therapy), immediate post-operative complications (e.g. spinal cord injury, hemorrhage, infections), related follow up care (e.g., office or clinic follow-up visits), and medications (e.g., opioid prescriptions) are included. Post-trigger window 1 also includes repeat procedures, and skilled nursing home facility stays.
- Post-trigger window 2 (31 through 60 days following discharge from the triggering facility): spend in the post-trigger window 2 includes spend related to opioid prescriptions and repeat procedures.

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.[17] Table 2 in the Appendix lists potential risk factors, and Exhibit 6 presents an analysis of these risk factors. Note that the final list of risk factors will be determined after feedback from providers.

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 spinal fusion and the spinal decompression without fusion episodes, 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. A standard business exclusion that does not apply to the spinal fusion and the

17 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 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.

spinal decompression without fusion episodes is long term care. Examples of clinical exclusions that do apply include spine fracture, tumor, or spine infection.

To address the overlaps between low back pain, spinal fusion, and spinal decompression without fusion episodes, the following rules apply:

- **Low back pain episode:** If a trigger code for a spinal surgery (spinal decompression with or without fusion) is present in the episode window or up to 60 days prior to the episode, the low back pain episode is excluded
- **Spinal decompression without fusion episode:** If a trigger code for a spinal fusion procedure is present in any window, the spinal decompression without fusion episode is excluded. Any care for low back pain is included in spend in the spinal decompression without fusion episode
- **Spinal fusion episode:** If a trigger code for low back pain diagnosis or concurrent decompression procedure (e.g., laminectomy, discectomy) is present in the episode window, the spinal fusion episode is not excluded. Spend for spinal decompression without fusion or low back pain are included in spend for the spinal fusion episode

The final list of exclusions and the factors of the risk-adjustment process will be determined based on feedback from providers. The current list of business and clinical exclusions is included in Table 3, and Exhibit 7 presents an analysis of these exclusions in the Appendix.

2.6 Quality and Utilization Metrics

To ensure the episode model incentivizes quality care, both the spinal fusion and the spinal decompression without fusion episodes have 10 quality and utilization metrics. For both of these episodes, one metric is linked to performance assessment, meaning that performance thresholds on this must be met in order for PAP to be eligible for a positive incentive. The specific threshold amount will be determined during the informational reporting period. The remaining nine quality and utilization metrics are for informational purposes only.

The metric tied to positive incentive payments is the difference between the average MED/day in the pre-trigger opioid window and the post-trigger opioid window. Informational metrics include average MED/day in the pre-trigger opioid window, average MED/day in the post-trigger opioid window, percent of valid episodes with a related readmission, percent of valid episodes triggered by cervical procedures with a complication, percent of valid episodes triggered by lumbar procedures with a complication, percent of valid episodes with a follow-up visit, percent of valid episodes with non-surgical management during the year before the trigger, percent of valid episodes with physical therapy, and percent of valid episodes where the patient

filled a prescription of both an opioid and benzodiazepine. A complete list of quality and utilization metrics is provided in Table 4, and Exhibit 8 presents an analysis of these quality and utilization metrics in the Appendix.

This concludes the descriptions of all the design dimensions for the spinal surgery episodes. The next section includes supporting information and analyses related to the design dimensions for the spinal fusion and spinal decompression without fusion episodes.

3. APPENDIX: SUPPORTING INFORMATION AND ANALYSES

Table 1A – Episode triggers for spinal fusion

Trigger category	Trigger codes (CPT)	Description
Lumbar spinal fusion	22533	Arthrodesis, lateral extracavitary technique, including minimal discectomy to prepare interspace (other than for decompression); lumbar
	22558	Arthrodesis, anterior interbody technique, including minimal discectomy to prepare interspace (other than for decompression); lumbar
	22586	Arthrodesis, pre-sacral interbody technique, including disc space preparation, discectomy, with posterior instrumentation, with image guidance, includes bone graft when performed, L5-S1 interspace
	22612	Arthrodesis, posterior or posterolateral technique, single level; lumbar (with lateral transverse technique, when performed)
	22630	Arthrodesis, posterior interbody technique, including laminectomy and/or discectomy to prepare interspace (other than for decompression), single interspace; lumbar
	22633	Arthrodesis, combined posterior or posterolateral technique with posterior interbody technique including laminectomy and/or discectomy sufficient to prepare interspace (other than for decompression), single interspace and segment; lumbar
	0195T	Arthrodesis, pre-sacral interbody technique, disc space preparation, discectomy, without instrumentation, with image guidance, includes bone graft when performed; L5-S1 interspace
Cervical spinal fusion	22551	Arthrodesis, anterior interbody, including disc space preparation, discectomy, osteophytectomy and decompression of spinal cord and/or nerve roots; cervical below C2
	22554	Arthrodesis, anterior interbody technique, including minimal discectomy to prepare interspace (other than for decompression); cervical below C2
	22600	Arthrodesis, posterior or posterolateral technique, single level; cervical below C2 segment
Cervical lamino-plasty	63050	Laminoplasty, cervical, with decompression of the spinal cord, 2 or more vertebral segments;
	63051	Laminoplasty, cervical, with decompression of the spinal cord, 2 or more vertebral segments; with reconstruction of the posterior bony elements (including the application

Trigger category	Trigger codes (CPT)	Description
		of bridging bone graft and non-segmental fixation devices [e.g., wire, suture, mini-plates], when performed)
Cervical total disc arthro-plasty	22856	Total disc arthroplasty (artificial disc), anterior approach, including discectomy with end plate preparation (includes osteophytectomy for nerve root or spinal cord decompression and microdissection), single interspace, cervical
	22861	Revision including replacement of total disc arthroplasty (artificial disc), anterior approach, single interspace; cervical
Lumbar total disc arthro-plasty	22857	Total disc arthroplasty (artificial disc), anterior approach, including discectomy to prepare interspace (other than for decompression), single interspace, lumbar
	22862	Revision including replacement of total disc arthroplasty (artificial disc), anterior approach, single interspace; lumbar

Table 1B – Episode triggers for spinal decompression without fusion

Trigger category	Trigger codes (CPT)	Description
Cervical laminect-omy	63001	Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (e.g., spinal stenosis), 1 or 2 vertebral segments; cervical
	63015	Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (e.g., spinal stenosis), more than 2 vertebral segments; cervical
	63020	Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc; 1 interspace, cervical
	63040	Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc, re-exploration, single interspace; cervical
	63045	Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [eg, spinal or lateral recess stenosis]), single vertebral segment; cervical
	63265	Laminectomy for excision or evacuation of intraspinal lesion other than neoplasm, extradural; cervical
	0274T	Percutaneous laminotomy/laminectomy (interlaminar approach) for decompression of neural elements, (with or without ligamentous resection, discectomy, facetectomy and/or foraminotomy), any method, under indirect image guidance (e.g., fluoroscopic, CT), with or without the use of an endoscope, single or multiple levels, unilateral or bilateral; cervical or thoracic
Lumbar laminect-omy	63005	Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (e.g., spinal stenosis), 1 or 2 vertebral segments; lumbar, except for spondylolisthesis
	63011	Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (e.g., spinal stenosis), 1 or 2 vertebral segments; sacral
	63012	Laminectomy with removal of abnormal facets and/or pars inter-articularis with decompression of cauda equina

Trigger category	Trigger codes (CPT)	Description
		and nerve roots for spondylolisthesis, lumbar (Gill type procedure)
	63017	Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (e.g., spinal stenosis), more than 2 vertebral segments; lumbar
	63030	Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc; 1 interspace, lumbar
	63042	Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc, re-exploration, single interspace; lumbar
	63047	Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [e.g., spinal or lateral recess stenosis]), single vertebral segment; lumbar
	63267	Laminectomy for excision or evacuation of intraspinal lesion other than neoplasm, extradural; lumbar
	63268	Laminectomy for excision or evacuation of intraspinal lesion other than neoplasm, extradural; sacral
	0275T	Percutaneous laminotomy/laminectomy (interlaminar approach) for decompression of neural elements, (with or without ligamentous resection, discectomy, facetectomy and/or foraminotomy), any method, under indirect image guidance (e.g., fluoroscopic, CT), with or without the use of an endoscope, single or multiple levels, unilateral or bilateral; lumbar

Table 2A –Episode risk factors for spinal fusion

Risk factor	Relevant time period
Congenital spine disorders	During the episode or up to 365 days before the start of the episode
Chronic Obstructive Pulmonary Disease (COPD)	During the episode or up to 365 days before the start of the episode
Gender: Female	As of episode start date
Pelvic fracture procedures	During the trigger window
Malnutrition	During the episode or up to 365 days before the start of the episode
Obesity	During the episode or up to 365 days before the start of the episode
Opioid abuse	During the pre-trigger window or up to 365 days before the start of the episode
Osteomyelitis	During the pre-trigger window or up to 365 days before the start of the episode
Other hereditary and nervous system disorders	During the episode or up to 365 days before the start of the episode
Spine deformities	During the episode or up to 365 days before the start of the episode

Table 2B –Episode risk factors for spinal decompression without fusion

Risk factor	Relevant time period
Obesity	During the episode or up to 365 days before the start of the episode
Age 56 to 65 years	As of episode start date
Spine deformities	As of episode start date
Congenital spine disorders	During the pre-trigger window or up to 365 days before the start of the episode
Cervical procedures (Triggers)	During the trigger window
Diabetes	During the episode or up to 365 days before the start of the episode
Other hereditary and nervous system disorders	During the episode or up to 365 days before the start of the episode
Acute myocardial infarction	During the pre-trigger window or trigger window or up to 365 days before the start of the episode

Table 3 – Episode exclusions

Exclusion type	Episode exclusion	Description	Relevant time period
Business exclusion[18]	Out of state	PAP operates out of state	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

[18] For the spine episodes, long term care is not considered as an exclusion.

Exclusion type	Episode exclusion	Description	Relevant time period
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
	Tuberculosis	Patient has diagnosis of tuberculosis	During the episode or up to 365 days before the start of the episode
	HIV	Patient has a diagnosis of HIV	During the episode or up to 365 days before the start of the episode
Episode-specific clinical exclusion (spinal fusion and spinal decompression	Age	Patient is younger than 18 (<18) years or older than 64 (>64) years of age	During the episode window
	Paralysis[19]	Patient has diagnosis of paralysis	During the 365 days

[19] Paralysis is a standard Ohio clinical exclusion. For the purposes of this episode, the duration for the exclusion is changed to during the 365 days before the procedure.

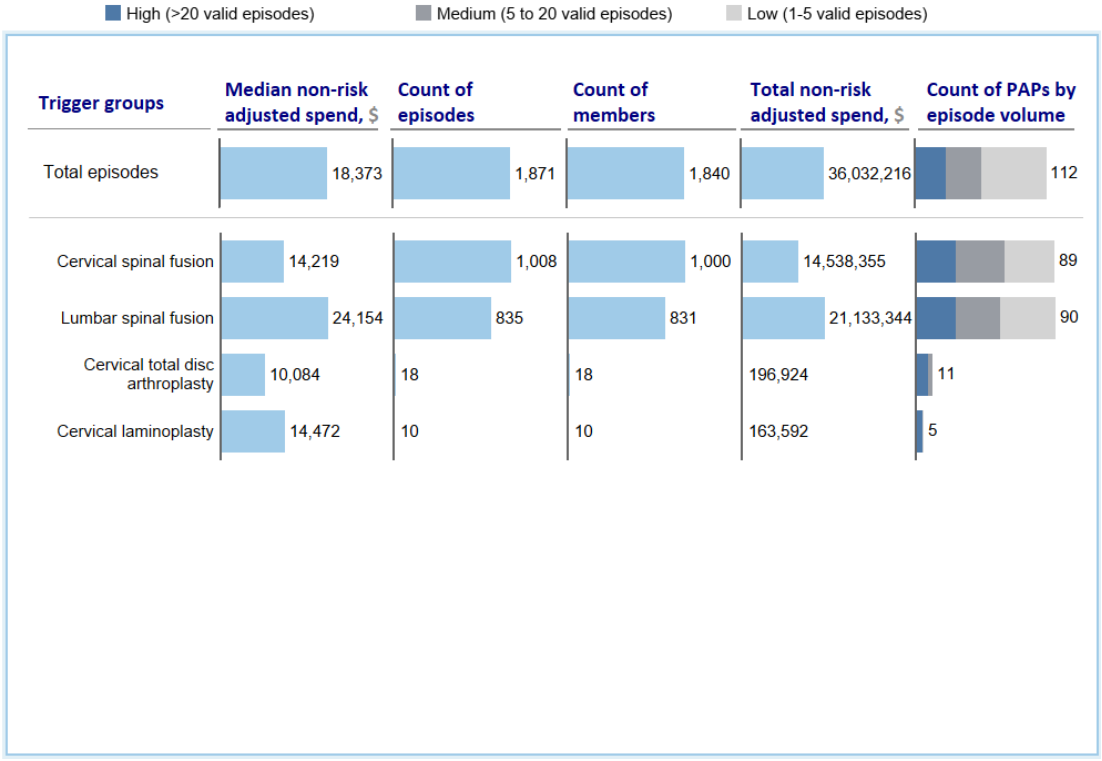
Exclusion type	Episode exclusion	Description	Relevant time period
without fusion)			before the procedure
Episode-specific clinical exclusion (spinal fusion)	Staged procedure	Patient has a staged procedure	During the trigger, post-trigger 1 or post-trigger 2 window
	Combined anterior and posterior approaches	Patient has spinal fusion surgery (combined anterior and posterior approaches)	During the trigger
Episode-specific clinical exclusion (spinal decompression without fusion)	Spinal fusion	Patient has spinal fusion surgery	During the episode window

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 post-trigger opioid window	Average difference between the MED/day in the pre-trigger opioid window and post-trigger opioid window	Opioid pre-trigger window And opioid post-trigger window
Informational	Average MED/day in pre-trigger opioid widow	Average MED/day prescribed in the pre-trigger opioid window	Opioid pre-trigger window
	Average MED/day in post-trigger opioid window	Average MED/day prescribed in the post-trigger opioid window	Opioid post-trigger window
	Rate of readmission	Percent of valid episodes with a related readmission included in spend	During the post-trigger window 1
	Rate of surgical complications in cervical episodes	Percent of valid cervical procedure episodes with a surgical complication	During the trigger or post-trigger 1 windows
	Rate of surgical complications in lumbar episodes	Percent of valid lumbar procedural episodes with a surgical complication	During the trigger or post-trigger 1 windows
	Rate of follow-up visits	Percent of valid episodes with follow-up visits after discharge	During the post-trigger window 1
	Rate of non-surgical management	Percent of valid episodes with non-surgical management before the episode	During the 365 days before the trigger window
	Rate of physical therapy after the procedure	Percent of valid episodes with evidence of physical therapy after the procedure	During post-trigger window 1 and 2
	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

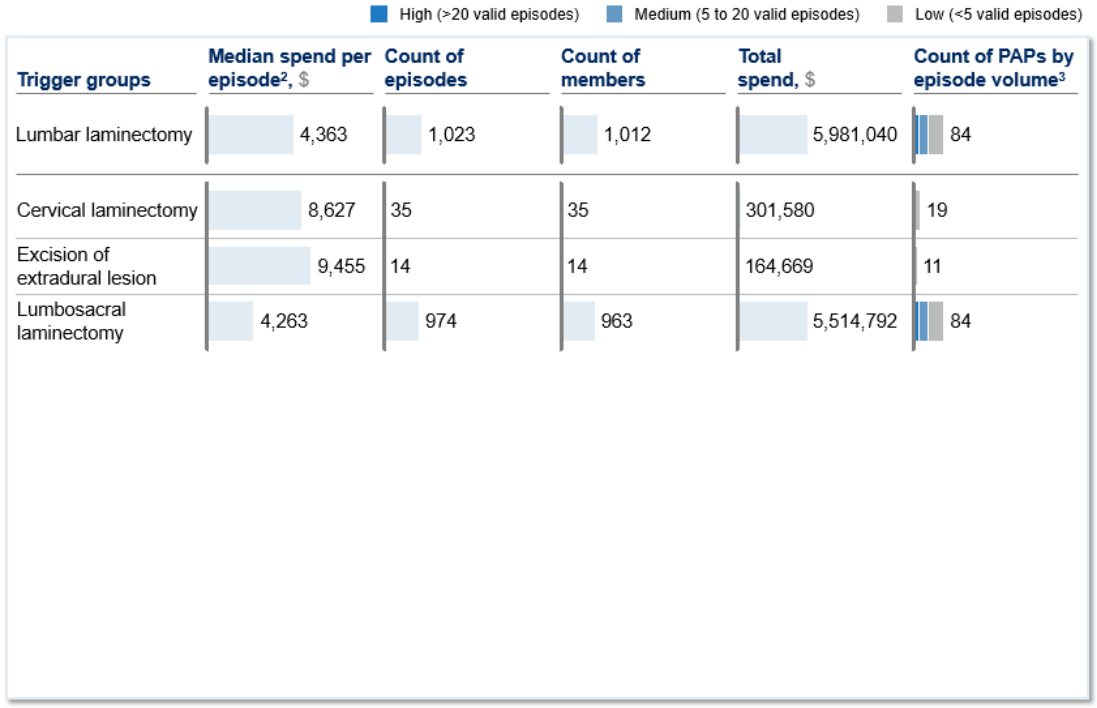
EXHIBIT 4 –TRIGGER GROUPS[1]

Spinal fusion



Trigger groups	Median non-risk adjusted spend, $	Count of episodes	Count of members	Total non-risk adjusted spend, $	Count of PAPs by episode volume
Total episodes	18,373	1,871	1,840	36,032,216	112
Cervical spinal fusion	14,219	1,008	1,000	14,538,355	89
Lumbar spinal fusion	24,154	835	831	21,133,344	90
Cervical total disc arthroplasty	10,084	18	18	196,924	11
Cervical laminoplasty	14,472	10	10	163,592	5

Spinal decompression without fusion



Trigger groups	Median spend per episode[2], $	Count of episodes	Count of members	Total spend, $	Count of PAPs by episode volume[3]
Lumbar laminectomy	4,363	1,023	1,012	5,981,040	84
Cervical laminectomy	8,627	35	35	301,580	19
Excision of extradural lesion	9,455	14	14	164,669	11
Lumbosacral laminectomy	4,263	974	963	5,514,792	84

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

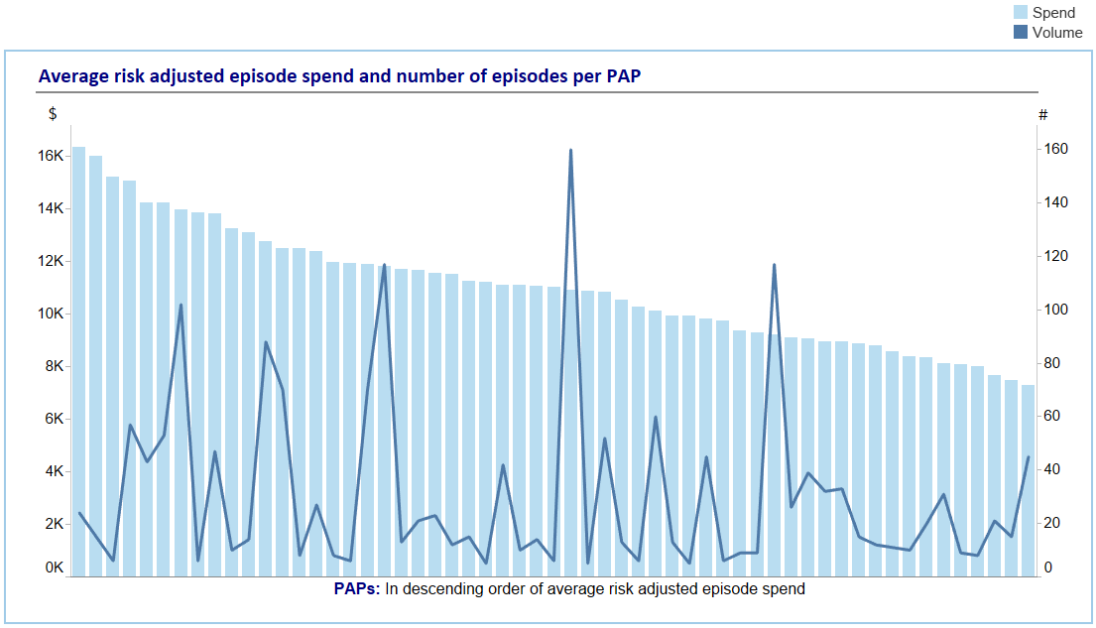
2 Median of non-adjusted spend based on the current episode algorithm

3 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

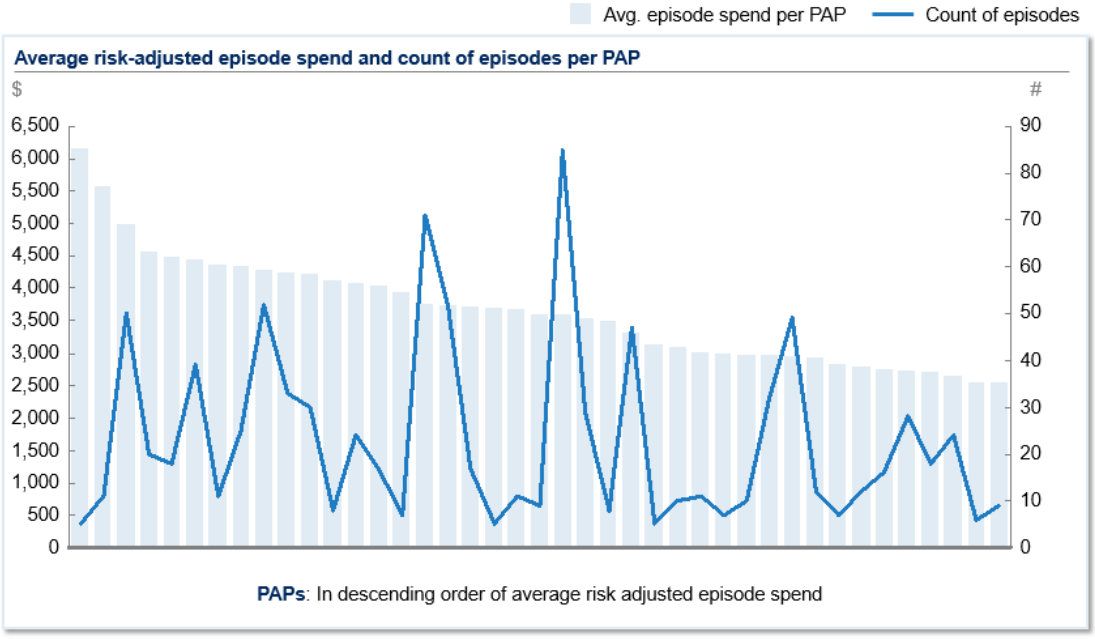
SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

EXHIBIT 5 - DISTRIBUTION OF RISK ADJUSTED AVERAGE EPISODE SPEND AND COUNT BY PAP[1]

Spinal fusion



Spinal decompression without fusion



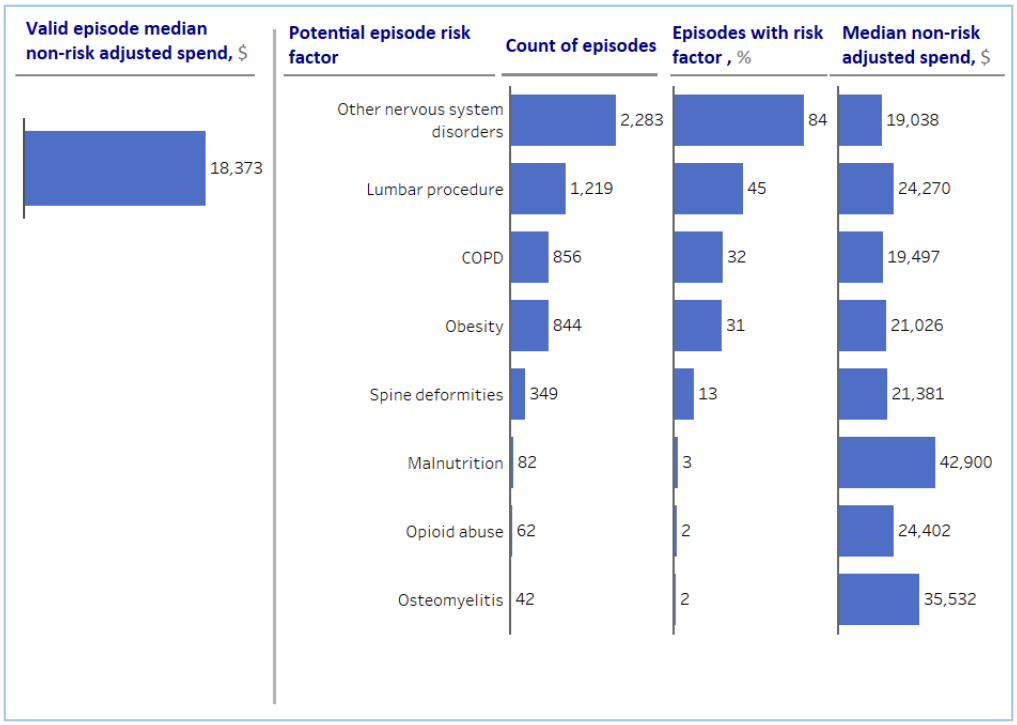
1 For valid episodes across PAPs with 5 or more valid episodes; valid episodes for PAPs with 4 or less episodes are not included in this analysis; valid episodes do not

include those with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., cancer, ESRD)

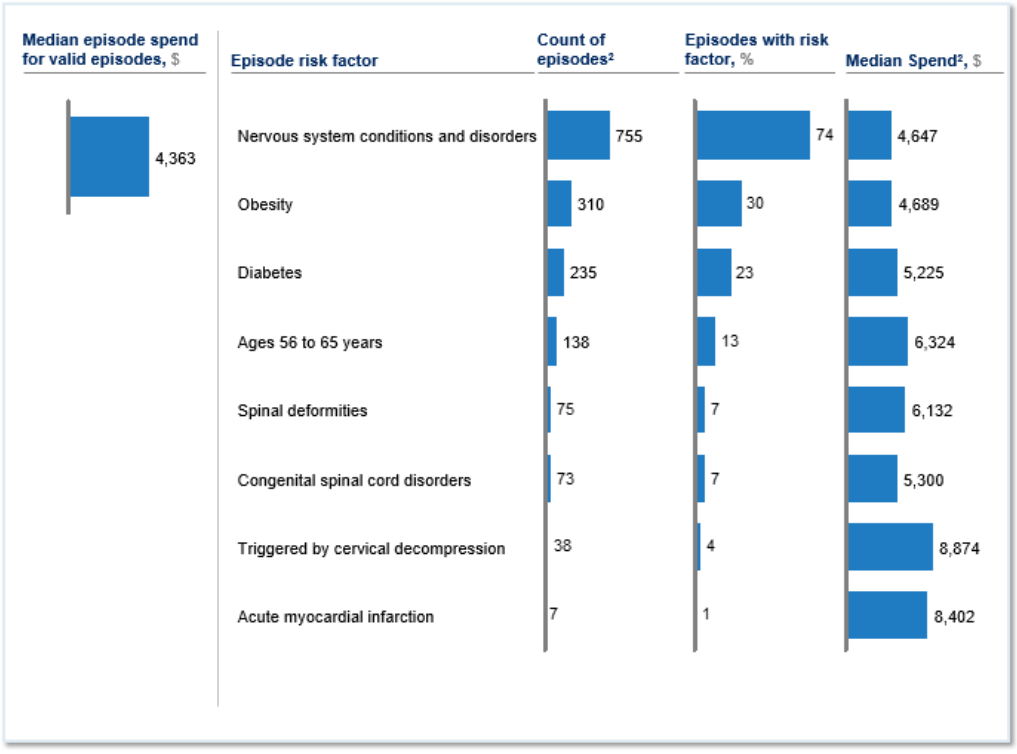
SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

EXHIBIT 6 – EPISODE COUNT AND SPEND BY EPISODE RISK FACTOR[1]

Spinal fusion



Spinal decompression without fusion



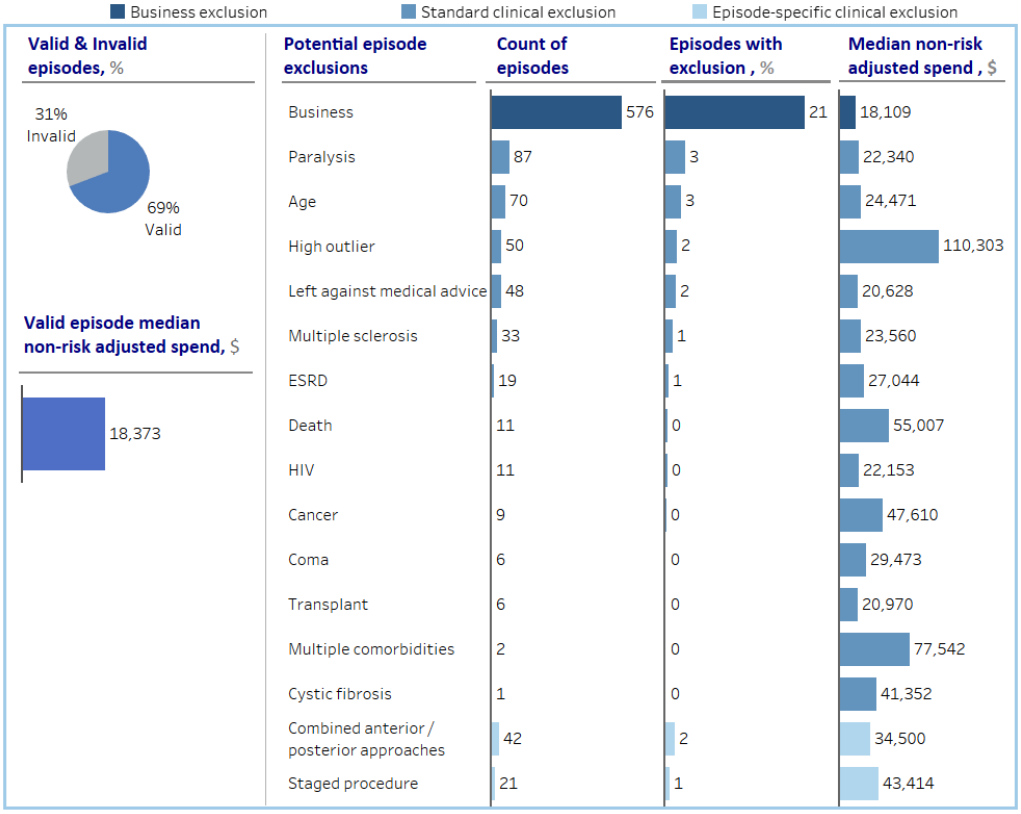
1 Valid episodes do not include those with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., cancer, ESRD)

2 Non-adjusted spend for episodes with this potential risk factor; one episode can have multiple risk factors

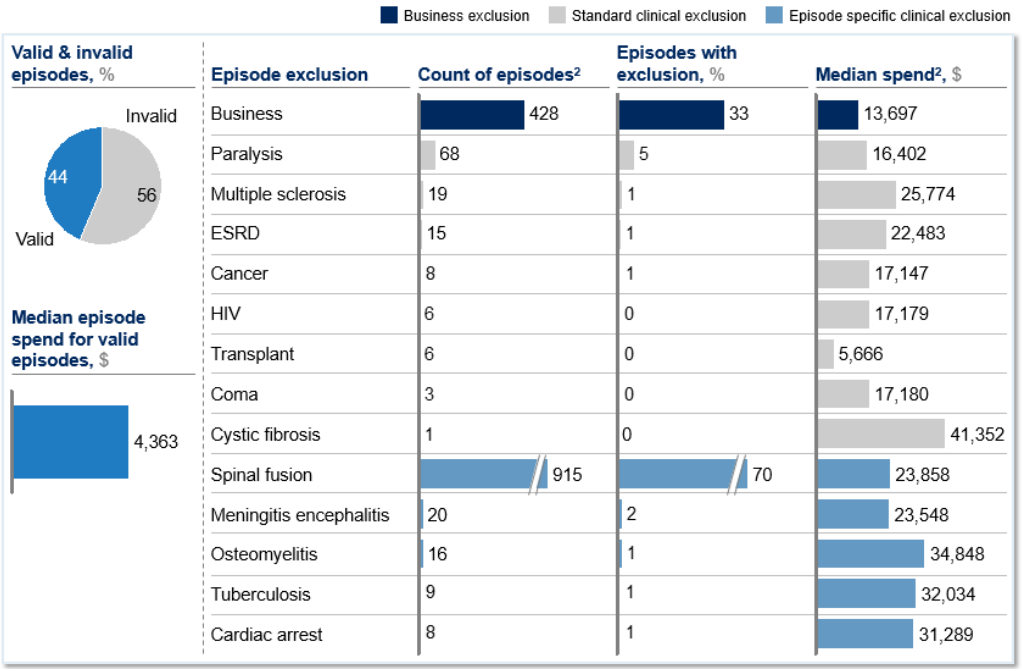
SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

EXHIBIT 7 – EPISODE COUNT AND SPEND BY EPISODE EXCLUSION[1]

Spinal fusion



Spinal decompression without fusion

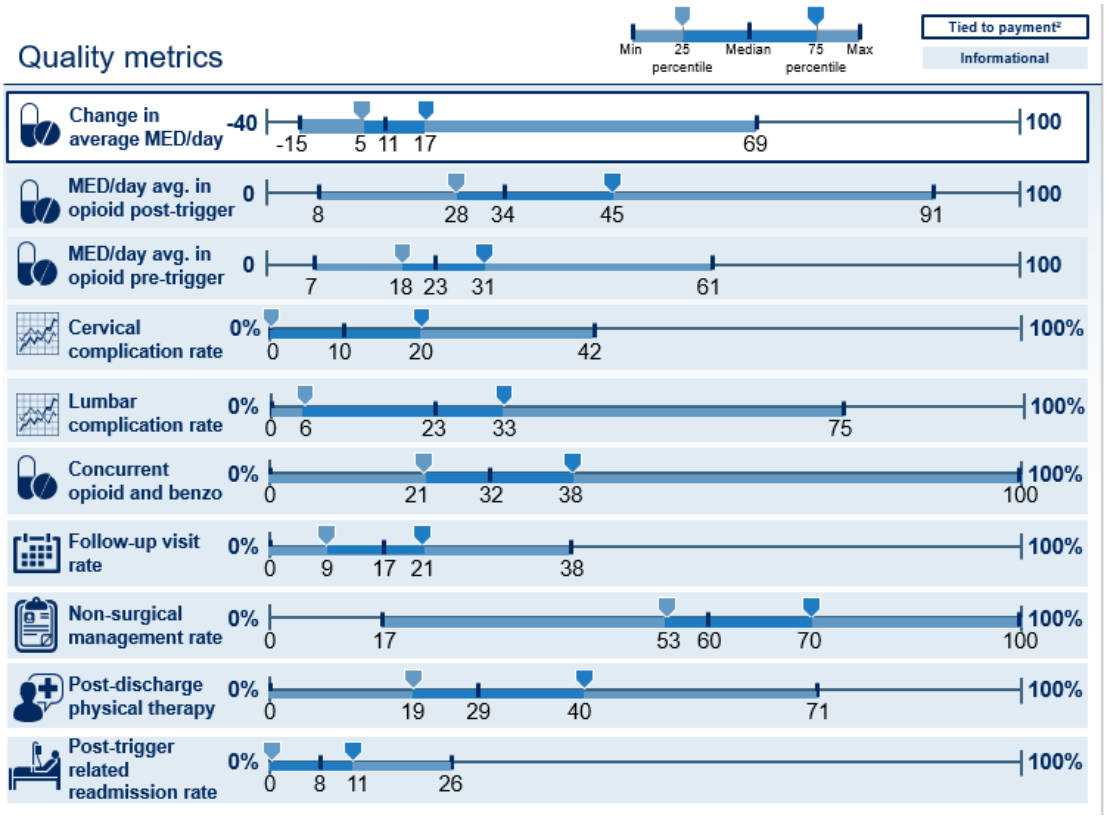


1 Individual business exclusions are collapsed into one row
2 Non-adjusted spend for episodes with this exclusion; one episode can have multiple exclusions

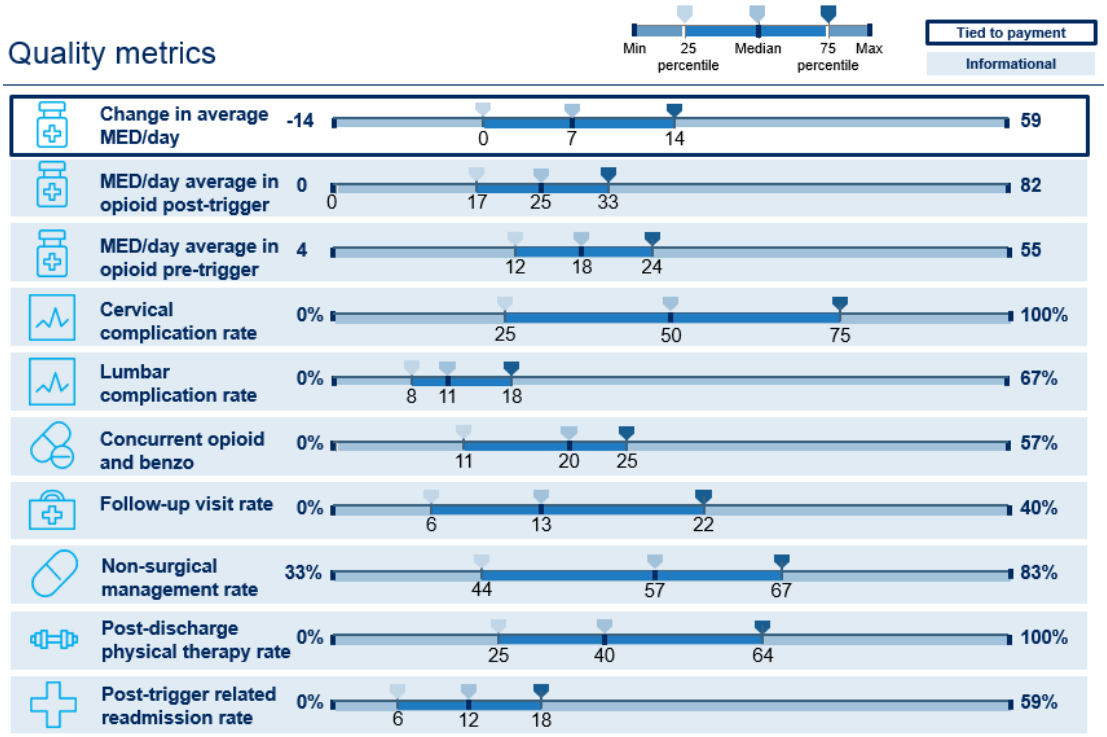
SOURCE: OH claims data with episodes ending between 10/01/2014 and 09/30/2015

EXHIBIT 8 – PAP PERFORMANCE ON EPISODE QUALITY AND UTILIZATION METRICS[1]

Spinal fusion



Spinal decompression without fusion



1 For valid episodes across PAPs with 5 or more valid episodes; valid episodes for PAPs with 4 or less episodes are not included in this analysis; 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 with episodes ending between 10/01/2014 and 09/30/2015