

# Overview of the femur and pelvis fracture episode of care

State of Ohio

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## 1. CLINICAL OVERVIEW AND RATIONALE FOR DEVELOPMENT OF THE FEMUR AND PELVIS FRACTURE EPISODE

### 1.1 Rationale for development of the femur and pelvis fracture episode of care

Femur and pelvis fractures can be the result of high-energy traumatic fractures (e.g., sports injuries among teenagers), low-energy traumatic fractures (e.g., minor falls in elderly patients with osteoporosis), and stress fractures resulting from repetitive overload.<sup>1</sup> Surgery on the femoral head and neck, femoral shaft, or pelvis (acetabular and non-acetabular) is one modality to treat specific pain, associated symptoms, and restore ambulatory function. Broadly, femoral head and neck fractures are the most common type (relative to femoral shaft and pelvis fractures) and occur in approximately 325,000 patients in the U.S. each year.<sup>2</sup> They are most prevalent in the elderly, largely resulting from low-energy incidents like falls. Pelvis fractures are the next most common and occur in about 65,000 patients a year typically due to low-energy events.<sup>3</sup> Femoral shaft fractures are the least common, occurring in about 30,000 patients a year primarily due to high-energy collisions such as motor vehicle accidents.<sup>4</sup> From October 2014 to September 2015, Ohio Medicaid beneficiaries between 0-64 years of age received over 2,200 such femur and pelvis fracture procedures.<sup>5</sup> This represents approximately \$45.1 million in spend, with a median cost of \$15,200 per episode.

<sup>1</sup> Severe trauma patients, as defined by multi-system trauma (e.g., concurrent hip and rib fractures), are excluded from this episode

<sup>2</sup> Office of the Surgeon General. Bone health and osteoporosis: A report of the Surgeon General. 2004.

<sup>3</sup> Kannus P, Palvanen M, et al. Epidemiology of osteoporotic pelvic fractures in elderly people in Finland: sharp increase in 1970-1997 and alarming projections for the new millennium. *Osteoporos Int.* 2000;11(5):443-8.

<sup>4</sup> American Academy of Orthopaedic Surgeons (AAOS). Femur Shaft Fractures (Broken Thighbone) - OrthoInfo - AAOS. 2011. Available at <https://orthoinfo.aaos.org/en/diseases--conditions/femur-shaft-fractures-broken-thighbone>. Accessed on December 11, 2017.

<sup>5</sup> Analysis of Ohio Medicaid claims data for episodes ending between October 1, 2014 and September 30, 2015.

There are many opportunities to improve guideline-concordant care in order to support optimal patient outcomes. For example, evidence-based clinical guidelines of the American Academy of Orthopaedic Surgeons (AAOS) outline best practices for clinicians to improve quality of care and outcomes for patients. During the peri-operative window, use of preoperative regional anesthesia can improve pain control and can reduce incidence of postoperative delirium.<sup>6</sup> After discharge from the hospital, patients should undergo physical therapy and nutritional supplementation to improve functional outcomes, prevent falls, and reduce mortality.

Despite these clinical guidelines, surgical and treatment practices during the operative and perioperative periods of a femur or pelvis surgery following a fracture 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 femur and pelvis fracture 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 osteoporosis while in the episodes program orthopedic surgeons may minimize procedural and other complications during the operative and post-operative periods. For example, the CPC program quality metrics encourage initiation of alcohol and drug dependence treatments,<sup>7</sup> 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 femur and pelvis fracture episode**

For this episode, femur and pelvis fracture surgery refers to various surgical procedures that are performed to alleviate pain and prevent morbidity and mortality caused by high-energy events such as a sports collision and low-energy events such as a minor fall. Patients with severe trauma, for example, as represented by concurrent pelvic and rib fractures, are excluded from this episode because of the

<sup>6</sup> AAOS. Management of hip fractures in the elderly. Evidence-based clinical practice guideline. September 5, 2014. Available at [https://www.aaos.org/research/guidelines/HipFxGuideline\\_rev.pdf](https://www.aaos.org/research/guidelines/HipFxGuideline_rev.pdf). Accessed on December 11, 2017.

<sup>7</sup> 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.medicare.ohio.gov/Portals/0/Providers/PaymentInnovation/CPC/qualityMetricSpecs.pdf>. Accessed on December 11, 2017.

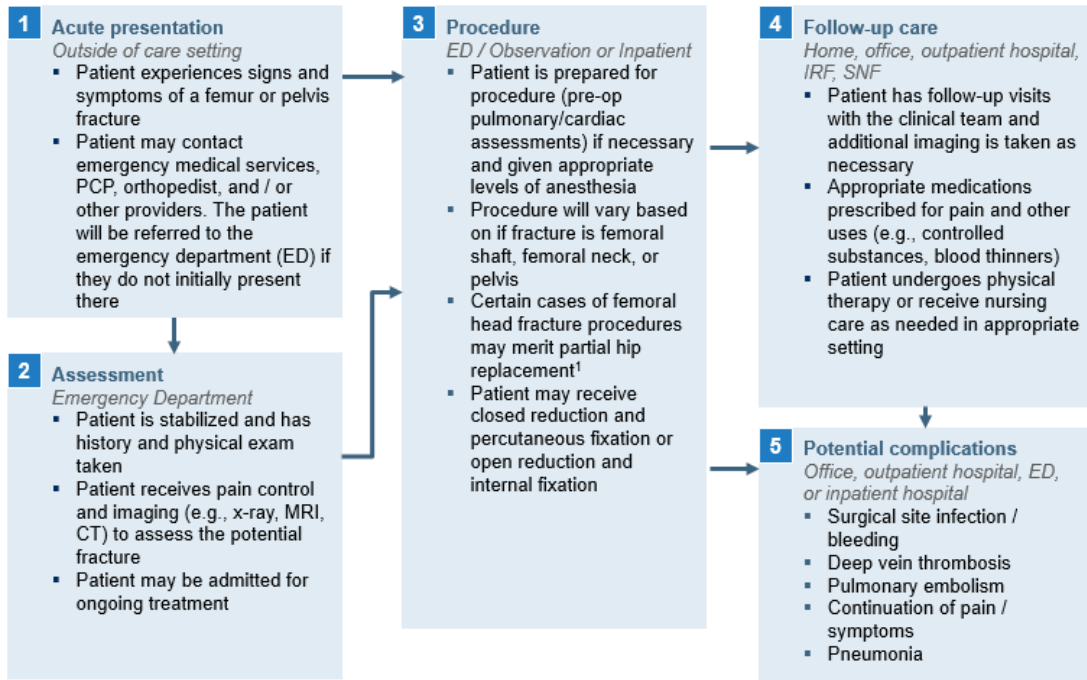
greater complexity of injury relative to other fracture types. Common procedures for femur and pelvis fractures include closed reduction and percutaneous fixation, open reduction and internal fixation, and arthroplasty. These procedures are done for common diagnoses such as femoral head and neck, femoral shaft, and pelvis fractures.

Femur and pelvis fracture procedures are surgical procedures intended to stabilize the fractured region through use of orthopedic hardware (e.g., pins, screws, nails). In some cases, treatment may result in a partial or total hip replacement. For femoral head / neck fractures, either open reduction with internal fixation or arthroplasty are typically performed. Femoral shaft fracture patients will receive intramedullary nailing. Pelvis fracture patients will receive open reduction with internal fixation, utilizing plates and screws.

As depicted in Exhibit 1, the patient journey begins when a patient experiences signs and symptoms of a femur or pelvis fracture (e.g., pain, bruising, and swelling). The patient may present to one of a range of providers (e.g., orthopedist, emergency medical services) and then most often then referred to the emergency department for stabilization. In the emergency department, the patient will receive pain medications and imaging (e.g., x-ray) prior to being admitted and stabilized before the appropriate operation on the fracture site. During the procedure, anesthesia is administered and the surgery is performed. Screws, nails, or other hardware may be placed to stabilize the fracture site. After the surgery, the patient is typically monitored for a short period of time for immediate post-operative complications and is counseled on the post-procedure treatment plan. After discharge, the patient should receive post-surgical follow-up care, including follow-up visits with the clinical team. The patient may also undergo physical therapy and require follow-up imaging to assess post-operative status of the fracture site. Pain management may 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, continuation of pain, and other procedural complications.

## EXHIBIT 1 – FEMUR AND PELVIS FRACTURE PATIENT JOURNEY



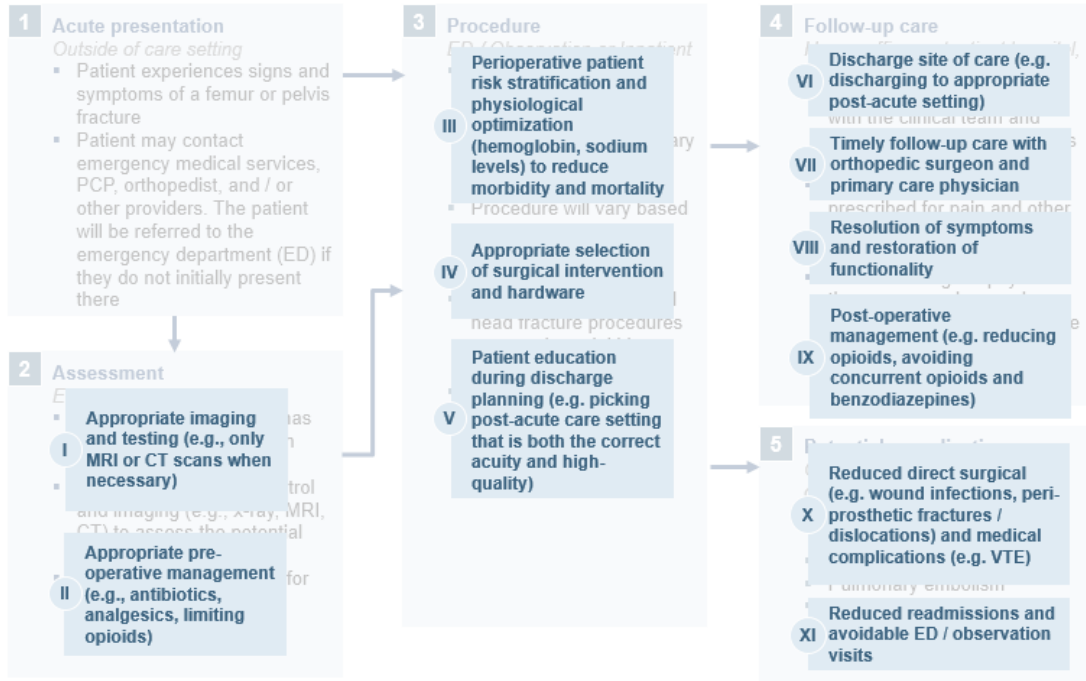
<sup>1</sup> Partial and total hip replacements are excluded for inclusion in the total joint replacement episode.

### 1.3 Potential sources of value within the patient journey

Within the femur and pelvis fracture episode, providers have several opportunities to improve quality of care and reduce unnecessary spend associated with the episode (see Exhibit 2). For example, prior to the procedure providers can utilize appropriate imaging (e.g., x-ray, MRI, CT scans). During the perioperative period, physiological optimization, such as providing antibiotic prophylaxis, can decrease the wound infections and other complications after surgery.<sup>8</sup> At discharge, providers can transition patients to the proper post-acute site of care based on unique patient risk factors (e.g., ability for self-care at home). 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.

<sup>8</sup> Beaupre LA, Jones CA, et al. Best practices for elderly hip fracture patients: A systematic overview of the evidence. *J Gen Intern Med.* 2005;20(11):1019-25.

## EXHIBIT 2 – FEMUR AND PELVIS FRACTURE SOURCES OF VALUE



## **2. OVERVIEW OF THE FEMUR AND PELVIS FRACTURE EPISODE DESIGN**

### **2.1 Episode Trigger**

The femur and pelvis fracture episode is triggered by a professional claim including a femoral head / neck, femoral shaft, or pelvis fracture procedure performed in an inpatient setting (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 femur and pelvis fracture 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 non-risk adjusted spend by PAP).

### **2.3 Episode Duration**

The femur and pelvis fracture episode begins with the operative procedure and associated inpatient admission (called the “trigger window”), and ends 60 days after discharge (called the “post-trigger window”). The 60-day post-discharge 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 femur or pelvis fracture 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 femur and pelvis fracture episodes are each comprised of three distinct windows for the purpose of spend inclusions: a trigger window, a post-trigger window 1, and a post-trigger window 2. Inclusions in the different episode windows are as follows:

- Trigger window (when the procedure and associated admission occurs): the hospital stay and all medical care is included as are related medications.
- Post-trigger window 1 (one through 30 days following initial discharge): immediate post-operative complications (e.g., surgical site infection, bleeding), related follow-up care (e.g., office or clinic follow-up visits, physical therapy), opioid prescriptions, skilled nursing home facility stays, and repeat procedures are included.
- Post-trigger window 2 (31 through 60 days following initial discharge): opioid prescriptions and repeat procedures are 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.<sup>9</sup> Table 2 in the Appendix lists the risk factors and Exhibit 5 presents an analysis of these risk factors.

<sup>9</sup> 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.



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 femur and pelvis fracture 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 femur and pelvis fracture episode has six quality and utilization metrics. Two are linked to performance assessment, meaning that performance thresholds on these must be met in order for PAP to be eligible for positive incentive. The specific threshold amount will be determined during the informational reporting period. Three of the quality and utilization metrics are for informational purposes only.

The metrics tied to positive incentive payments are rate of follow up care during the first post-trigger window and the average difference in morphine equivalent dose (MED)/day of all opioid prescriptions between the post-trigger opioid window and the pre-trigger opioid window. Informational metrics include the average MED/day during the 1-60 days prior to the trigger window (the pre-trigger opioid window), the average MED/day in days 31-60 after the trigger window (the post-trigger opioid window), the percentage of valid episodes with a related readmission, the percentage of valid episodes with a related ED or observation visit in the first post-trigger window, the percentage of valid episodes with a surgical complication in the first post-trigger window, and the percentage of valid episodes that are discharged to a post-acute care setting after the index admission.

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 femur and pelvis fracture**

Trigger category	Trigger codes (CPT)	Description
<b>Acetabulum operation</b>	27226	Open treatment of posterior or anterior acetabular wall fracture, with internal fixation
	27227	Open treatment of acetabular fracture(s) involving anterior or posterior (one) column, or a fracture running transversely across the acetabulum, with internal fixation
	27228	Open treatment of acetabular fracture(s) involving anterior and posterior (two) columns, includes T-fracture and both column fracture with complete articular detachment, or single column or transverse fracture with associated acetabular wall fracture, with internal fixation
<b>Femoral head/neck operation</b>	27235	Percutaneous skeletal fixation of femoral fracture, proximal end, neck
	27236	Open treatment of femoral fracture, proximal end, neck, internal fixation or prosthetic replacement
	27269	Open treatment of femoral fracture, proximal end, head, includes internal fixation, when performed
<b>Femur operation</b>	27244	Treatment of intertrochanteric, peritrochanteric, or subtrochanteric femoral fracture; with plate/screw type implant, with or without cerclage
	27245	Treatment of intertrochanteric, peritrochanteric, or subtrochanteric femoral fracture; with intramedullary implant, with or without interlocking screws and/or cerclage
	27248	Open treatment of greater trochanteric fracture, includes internal fixation, when performed
	27506	Open treatment of femoral shaft fracture, with or without external fixation, with insertion of intramedullary implant, with or without cerclage and/or locking screws
	27507	Open treatment of femoral shaft fracture with plate/screws, with or without cerclage
	27509	Percutaneous skeletal fixation of femoral fracture, distal end, medial or lateral condyle, or supracondylar or transcondylar, with or without intercondylar extension, or distal femoral epiphyseal separation
	27511	Open treatment of femoral supracondylar or transcondylar fracture without intercondylar extension, includes internal fixation, when performed

Trigger category	Trigger codes (CPT)	Description
	27513	Open treatment of femoral supracondylar or transcondylar fracture with intercondylar extension, includes internal fixation, when performed
	27514	Open treatment of femoral fracture, distal end, medial or lateral condyle, includes internal fixation, when performed
<b>Pelvis operation</b>	27215	Open treatment of iliac spine(s), tuberosity avulsion, or iliac wing fracture(s), unilateral, for pelvic bone fracture patterns that do not disrupt the pelvic ring, includes internal fixation, when performed
	27216	Percutaneous skeletal fixation of posterior pelvic bone fracture and/or dislocation, for fracture patterns that disrupt the pelvic ring, unilateral (includes ipsilateral ilium, sacroiliac joint and/or sacrum)
	27217	Open treatment of anterior pelvic bone fracture and/or dislocation for fracture patterns that disrupt the pelvic ring, unilateral, includes internal fixation, when performed (includes pubic symphysis and/or ipsilateral superior/inferior rami)
	27218	Open treatment of posterior pelvic bone fracture and/or dislocation, for fracture patterns that disrupt the pelvic ring, unilateral, includes internal fixation, when performed (includes ipsilateral ilium, sacroiliac joint and/or sacrum)
	27254	Open treatment of hip dislocation, traumatic, with acetabular wall and femoral head fracture
<b>Total hip replacement</b>	27130	Arthroplasty, acetabular and proximal femoral prosthetic replacement (total hip arthroplasty), with or without autograft or allograft

**Table 2 – Episode risk factors**

Risk factor	Relevant time period
Fluid disorders	During the 365 days before the start of the episode and during the episode window
Malnutrition	During the 365 days before the start of the episode and during the episode window
Pelvic fractures	During the trigger window
Respiratory failure	During the 365 days before the start of the episode
White blood cells disorders	During the 365 days before the start of the episode and during the episode window
Head wound	During the 365 days before the start of the episode and during 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	During the episode window

Exclusion type	Episode exclusion	Description	Relevant time period
		claim detail line or if the patient has relevant third-party coverage at any time	
	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
	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	Age	An episode is excluded if the patient is older than 64 (>64) years of age.	During the episode window

Exclusion type	Episode exclusion	Description	Relevant time period
	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
	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

Exclusion type	Episode exclusion	Description	Relevant time period
	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	Severe trauma	Patient has concurrent femur / pelvis fracture and rib fracture or has an amputation, skull fracture, abdominal injury, or an intracranial injury.	During the trigger window
	Malunion / nonunion	Patient has a malunion or nonunion.	During the trigger window
	Open hip fractures	Patient has an open hip fracture	During the trigger window
	Non-traumatic total hip replacement (THR)	Patient has a non-traumatic total hip replacement surgery	During the trigger window
	Osteomyelitis	Patient is diagnosed with osteomyelitis	During the episode window

**Table 4 – Episode quality and utilization metrics**

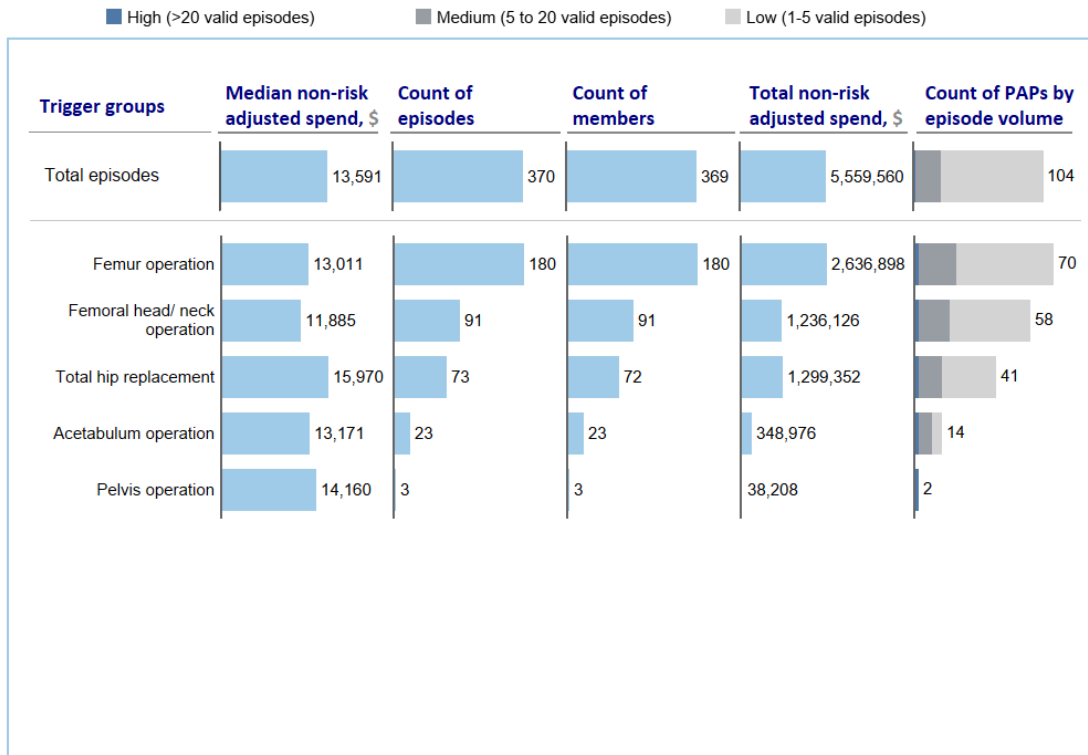
Metric type	Quality or utilization metric	Description	Relevant time period
	Follow-up rate	Percent of valid episodes with a follow up visit	During the post-trigger 1 window



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 <sup>10</sup>	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
	Related readmissions	Percent of valid episodes with a related readmission included in spend	During the post-trigger window 1
	Related ED / observation visits	Percent of valid episodes with a related ED or observation visit included in spend	During the post-trigger window 1
	Surgical complication rate	Percent of valid episodes with a surgical complication	During the post-trigger window 1
	Discharge to post-acute care setting rate	Percent of valid episodes with a discharge to post-acute care facility after index admission	During the trigger window

<sup>10</sup> The pre-trigger opioid window and post-trigger opioid window are specific time periods that are defined in the detailed business requirements.

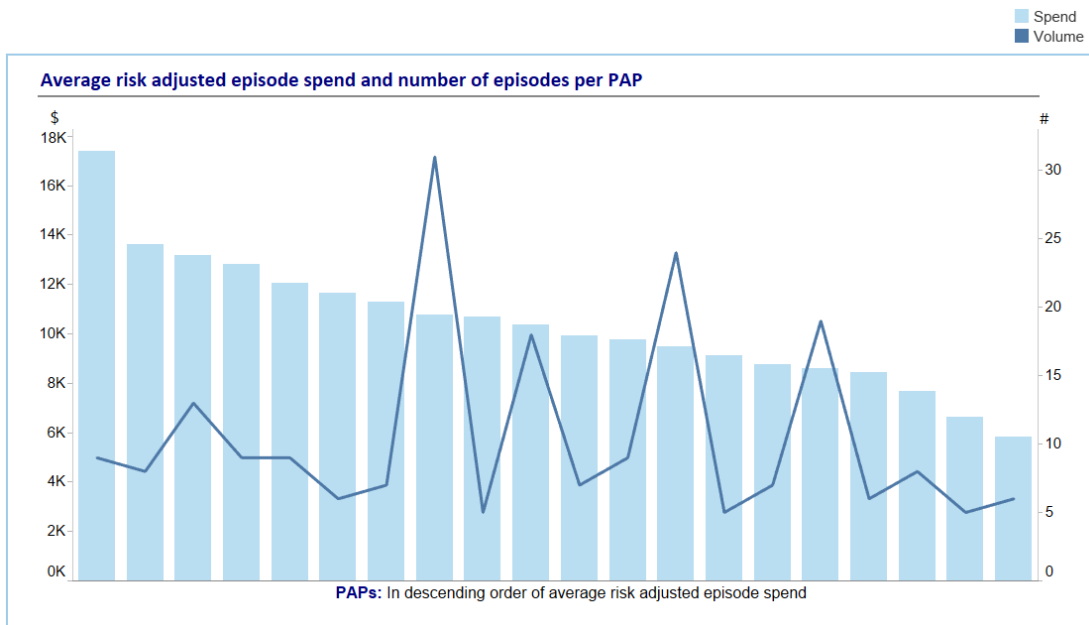
**EXHIBIT 3 –TRIGGER GROUPS<sup>1</sup>**



1. For valid episodes (370 episodes) across 104 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.,  $\geq 5$  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

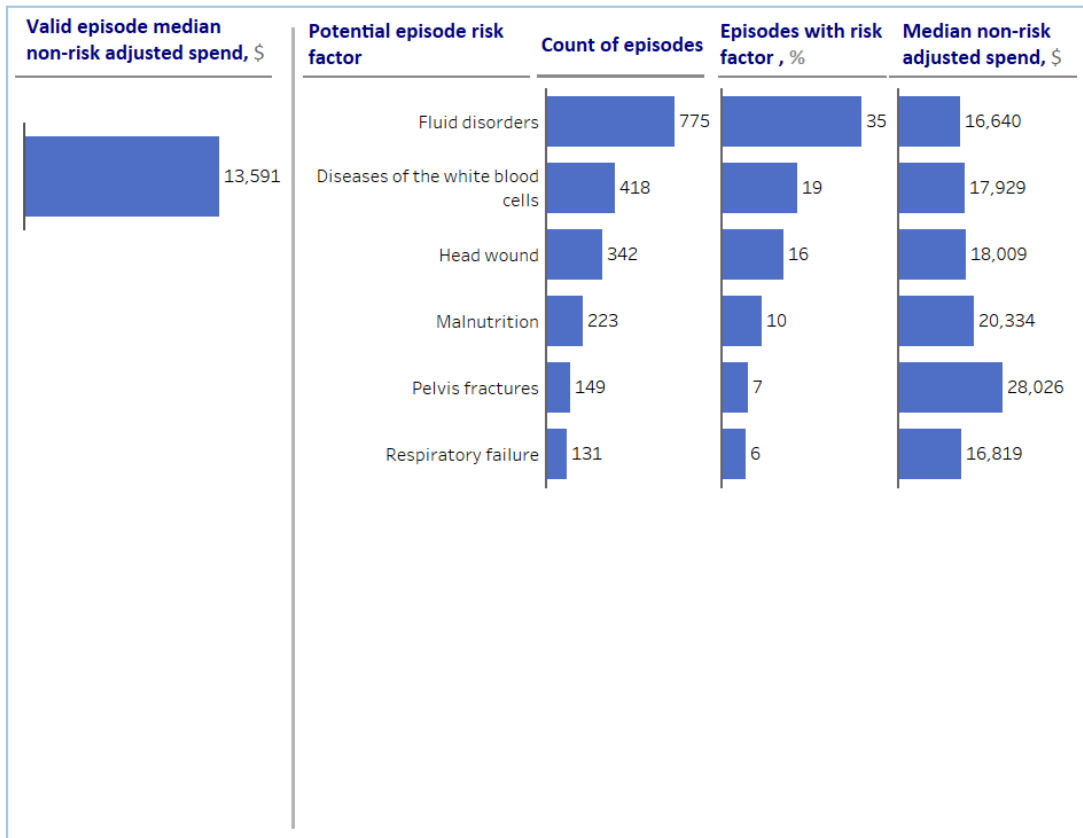
### EXHIBIT 4 - DISTRIBUTION OF RISK ADJUSTED AVERAGE EPISODE SPEND AND COUNT BY PAP<sup>1</sup>



1. For valid episodes (222) across PAPs with at least 5 valid episodes (22); 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

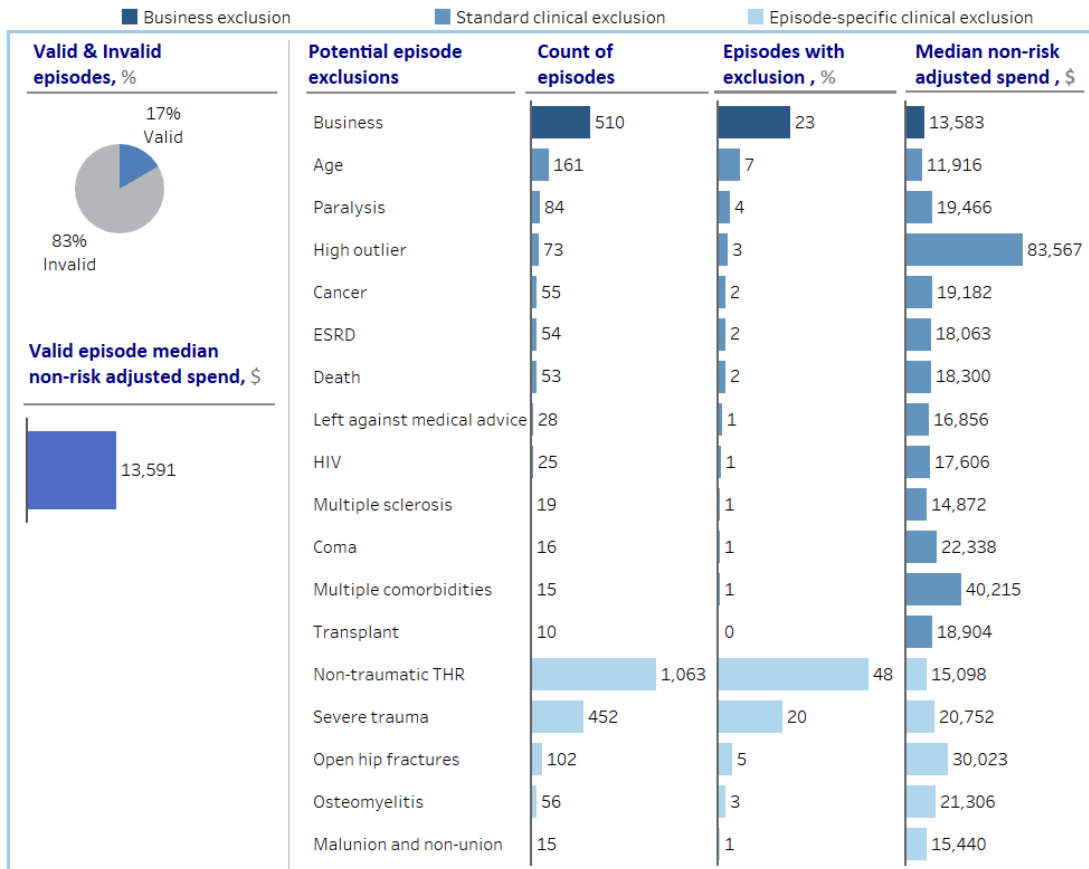
**EXHIBIT 5 – EPISODE COUNT AND SPEND BY EPISODE RISK FACTOR<sup>1</sup>**



<sup>1</sup> 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<sup>1</sup>**



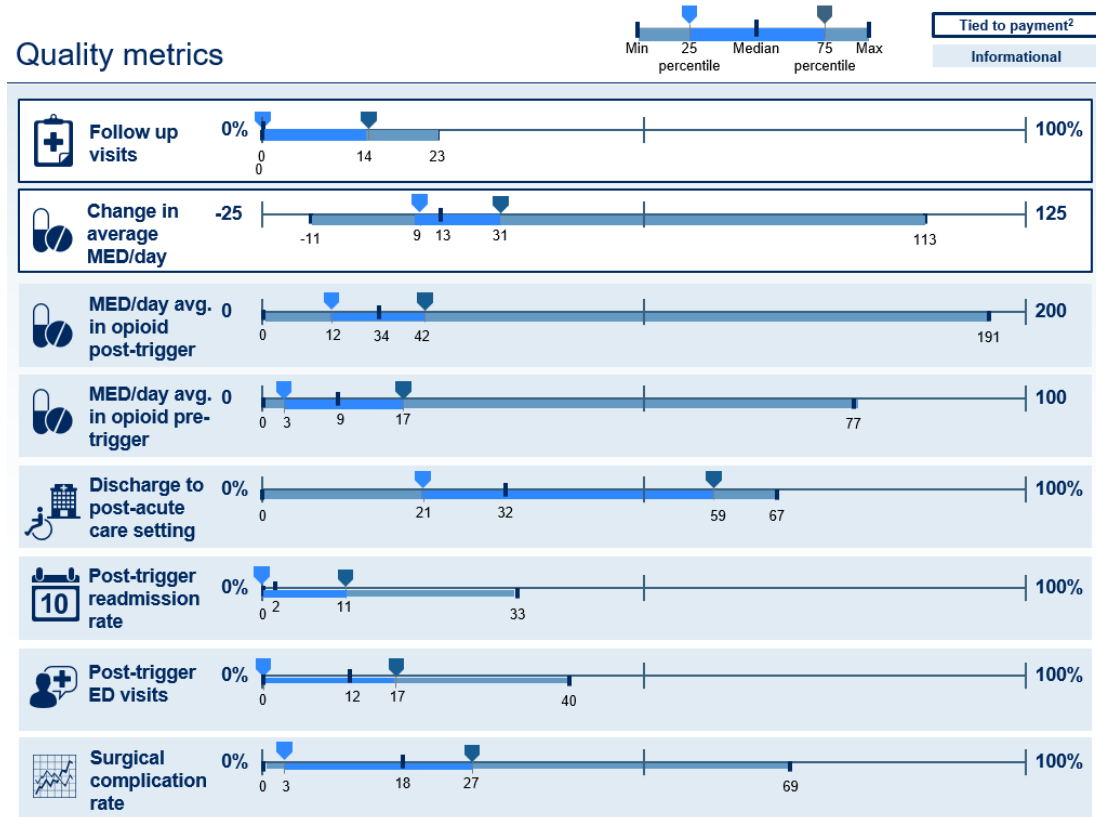
1 Individual business exclusions are collapsed into one row

2 Non-adjusted spend for episodes with this exclusion; one episode can have multiple exclusions

Note: Showing select 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<sup>1</sup>



1. For valid episodes (222) across valid PAPs (22); valid episodes do not include episodes with business (e.g., third-party liability, dual eligibility) or clinical exclusions (e.g., total hip 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