OPTUM®

White paper

Symmetry Procedure Episode Groups

Understanding the cost and quality of surgical procedures

While U.S. health care expenditures continue to consume a large share of the Gross Domestic Product and the federal government estimates that costs will continue to grow at an average 5.4% annually over the next decade, health care organizations must focus intently on restraining this rate of growth while improving the quality of care provided.[1] This effort requires valid and reliable tools to measure those costs in order to inform efforts to modify the growth trajectory. Optum® Symmetry® Procedure Episode Groups® (PEG) can play a vital role in this effort by providing a clinically valid measure of cost and quality related to medical and surgical procedures.

As the population ages and life expectancy increases, utilization of procedural services shows a corresponding rise. When comparing Medicare services in 2018 to 2019, the volume growth for major procedures was 1.7%, while the volume growth for procedures other than a major procedure (for example, skin procedures and physical therapy) was 4.2%. During the same period of time, Medicare services for imaging encounters grew by 2.0%.[2]

As the population ages and life expectancy increases, utilization of procedural services shows a corresponding rise.

In addition to utilization, associated costs have increased at an even higher rate, representing a significant proportion of health care spending. When comparing Medicare services in 2018 to 2019, allowed charges per beneficiary increased 5.1% for major procedures, 5.6% for procedures other than a major procedure, and 3.5% for imaging services. Among service categories, the highest rate of growth was observed for vascular major procedures (14.4%) — largely driven by revascularization procedures of the lower extremity.[2]

These trends are accompanied by another important observation — the tremendous variation in the cost of certain procedures. In a recent analysis of one large hospital system that publicized their negotiated prices with all contracted insurers, widespread variation in prices across services, insurance plans and hospitals was reported. For some commercial plans, negotiated prices for an upper GI biopsy were nearly five times higher than other commercial plans. Similarly, across different commercial plans, the price paid for a C-section could vary by more than $35,000 and major joint replacement could vary by nearly $55,000.[3] According to a 2015 Comparative Price Report from the International Federation of Health Plans, allowed hospital and physician costs for an appendectomy varied from $9,332 at the 25th percentile to over $33,250 at the 95th percentile. Allowed costs for a knee replacement were $18,577 to $55,579, for a hip replacement $18,810 to $57,225, and for a C-section $11,401 to $28, 473, at the 25th and 95% percentiles respectively.[4]

A fundamental shift to value-based care is underway in the health care industry, including the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA). MACRA was established to shift to value-based reimbursement by focusing on quality over quantity with the goal of making patients healthier. To derive value, it is essential to understand the costs and quality of all aspects of procedural service that are delivered to identify focus areas for improvement.

Historically, assessing the cost and quality of procedural care has been focused on the procedure itself, primarily the same-day services performed or the hospital stay. However, this approach presents measurement challenges and does not represent the complete picture. While a significant portion of procedural care occurs on the day of a surgery, equally important services happen before and after the procedure, such as physical therapy, additional procedures and patient visits.

Indicators of quality also occur outside the surgical event, such as complications and reoperations. Recent policy changes and reimbursement models have increased our need to understand the association between costs and complications from procedures. For example, newer policies have shifted financial risk to hospitals by holding them accountable for the additional costs associated with complications. In addition, bundled payment initiatives — where providers receive a single, fixed payment for many of the services within the episode — are becoming an increasingly popular form of value-based payment. While successful bundled payment initiatives have the potential to both lower costs and improve health care quality, comprehensive procedure episodes that include quality metrics are an important step forward in determining the risk-sharing costs that might be associated with a procedure "bundle."

Recent publications that have focused on surgical procedures and quality indicators have demonstrated that complications are common and costly. In one study, nearly 1 in 7 Medicare patients hospitalized for a major surgical procedure were readmitted to the hospital within 30 days of discharge.[5] In another study designed to evaluate the costs associated with surgical quality, complication data from the Michigan Surgical Quality Collaborative were merged with internal cost accounting data. Overall, 14.5% of patients experienced a complication with risk-adjusted mean hospital costs significantly higher ($19,626) for patients with complications ($36,060), compared with those without complications ($17,373).[6]

Optum Symmetry PEG provides a sophisticated method that enhances the measurement of procedural care by using a comprehensive approach to combine all services related to the procedure. PEG is an episode-grouping solution that identifies a unique procedure event, as well as the related services performed before and after that procedure, creating a procedure episode. Procedure episodes describe not only the surgery itself, but the entire sequence of care, including workup and therapies prior to the procedure and post-operative activities such as repeat surgeries and patient follow-up.

This white paper provides an overview of the value PEG can offer in understanding and measuring procedural care beginning with a brief description of the PEG approach, followed by examples of using PEG to support measurement.

To support valid measurement of procedural care, including before and after care, complications and cost variation, a broader perspective for all care related to a procedure is required.

Procedure episode grouping

PEG uses information readily available from administrative claims and encounter data to identify unique procedure episodes as well as the medical and pharmacy services related to those episodes. Administrative claims/encounter data and enrollment is prepared by the user and processed using the PEG software.

PEG episodes are constructed using three key steps:

1. Identifying anchor procedures around which episodes will be built
2. Building the episodes by identifying and gathering services to, or grouping to, an anchor
3. Limiting service identification to an appropriate time frame

Fully defined episodes are categorized in terms of the clinical nature of the procedure performed and whether or not the episode is complete. Additional information about the episode is also provided, including the provider responsible for care.

Identifying anchor procedures

PEG episodes are initiated by procedures called anchors that are performed by a clinician as treatment for a condition. Anchors are identified using the procedure codes recorded on medical service encounters and claims.

Nearly 200 anchor categories are defined by PEG and used to aggregate clinically related procedures into unique therapeutic events. Each PEG anchor category belongs to a PEG practice category (PPC), which corresponds to the medical and surgical subspecialties that typically perform a given procedure. Examples of PEG practice categories are listed in Table 1.

Not every procedure record qualifies as an anchor. For example, an anchor must be performed by a physician in an appropriate clinical specialty facility, and the procedure must be related to the treatment of a relevant clinical condition. To do this, PEG uses the assigned medical episode from Symmetry Episode Treatment Groups® (ETG) as a proxy for diagnosis to qualify a pertinent procedure to serve as an anchor. Finally, only one anchor procedure can occur on the same day within a PEG practice category. If more than one procedure is observed, a hierarchy is used to select the most significant anchor. On occasion, there are multiple claims eligible for PEG anchor procedure status. Depending on the circumstances, the PEG application can use the provider specialty ranking or the anchor category hierarchy to identify the actual PEG anchor procedure.

Table 1. PEG practice category (PPC) descriptions

PPC description
Ophthalmology
Cardiology
Otolaryngology
Gastroenterology/Hepatology/Endoscopy/ Hematology
Nephrology/Urology/Gynecology
Neurological/Orthopedic surgery

Sub-anchors

Occasionally, episodes within the same anchor category vary in key aspects that are important to consider when analyzing and comparing episodes. For example, the cost impact of an initial, partial-joint knee replacement is different when compared with an initial, total-joint knee replacement. Additionally, the cost impact of an initial knee replacement procedure is different when compared with a knee replacement revision.

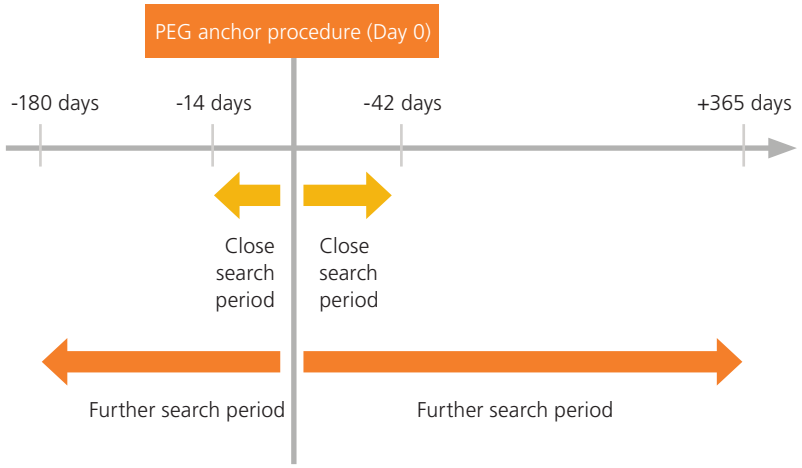
Sub-anchors were developed for a limited number of PEG anchors to distinguish important differences between procedure episodes within the same anchor category. These sub-anchors improve clinical homogeneity, which support more meaningful comparisons while allowing flexible levels of aggregation. Below are some additional examples where the analysis and comparison of procedure episodes might need to account for special attributes related to each episode:

- An appendectomy may have been performed in circumstances involving a rupture.
- A lumbar fusion may be anterior, posterior or a total disc replacement.
- An upper gastrointestinal endoscopy may include minor intervention, major intervention or control of variceal or non-variceal bleeding.
- Removal of foreign material in the eye may be extraocular or intraocular.

Constructing procedure episodes

Once a PEG anchor is identified, eligible search windows gather claims to the episode. These windows are created using a defined number of days before and after a procedure and segmented into "close" and "further" periods. The close time frame is close to the date of the anchor procedure while the further time frames extend much longer. The length of each time frame is specific to a given PEG and can be customized by users. Within each window, services are reviewed based on their clinical relationship to the anchor, with a stronger relationship required for the further time window. The services meeting an appropriate threshold of clinical evidence are grouped to the episode. A claim can only be assigned to one procedure episode. Figure 1 demonstrates close and further windows.

Figure 1. PEG close and further windows



Determining procedure episode severity score

A patient's age, health conditions and other factors affect the care necessary to treat the patient. Episode severity defines the variation in cost across procedure episodes that can be explained by an episode's clinical characteristics. The PEG software includes a methodology to assign a measure of severity to a subset of procedure episodes for which statistically meaningful categories can be supported. A higher severity score for an episode means a higher expected cost relative to other episodes of the same type. The methodology includes the member comorbidities as well as markers of disease severity (referred to as condition status) identified for the ETG episode associated with each procedure episode. Other member characteristics (line of business, age and gender) also play a role in computing episode severity.

The severity score takes into account multiple factors involved in the procedure episode and gives them a weight. Those factors are:

- Demographic weight: the age and gender of the member
- Condition status weight: the condition statuses assigned to the ETG episode associated with the PEG episode (each condition status must also be clinically associated with the PEG category in order to be considered)
- Comorbidity weight: comorbidities assigned to the member (via ETG processing) and also clinically relevant to the procedure episode's PEG category

A higher severity score for an episode means a higher expected cost relative to other episodes of the same type.

For severity markers, weights are distinguished between the commercial line of business and Medicare line of business.

Table 2 demonstrates how a severity score is computed for a 50-year-old male, in the commercial line of business, who had a coronary artery catheterization. The weights provided here are for illustration only and do not represent real data.

The weights vary from one PEG category to the next. For example, the same member with two different procedure episodes (each with a different PEG category) would likely have a different demographic weight for each episode.

Weights are differentiated by line of business. For example, if an ETG condition status applies for an episode, the weight that is assigned depends on whether the member's line of business is commercial or Medicare. Commercial severity included members of all ages, not just those under age 65. Medicare severity applies to only members age 65 and older.

The weights are summed to produce the overall severity score for the episode.

We evaluated potential bias in our models through a variety of methods, including an open-source toolkit from Aequitas. For more information about this topic, please email empower@optum.com or call 1-800-765-6807 and reference this white paper.

Table 2. Severity score example

Weight	Weight category
0.20	Demographics
0.32	Condition status: subendocardial infarction
0.45	Condition status: obesity, morbid
0.62	Comorbidity: congestive heart failure
0.45	Comorbidity: thrombocytopenia
2.04	**Severity score**

Place of service

Certain procedures are expected to occur in certain settings. This is influenced by several factors, such as the level of risk associated with the procedure, the intensity of the procedure and post-procedure care, and a determination of clinical appropriateness that considers the health status of the person who is receiving this care.

The ability to identify where a procedure was performed is incredibly valuable. This information might uncover quality of care concerns, find actionable, cost-saving opportunities, and detect variations in care worthy of further evaluation. In addition, an unexpected place of service assignment from claims data might suggest that the episode is atypical (for example, incomplete or inaccurate data) and perhaps should be excluded from any comparative analysis.

The PEG place of service (POS) logic assigns a place of service to the PEG episode. Table 3 provides the POS assignments used by PEG.

By applying four separate methodologies to a given episode, a final POS designation is assigned to the episode. A POS status value indicates missing data, specific flags or a conflict between the various POS assignment methods. Also, a POS expected flag indicates if the final POS assignment is expected or unexpected. The four POS methodologies behind this logic include:

- Hospitalization POS method that uses facility records to determine the POS
- CMS POS method that maps anchor procedure POS claims to a POS code defined by the Centers for Medicare and Medicaid Services
- Revenue code POS method that uses revenue codes to determine the POS
- Bill Type POS method that uses UB Type of Bill codes to determine the POS

Table 3. PEG place of service (POS)

POS descriptions
Hospital inpatient
Hospital outpatient
Ambulatory surgery center
Emergency room
Birthing center
Outpatient clinic
Critical access hospital
Military treatment facility
No assigned POS

Determining complications

Postoperative complications may add substantial cost to the procedure episode. PEG software identifies complications for many of the procedure episodes. Complications refer to medical conditions or events that may have resulted from a PEG episode's anchor procedure and may have been preventable. Table 4 lists costs and complication rates for three procedures from PEG benchmarks, commercial and Medicare lines of business.

PEG logic recognizes a limited number of conditions or events that can qualify as a complication. Examples of complications include: sepsis, pneumonia, urinary tract infection, pulmonary embolism, myocardial infarction, acute renal failure, foreign object retained after surgery, hemorrhage, stroke/CVA and surgical site infection. While most PEG anchor categories are eligible for complication assignment, the complications that are eligible for each anchor category can vary. A complication that is eligible for one anchor category might not be eligible for others. Table 5 provides complication types and rates for two procedures from PEG benchmarks, commercial and Medicare lines of business.

In addition to the other exclusions, the PEG logic excludes a complication if diagnostic evidence of the complicating condition or medical event appeared before the PEG anchor procedure. After complications identified for a PEG episode have gone through the exclusion logic, any remaining complications are further evaluated to see if they are clinically related. Complications are reported in for the following categories:

- The episode is not eligible for complication logic.
- The episode is eligible, but no complication was found.
- One or more complication exclusions occurred for the episode.
- The episode has one or more complications.

Postoperative complications may add substantial cost to the procedure episode.

Table 4. Complication costs and rates — commercial and Medicare[7]

PEG description	Average complication cost, commercial	Complication rate, commercial	Average complication cost, Medicare	Complication rate, Medicare
Mastectomy	$52,849	6.04%	$27,756	10.31%
Appendectomy	$27,191	4.64%	$24,300	16.74%
Knee replacement surgery	$39,859	5.32%	$35,176	11.64%

Table 5. Complication types by PEG — commercial and Medicare[7]

PEG category description	Complication description	Complication rate, commercial	Complication rate, Medicare
Appendectomy	Sepsis	0.84%	3.90%
Appendectomy	Pneumonia	0.39%	1.26%
Appendectomy	Urinary tract infection	0.81%	2.81%
Appendectomy	Pulmonary embolism	0.08%	0.59%
Appendectomy	DVT/thrombophlebitis	0.25%	1.00%
Appendectomy	Acute renal failure	0.39%	4.49%
Appendectomy	Pulmonary edema	0.20%	3.16%
Appendectomy	Hemorrhage	0.22%	0.37%
Appendectomy	Stroke/CVA	*	0.55%
Appendectomy	Surgical site infection	1.73%	2.43%
Appendectomy	Wound dehiscence	0.29%	0.85%
Knee replacement surgery	Sepsis	0.34%	0.69%
Knee replacement surgery	Pneumonia	0.27%	0.73%
Knee replacement surgery	Urinary tract infection	1.06%	2.75%
Knee replacement surgery	Pulmonary embolism	0.46%	0.71%
Knee replacement surgery	DVT/thrombophlebitis	1.03%	1.44%
Knee replacement surgery	Myocardial infarction	*	0.09%
Knee replacement surgery	Acute renal failure	0.91%	2.61%
Knee replacement surgery	Pulmonary edema	0.53%	2.52%
Knee replacement surgery	Hemorrhage	0.24%	0.31%
Knee replacement surgery	Stage III and IV pressure ulcers	0.04%	0.17%
Knee replacement surgery	Stroke/CVA	0.12%	0.52%
Knee replacement surgery	Surgical site infection	0.61%	0.78%
Knee replacement surgery	Wound dehiscence	0.52%	0.65%

* Insufficient number of episodes

Finalizing a procedure episode

Each final procedure episode is assigned the following:

- Responsible provider — the clinical provider identified as responsible for managing the procedure and related care
- Completeness status — indicates if an episode was interrupted at the start or end of the final time window because of the existence of a competing PEG anchor or an absence of member enrollment eligibility
- Severity level and severity score — indicates the variation in cost that can be explained by an episode's clinical characteristics (patient's demographics, comorbidities and condition status factors)
- Complication flag — indicates whether any complications were found for the episode
- Combined status — indicates that at least two distinct, yet related, procedures were performed on the same date
- Laterality — indicates, where applicable, the laterality of the PEG anchor procedure (for example, bilateral knee procedure)
- Sub-anchor — assigns, where applicable, a sub-anchor to the PEG episode
- Place of service (POS) — indicates where a procedure occurred, identifies missing or conflicting POS data, and identifies if the POS assignment was expected or unexpected
- Outlier status — a customizable feature that classifies the episode's cost (not an outlier, low outlier, high outlier) based on a comparison of the episode's cost to a dollar amount specified for each PEG anchor category

PEG output files include detail on the individual services grouped to the episode and a summary of the episode's key characteristics, including the PEG anchor category and PPC, responsible provider, episode start and end dates, completion status, laterality, severity level, complication flag, outlier status, sub-anchor and place of service.

Using Procedure Episode Groups

PEG presents several opportunities to understand and compare the services related to procedural care:

- Understand the prevalence and costs of key procedures.
- Analyze the mix of services provided in the context of a procedure, including pre- and postoperative care.
- Assess the use of outpatient care in delivering a procedure and the overall effect on costs and quality of performing surgery in an inpatient versus outpatient setting.
- Use procedure episodes to support bundled payment design.
- Compare the cost and quality of procedures performed by provider networks and different specialists.
- Support network design and value-based payment using measurement results to identify and reward high performers.

The remainder of this paper provides examples of PEG applications and their results. To support these examples, administrative claims and enrollment data from a large population were processed using the PEG software.

Complete, non-outlier PEG episodes were selected for analysis. Outliers were identified from both a clinical and financial perspective. Clinical outliers were those procedure episodes without evidence of an expected clinically and financially important service. For example, for coronary artery bypass graft (CABG) procedures, evidence of an acute inpatient hospital stay is required. Identifying clinical outliers has value in targeting and excluding episodes where available data may not be complete. Financial outliers were defined as those procedures with costs significantly outside the normal range for the PEG. Low- and high-cost trim points were set for each PEG and approximated the 2.5 and 97.5 percentiles in the observed distribution of costs for a PEG. If an episode had a total overall cost outside of the range defined by the low- and high-cost trim points, it was considered a financial outlier and excluded from the analysis.

Understanding procedure costs

PEG results can provide insights into individual procedure costs as the percentage of total procedure cost to prioritize cost savings opportunities. Tables 6 and 7 outline the percentage of costs for select cardiology PEGs for commercial and Medicare populations, with surgical valve repair accounting for a small percentage of the number of episodes but a significant portion of costs.

To take the analysis to the next level, view how costs are distributed across types of service (TOS) and by severity level. With PEG output, procedures that are done in both an inpatient and outpatient setting can be analyzed to determine if there are opportunities to reduce costs by moving to a less resource-intensive care setting. In addition, differences between the commercial and Medicare populations can be delineated.

Table 6. Percentage of cost by type of service (TOS) for select cardiology PEGs — commercial

PEG category description	Severity level	% of total episodes	% of total cost	Management cost % of total	Surgical cost % of total	Facility cost % of total	Ancillary cost % of total	Pharmacy cost % of total
Cardiology								
Coronary artery bypass graft	1	0.15%	1.41%	4.91%	19.23%	58.43%	17.00%	0.42%
Coronary artery bypass graft	2	0.03%	1.52%	7.78%	14.71%	60.47%	16.49%	0.54%
Closed valve repair	1	0.01%	1.02%	2.68%	38.66%	17.48%	40.44%	0.74%
Implantable device defibrillator	1	0.10%	1.77%	1.81%	33.71%	12.76%	51.37%	0.36%
Implantable device defibrillator	2	0.02%	1.58%	4.75%	27.74%	28.19%	38.88%	0.45%
Implantable device pacemaker	1	0.07%	0.71%	6.91%	36.68%	27.57%	28.16%	0.68%
Surgical valve repair	1	0.10%	1.67%	3.50%	20.63%	59.61%	15.75%	0.51%
Surgical valve repair	2	0.02%	2.24%	5.15%	14.32%	66.53%	13.25%	0.75%

Table 7. Percentage of cost by TOS for select cardiology PEGs — Medicare

PEG category description	Severity level	% of total episodes	% of total cost	Management cost % of total	Surgical cost % of total	Facility cost % of total	Ancillary cost % of total	Pharmacy cost % of total
Cardiology								
Coronary artery bypass graft	1	0.40%	1.79%	7.73%	17.93%	57.01%	16.83%	0.51%
Closed valve repair	1	0.02%	1.06%	9.34%	23.49%	49.32%	17.09%	0.76%
Implantable device defibrillator	1	0.29%	1.36%	4.31%	45.35%	16.02%	33.53%	0.79%
Implantable device pacemaker	1	0.63%	0.62%	11.07%	38.88%	27.43%	21.66%	0.95%
Surgical valve repair	1	0.17%	1.72%	4.83%	26.93%	50.21%	17.69%	0.35%
Surgical valve repair	2	0.10%	1.99%	6.39%	22.38%	55.45%	15.49%	0.29%
Surgical valve repair	3	0.07%	2.30%	8.84%	17.44%	59.31%	14.11%	0.30%

Procedure episodes and bundled payment

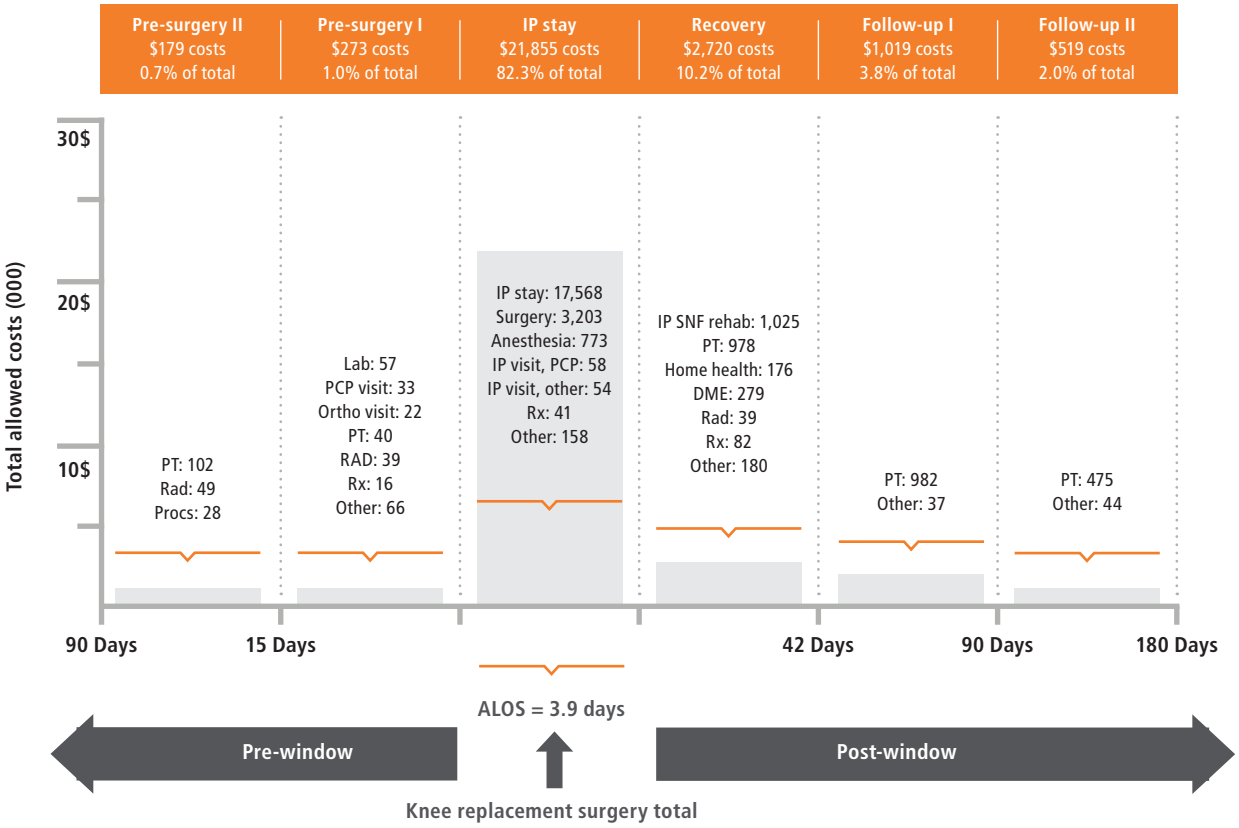
Public and private payers are implementing new approaches to reimburse hospitals and physicians for the services involved in treating an episode of care. These designs, often called "bundled payments," define a set of services to be included in delivering a procedure or treating a chronic condition and establish a fixed price or budget for the performance of that episode. If providers deliver the required care for less than that amount, they can benefit financially. If actual costs exceed the price, providers might share in the loss.

Bundled payment designs vary in terms of the financial risk placed on a provider or group of providers. However, they all share the concept of a prospective budget or price and a defined set of services covered by that amount. Quality measures are often tied to these arrangements. By rewarding value and providing incentives for successful outcomes, bundled payments might enhance the affordability and quality of care.

PEG provides the foundational information needed to support bundled payments for procedural care. For example, a knee replacement episode of care might include the procedure itself, an inpatient stay and the imaging, physical therapy, evaluation/management and other services involved. PEG provides a starting point for deeper analysis of the services typically involved in a procedure episode.

In addition to identifying the types of services and costs associated with a PEG , Figure 2 provides an example of how PEG outputs might be used to support payment for a knee replacement episode.

Figure 2. Knee replacement PEG



On average, the total cost for all services in the knee replacement episodes analyzed was $26,565. Most costs (82%) were incurred during the inpatient stay where the procedure was performed. Some radiology, physical therapy (PT) and laboratory testing are observed during the pre-surgical periods — although pre-surgical services were responsible for less than 2% of total costs. Recovery and follow-up services accounted for 16% of total costs, driven primarily by physician therapy (PT) and inpatient rehabilitation. A similar analysis that assesses the different types of hospital and physician providers that deliver care during such an episode could be performed.

Provider performance measurement

PEG episodes can serve as a key unit of analysis to assess provider cost and quality for procedural care. By linking all the services related to a procedure, PEG allows a more complete view of the resources involved in delivering surgical care. In addition, the clinical definition around procedure episodes might support measurement of the processes and outcomes that suggest high-quality care.

For instance, if orthopedic surgery is selected for analysis, physicians in this specialty are identified to create a "peer group" that includes all orthopedic surgeons observed to have one or more selected PEG episodes. PEG episodes are selected for these physicians using the following criteria:

- PEGs that are typically performed by orthopedic surgeons — for example, cervical spine laminectomy, total hip replacement, knee arthroscopy with meniscectomy and open carpal tunnel repair — were among the PEGs selected for orthopedics
- Episodes where the physician was the primary surgeon for the anchor procedure
- Complete episodes that not clinical or financial outliers

For each episode, the observed and peer (expected) costs are computed — overall, for all services, and by type of service. The observed costs represent actual episode costs. Peer costs are computed as the average cost for all episodes assigned to the peer group with that same PEG. The results are aggregated across episodes to produce observed and peer costs for each physician, by PEG and across all PEGs.

The ratio of observed-to-expected peer costs (the index) is used to describe the physician's average use of resources relative to their peers. When combining results across PEGs, the peer costs for a physician can be interpreted as the average result for the physician's peers — if they had the same mix of PEG episodes as the physician who is being evaluated. In this way, case mix adjustment is applied to the results and reflected in the index. Case mix adjustment is a key consideration to support valid comparisons across physicians. A physician with an index greater than 1.0 uses more resources relative to peers whereas an index less than 1.0 indicates use of fewer resources.

Table 8 summarizes the cost of care comparison for three higher-volume orthopedic surgeons. For each surgeon, results are shown for their most prevalent PEG episodes, all episodes, observed and peer costs, and the index. In addition, results are shown for all services observed for a PEG and by type of service.

By linking all the services related to a procedure, PEG allows a more complete view of the resources involved in delivering surgical care.

Table 8. Provider performance measurement — procedure episode cost of care comparisons

PEG description	Measure	# Episodes	Total cost	Inpatient facility costs	Outpatient facility costs	Ancillary and pharmacy costs	Total professional costs
Dr. Jones							
Knee arthroscopy with cruciate ligament repair	Observed	27	$14,211	$0	$9,324	$632	$4,255
	Expected		$14,555	$85	$7,401	$1,077	$5,993
	Index		0.98	-	1.26	0.59	0.71
Knee arthroscopy with meniscectomy	Observed	50	$6,220	$0	$3,714	$66	$2,440
	Expected		$5,881	$13	$3,162	$238	$2,468
	Index		1.06	-	1.17	0.28	0.99
Other knee arthroscopy, with treatment	Observed	24	$6,322	$24	$3,441	$120	$2,737
	Expected		$7,383	$72	$3,643	$346	$3,323
	Index		0.86	0.33	0.94	0.35	0.82
Arthroscopic repair, rotator cuff or slap shoulder	Observed	7	$10,370	$0	$6,170	$66	$4,133
	Expected		$13,016	$109	$6,515	$355	$6,036
	Index		0.8	-	0.95	0.18	0.68
All episodes	Observed	125	$8,539	$92	$5,080	$229	$3,138
	Expected		$8,996	$176	$4,535	$474	$3,811
	Index		0.95	0.52	1.12	0.48	0.82
Dr. Smith							
Hip replacement	Observed	7	$22,336	$16,146	$1,205	$681	$4,304
	Expected		$24,269	$17,779	$992	$524	$4,974
	Index		0.92	0.91	1.22	1.3	0.87
Knee replacement surgery	Observed	24	$27,683	$19,411	$1,519	$790	$5,963
	Expected		$26,537	$18,652	$1,437	$722	$5,726
	Index		1.04	1.04	1.06	1.09	1.04
Knee arthroscopy with meniscectomy	Observed	28	$6,934	$195	$3,591	$220	$2,929
	Expected		$5,881	$13	$3,162	$238	$2,468
	Index		1.18	15.1	1.14	0.92	1.19
Other knee arthroscopy, with treatment	Observed	16	$8,322	$0	$4,197	$263	$3,862
	Expected		$7,383	$72	$3,643	$346	$3,323
	Index		1.13	-	1.15	0.76	1.16
All episodes	Observed	85	$15,007	$7,041	$3,147	$484	$4,335
	Expected		$14,317	$6,838	$2,924	$492	$4,063
	Index		1.05	1.03	1.08	0.98	1.07
Dr. Olson							
Hip replacement	Observed	34	$24,766	$18,223	$1,403	$482	$4,657
	Expected		$24,269	$17,779	$992	$524	$4,974
	Index		1.02	1.02	1.42	0.92	0.94
Knee replacement surgery	Observed	18	$29,185	$20,975	$2,504	$769	$4,937
	Expected		$26,537	$18,652	$1,437	$722	$5,726
	Index		1.1	1.12	1.74	1.07	0.86
Knee arthroscopy with meniscectomy	Observed	8	$6,243	$0	$3,276	$78	$2,888
	Expected		$5,881	$13	$3,162	$238	$2,468
	Index		1.06	-	1.04	0.33	1.17
All episodes	Observed	61	$23,355	$16,347	$2,035	$513	$4,461
	Expected		$22,250	$15,417	$1,451	$542	$4,840
	Index		1.05	1.06	1.4	0.95	0.92

As shown in Table 8, the number of PEG episodes for these providers ranged from 61 to 125. Also, the mix of PEGs varied across providers, underscoring the importance of case mix adjustment when comparing results across providers.

The results by PEG describe the physician's performance for procedure episodes around a specific surgery. For example, Dr. Jones was observed to have 50 episodes for "knee arthroscopy, with meniscectomy." The observed cost for Dr. Jones' episodes were $6,220 for all services. This amount compares to $5,881 for peers, 6% higher than peers for a cost of care index of 1.06. Outpatient facility services appear to be the most important driver of this difference.

The cost of care index for "all episodes" summarizes the provider's overall result, aggregated across the selected episodes. As shown, the index results for "total" services range from 0.95 for Dr. Jones to 1.05 for Dr. Smith and Dr. Olson. The result for Dr. Jones indicates observed costs at 5% less than peers after adjusting for differences in the mix of PEG episodes between Dr. Jones and peers.

Finally, as noted above, the peers' expected cost for all episodes describes the average cost for a provider's peers if they had the same mix of episodes as that provider. In this way, this value reflects a case mix-adjusted comparison for the provider, overall and by type of service, adjusting for the provider's mix of PEG episodes. Across the providers shown in Table 8, Dr. Olson has the highest-cost case mix ($22,250 per episode), reflecting a greater mix of hip replacement and knee replacement procedures. Dr. Jones has the lowest-cost case mix, reflecting a greater mix of lower cost knee arthroscopy procedures.

Summary

PEG introduces a powerful approach to assessing the cost and quality of the services involved in delivering a surgical procedure. By leveraging the same methodological platform as ETG and other Symmetry tools, PEG provides a consistent approach to episodes of care and contributes to a more complete solution in health care measurement. While consistent with ETG, PEG offers important added value with its unique focus on procedural care that provides important insights and better understanding regarding the comprehensive cost and quality of a surgery.

To learn more about Symmetry Procedure Episode Groups, please contact us at **1-800-765-6807** or **empower@optum.com.**

Sources

1. Centers for Medicare and Medicaid Services. National Health Expenditure Data. NHE Fact Sheet. December 2020.
2. Medicare Payment Advisory Commission (MedPAC) Report to the Congress: Medicare Payment Policy, March 2021.
3. Kennedy K, Given P, et al. The insanity of U.S. health care pricing: An early look at hospital price transparency data. Health Care Cost Institute. April 2021.
4. International Federation of Health Plans. 2015 Comparative Price Report. Variation in Medical and Hospital Prices by Country.
5. Tsai TC, Joynt KE, Orav EJ, et al. Variation in surgical-readmission rates and quality of hospital care. *N Engl J Med.* 2013;369(12):1134-1142.
6. Healy MA, Mullard AJ, Campbell DA, Dimick JB. Hospital and Payer Costs Associated With Surgical Complications. *JAMA Surg.* 2016;151(9):823–830. doi:10.1001/jamasurg.2016.0773
7. Optum. PEG 10.1 Benchmarks. 2020.

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