

**MICHIGAN VALUE
COLLABORATIVE**

OCTOBER 2024

DATA USERS GUIDE



**Improving the health of Michigan through
sustainable, high-value healthcare**



Nonprofit corporations and independent licensees
of the Blue Cross and Blue Shield Association

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Purpose

The purpose of this document is to provide information about the Michigan Value Collaborative's (MVC) episode data structure to MVC members who utilize our data for quality improvement purposes. MVC data consists of medical claims data from Blue Cross Blue Shield of Michigan (BCBSM), Blue Care Network (BCN), the Centers for Medicare and Medicaid Services (CMS), and the Michigan Department of Health and Human Services (MDHHS). MVC maintains claims from these payers going back to January 1, 2015.

Background

The Michigan Value Collaborative is a partnership between over 100 Michigan hospitals, 40 physician organizations, and BCBSM/BCN. MVC is a collaborative quality improvement initiative that aims to improve the health of Michigan through sustainable, high-value healthcare. MVC strives to achieve this through rigorous performance feedback, empirical identification of best practices, and collaborative learning. All analyses and reports are based on paid claims data for BCBSM, BCN, Medicare Fee-for-Service (FFS), and Medicaid beneficiaries who are Michigan residents. These claims are used to create 30- or 90-day episodes of care for 14 service lines inclusive of over 40 different index conditions.

Defining Episodes of Care

I. Index Events and Post-Discharge Period

MVC organizes claims into 30- and 90-day episodes of care for over 40 different surgical and medical conditions (for the full list, see Appendix A). An episode begins with an index event and includes all of a beneficiary's facility and professional claims within the 30- or 90-days post-discharge. An episode of care is made up of four main payment components: a facility index payment, professional payments, post-acute care payments, and inpatient readmission payments. These components, and their sub-components, can be seen in Figure 1 below. Please refer to Appendix B for a more detailed episode component breakdown and Appendix C for MVC's claim categorization rules.

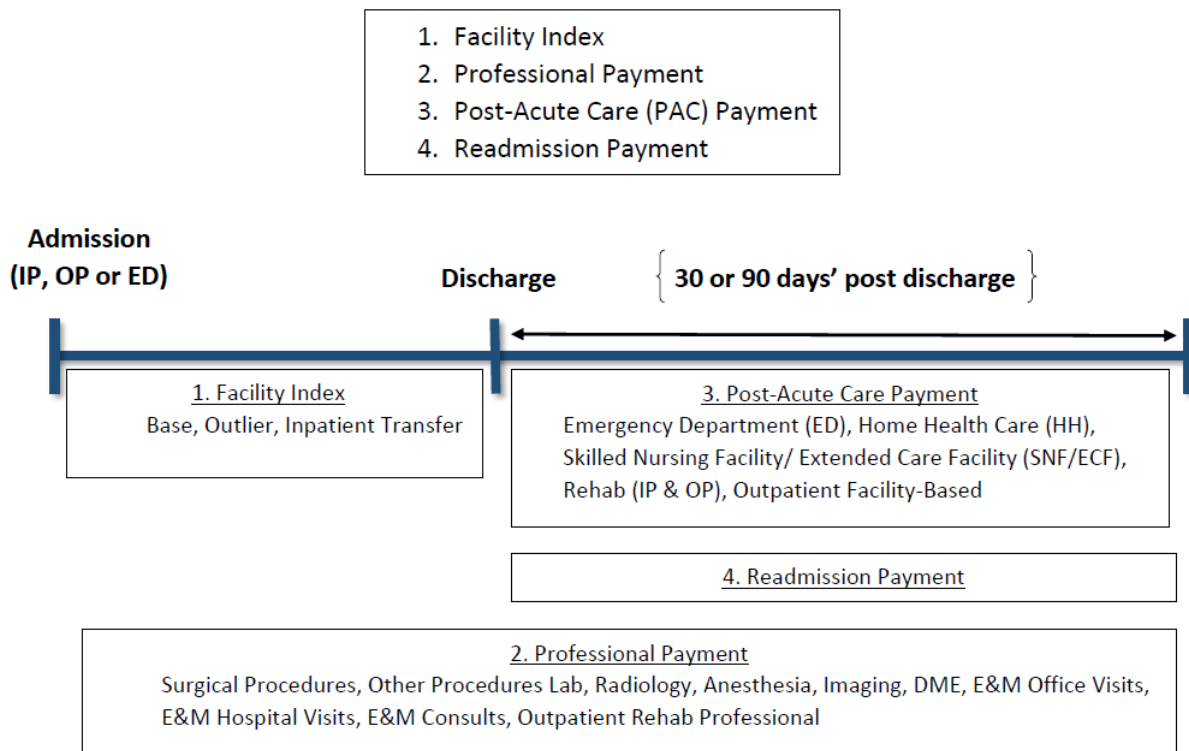
The data on MVC's registry features episodes of care initialized by an inpatient hospitalization or an inpatient or outpatient surgery. This hospitalization or surgery is considered the "index event", and the facility claim containing the relevant billing codes for that event is considered the "facility index claim".

MVC considers multiple date fields on each claim to identify the correct date for the start and end of an index event. MVC methodology utilizes the admission date on a facility claim when present, otherwise the claim from/start date is used to identify the start of the index event. Similarly, MVC prioritizes using the discharge date on a claim but uses the claim end date when the discharge date is missing.

A variety of fields are used to categorize claims found within the post-discharge period. Medicare Severity Diagnosis Related Groups (MS-DRG) are used to categorize inpatient facility claims. Berenson-Eggers Type of Service (BETOS) codes are used to categorize professional claims. BETOS codes group Current Procedural Terminology (CPT) codes into clinically meaningful categories. A listing of BETOS codes can be found on the [CMS website](#).

All claims for a given patient within the timeframe of an episode are considered part of the episode of care, regardless of the episode's index condition or the diagnosis or procedure codes on a given claim.

Figure 1. Episode of Care Payment Components



II. Episode Condition Definitions

MVC categorizes each episode according to its index condition, each of which is defined using International Classification of Diseases 9/10 (ICD9/ICD10) procedure and diagnosis codes as well as Current Procedural Terminology (CPT) codes. We use this approach to create clinically meaningful cohorts rather than conditions based on diagnosis-related groups (DRG), which are assigned by billing departments. When identifying index events for episodes, the primary diagnosis code on a claim is considered for medical conditions, while all procedure codes on a claim are evaluated for surgical conditions. Certain exclusion criteria are applied to each condition to ensure that the patients attributed to that condition are comparable across hospitals. For a full set of MVC episode condition definitions, please refer to the Resources section on the MVC [registry](#).

While medical condition episodes must begin with an index event in the inpatient setting, many surgical condition episodes are structured so that the corresponding index surgical procedure can be identified in the inpatient, outpatient, or emergency department setting.

III. Transfer Cases

When a patient is transferred between hospitals during their index event, MVC attributes those transfer patients to the original hospital where the index admission began. However, if a patient is transferred from the originating hospital before an MVC episode has been initialized, then the patient is attributed to the receiving hospital. MVC episodes are initialized by an index event that meets the inclusion criteria for one of our conditions. Transfer cases represent a small percentage of overall cases, but because they represent real patients, inclusion in the MVC episode data ensures that this population's outcomes have the ability to be measured and improved as part of overall quality improvement efforts.

IV. Validity

MVC methodology for claim categorization and attribution was validated during the 2015 MVC Validation Project, at which time MVC claims data were compared with electronic medical record data across all participating hospitals. These efforts resulted in significant improvements to MVC methodology. This validation study was published in the Journal of Managed Care in 2017.¹ MVC continues to evaluate and refine our methodology on a regular basis.

V. Dual-Insurance Considerations

As MVC contains a multi-payer claims database, there are instances in which a beneficiary is covered by multiple insurance plans. To avoid the duplication of episodes, for each index event an episode will only be selected and created using data from one of a patient's insurance providers. If a patient appears under multiple insurance plans, for each index event an episode is created using claims from the payer in which the patient has the highest utilization and payments on claims in the post-index period. In this way, MVC selects the payer that is covering the majority of the services within that episode. MVC does not combine claims from different payers into a single episode.

VI. Condition Hierarchy and Temporal Considerations

MVC creates episodes chronologically and does not allow for a patient to have overlapping episodes. A new episode will not initialize for any given patient unless at least 90 days have passed since the index discharge of their previous episode, if any. For example, if a patient has an admission for CHF and an admission for COPD three weeks later, then MVC data would contain a CHF episode, and the COPD admission would appear as a readmission within that CHF episode. If two surgical procedures occur on the same day, then MVC employs a condition hierarchy to determine which condition the episode will be classified as. This condition hierarchy is largely based on the average payment of each condition, with the most expensive procedures prioritized highest.

VII. Reporting Population

MVC inpatient and surgical-based episodes of care are created for adults aged 18.5 years or older at the time of the index hospitalization or surgery. These episodes are created only for patients whose index hospitalization or surgery began at a MVC hospital in Michigan. MVC incorporates claims for all beneficiaries of Blue Cross Blue Shield of Michigan and Blue Care Network plans, but only receives Medicare FFS claims and Michigan Medicaid claims for residents of Michigan. All Michigan Medicaid plans are included.

A 6-month enrollment requirement is applied to beneficiaries appearing in MVC episodes of care. To be eligible to appear in an MVC episode, a beneficiary must have been enrolled with their insurance provider for at least 180 days prior to a potential index event. This restriction is applied across payers and has a small impact on the total number of episodes created for each site of care, but is necessary to ensure that for all beneficiaries there is an equal likelihood of identifying comorbid diagnoses prior to an episode of care. Claims in the 180 days prior to an episode are used to identify patient comorbidities and prior healthcare utilization, all of which inform the risk-adjustment process.

Price Standardization

MVC uses a process to standardize all medical claim payments to the Medicare FFS fee schedule for the purpose of better analyzing hospital level variation in utilization. The goal of our approach is to eliminate the extent to which price variations are a result of differences due to negotiated contracts, inflation, wage index, geographic region, payer, or hospital characteristics. The standard price applied to each service is based on all available Medicare FFS data for Michigan residents. This method would tend to overestimate the actual payments at small, rural hospitals and underestimate the payments at large, urban hospitals. Therefore, the price-standardized payments within MVC data are a measure of utilization instead of actual cost.^{2,3}

The MVC Coordinating Center continues to evaluate changes in reimbursement policies over time to ensure that standardized payments are as accurate as possible across services and payers. The goal is to accurately measure the proportionate contribution of each payment component to the total episode payment.

Our price standardization process is applied to claims data in three parts. Facility claims are comprised of inpatient facility claims and post-acute care facility claims, while professional claims are treated as a unique group. This document will describe price standardization for each group separately.

I. Inpatient Facility Claims

We calculate three payment amounts for inpatient claims: DRG base payments, outlier payments, and transfer payments.

A. *Diagnosis Related Group (DRG) Base Payment*

Inpatient claims are assigned payments according to the claim's Medicare Severity Diagnosis Related Group (DRG). Each DRG is assigned an average price based on Medicare data, and that payment amount is applied across payers as the price-standardized base payment for all inpatient claims assigned the DRG. One complication in pricing data over multiple years is that the DRG definitions (and relative weights) change over time. To account for this, we use the most recent version of third party DRG grouping software to regroup DRGs on all inpatient claims before applying DRG base payments. The DRG grouping process takes information from five data elements: patient sex, patient age, patient discharge disposition, ICD9/ICD10 diagnoses, ICD9/ICD10 procedure codes and assigns a consistently defined DRG to each inpatient claim.

B. *Outlier Payment*

Length of stay-based outlier payments are applied to price-standardized inpatient claim amounts separately from the base payment to account for particularly complicated patients (i.e., when the level of treatment greatly exceeds the expected average for a given DRG's relative weight). As a general rule, these outlier payments are applied when an inpatient claim's length of stay is significantly longer than the average length of stay for its DRG.

Our outlier payment methodology utilizes a calculation of the 99th percentile of length of stay by DRG among Medicare FFS inpatient facility claims. The 99th percentile length of stay for each DRG is set as the length of stay threshold for that DRG. Any inpatient claim with a length of stay greater than the threshold for its DRG is assigned an outlier payment. The outlier payment for a claim is calculated as \$2,500 x each day over the length-of-stay threshold.

**If LOS > LOS Threshold DRG, then Outlier Payment = (LOS-LOS Threshold DRG)*\$2,500
Otherwise, Outlier Payment = 0**

C. Transfer Payment

When a patient is transferred from one hospital to another, both the initial hospital as well as the transfer hospital will bill for an inpatient admission separately. When this occurs, the initial hospitalization is captured as the index event, and the assigned DRG would determine the index base payment. Any transfer payment is based on the DRG from the inpatient stay at the transfer hospital. If a transfer did not occur, the transfer payment for the episode is \$0.

II. Post-Acute Care Facility Claims

A. Inpatient Rehab and Long-Term Acute Care Facility Claims

Inpatient rehab and long-term acute care hospitalization (LTACH) claims are priced based on DRG, using the same methodology as inpatient claims. Stays that extend past the episode end date are pro-rated. For example, if a patient begins an IP rehab stay on day 88 and is discharged on day 92, then only three of the five days would count toward the 90-day episode payment. To accomplish this, MVC would calculate the IP rehab payment as three-fifths of the total.

B. Skilled Nursing Facility (SNF) Claims

In Q4 2019, CMS moved away from utilizing Resource Utilization Groups (RUGs) and instead began using a Patient Driven Payment Model (PDPM). To appropriately standardize payments, MVC applied this per diem payment across conditions, payers, and years. Therefore, SNF payment variation will be fully due to utilization rate and length of stay. SNF stays that extend past the episode end date are pro-rated. For example, if a patient begins a SNF stay on day 86 and is discharged on day 100, then only five of the fifteen days would count toward the 90-day episode payment. To accomplish this, MVC would calculate the SNF payment as one-third (5/15) of the total.

C. Outpatient Rehab Claims

Outpatient rehab claims are price-standardized according to CPT codes on the claim.

D. Home Health (HH) Claims

Consistent with CMS, HH payments are calculated using predetermined base payments under the Prospective Payment System (PPS). Base payments are adjusted according to characteristics in the Home Health Resource Groups (HHRG), including different patient health conditions and patient care needs.

MVC calculates HH payments based on the code rates and length of service. In accordance with CMS payment policies, if the patient receives four visits or fewer during the 60-day episode, the services are paid using the standardized per visit payment and Healthcare Common Procedure Coding System (HCPCS) code. CMS refers to this payment adjustment as Low Utilization Payment Adjustments (LUPAs). For HH claims that contain more than four visits in a 60-day period, the payment calculation is based on the HHRG code in the Non-LUPA payment schedule. For BCBSM HH claims, we use the standard payment application for CMS HH LUPA claims.

E. ED Claims

ED claims are price-standardized based on CPT codes.

MVC standardizes the method by which ED visits are identified and priced to account for hospital differences. Typically, an ED visit that directly precedes a hospital admission is billed as a claim line within that hospital admission. In this case, there would be no separate facility payment associated with that ED visit, as the entire claim would be price-standardized based on its DRG. However, critical access hospitals (CAHs) are able to bill for this ED visit separately, resulting in payment and rate differences. Therefore, in order to utilize a



consistent methodology across hospitals MVC does not incorporate ED claims prior to an index end date into any episodes of care.

F. Other Outpatient Facility Claims

Other outpatient facility claims constitute a wide variety of outpatient services billed on facility claims which are not categorized elsewhere. These services can include outpatient procedures, imaging, tests, or ambulance services. When possible, we use the CPT codes associated with each claim line to price-standardize the claim. In instances where a CPT code is not available, we use the revenue code on the claim line. Each CPT or revenue code is associated with a quantity. The total payments for each code are summed and then divided by the sum of quantities to create a code rate for each CPT and revenue code, i.e.:

Standardized payment = Code Rate * Quantity
where Code Rate = Total payment for code / Total code quantity
and quantity is capped at 0.95*max code quantity

Outpatient facility claims with a \$0 paid amount are assigned a \$0 standard payment. Prescriptions filled in the post-discharge period are not included in the episode.

III. Professional Claims

The process for price-standardizing professional claims is similar to the approach used for outpatient facility claims, with the only difference being that all professional claims have CPT codes. Each professional claim is associated with a CPT code, quantity, and unit which are used to calculate the total payment for that claim. Additionally, the professional claim price-standardization process incorporates CPT modifier codes when present. CPT modifier codes will either increase or decrease the standard payment for the claim. For example, there is a CPT modifier code for another surgeon assisting in the case. In this situation, there will be a secondary claim to accompany the primary surgical claim, but this secondary claim will have a CPT modifier code which will result in a lower payment on that claim. Professional claims with a \$0 paid amount are assigned a \$0 standard payment.

Risk Adjustment

I. What is Risk Adjustment?

Hospitals treat a variety of patients, and some patients have more complex health needs or are costlier than others. Hospitals that treat a disproportionate number of costly patients may be unfairly classified as “high-cost hospitals” simply because of the group of patients that they treat. Risk adjustment is a statistical method that “levels the playing field” by accounting for differences in hospital case mix.

II. How Does MVC Calculate Risk-Adjusted Episode Payments?

MVC performs risk adjustment of payments and utilization rates using observed/expected (O/E) ratios. The numerator in this ratio is the aggregate of all the observed payments and the denominator is the aggregate of all of the expected payments for a particular hospital. This ratio is multiplied by the statewide expected mean payment to arrive at the risk-adjusted payment for that hospital.

III. How Does MVC Calculate Expected Payments?

MVC calculates expected payments separately for each condition (e.g., AMI, pneumonia, CABG) and each episode component (e.g., total episode payments, readmission payments). Condition and component-specific expected payments are based on statistical models that incorporate a combination of required and non-required variables for adjustment.

IV. Variables Included in Risk Adjustment

Required Variables

The following required variables are always included in the final expected payments models:

- Patient age
- Patient sex
- High or low healthcare claim payments for that patient in the six months prior to the index event, relative to the collaborative median

Non-Required Variables

Non-required variables in MVC risk-adjustment models include a beneficiary’s insurance type (private or public payer, with private payers consisting of BCBSM/BCN and public payers consisting of Medicare FFS and Michigan Medicaid), 79 patient comorbidities based on CMS hierarchical condition categories (HCCs; Appendix D) as well as some condition-specific risk adjusters (see Episode Definition file in resource section of the [registry](#)).

The MVC risk-adjustment models employ 79 Hierarchical Condition Categories (HCCs) that CMS has empirically shown to be predictive of expenditures for Medicare beneficiaries. For each episode, the patient HCCs are assessed according to diagnosis codes on claims for that patient in the six months prior to the index event. We utilize all 25 diagnosis codes reported on a claim to identify these HCCs. By risk adjusting for HCCs, which include end-stage renal disease and cancer, we account for the greater complexity and cost of these episodes.

Among non-required variables, final model covariates are selected using a model specification technique that occurs in two steps:

1. All candidate variables are individually tested using a univariate regression model to see if they predict payment. Non-required variables with a p-value < 0.10 are retained.
2. All of the retained variables are included in a multivariable regression model and variables with a p < 0.05 are used for the final model.

Condition-Specific Risk-Adjustment Variables (CSRAV)

MVC incorporates several condition-specific variables into our risk-adjustment models based on suggestions by participating hospitals and clinicians. For each variable that is suggested, MVC evaluates the appropriateness of including the variable by following the four principles below:

Principle 1: All variables will be considered as a “candidate” for the risk-adjustment model. In other words, any variable may be excluded in the final model if they are not found to be statistically significant.

Principle 2: For surgical conditions, treatment decisions (e.g., laparoscopic vs open) are typically not considered.

Principle 3: For all conditions, we will consider certain diagnosis codes:

- Cancer diagnosis
- Reoperation diagnosis

Principle 4: Variables that represent small variations of a disease process should not be considered. However, these variables can be grouped into broad categories:

- Simple case
- Complex case

Examples

Variable	Category	Appropriate risk-adjustment variable?
Lap vs Open for Colectomy	Treatment decision (rarely both)	No
Cancer for colectomy	Severity of illness	Yes
Dialysis for AMI	Treatment decision or complication	No
Emergency intubation for AMI	Treatment decision or complication	No
GI bleed for colectomy	Severity of illness	Yes
Re-operative CABG	Severity of illness	Yes
Cardiac surgery for AMI	Severity of illness	Yes*
Trach for pneumonia	Treatment decision or complication	No

**In select instances, a treatment decision strongly reflects severity of illness.*

MVC Registry

MVC maintains an interactive online claims-based registry dashboard providing insight into 30- and 90-day inpatient and surgical-based episodes of care attributed to MVC hospitals. The MVC registry allows individuals affiliated with MVC hospitals to view MVC's claims-based episodes of care data for patients whose episode began at their hospital(s). Metrics available on the registry include price-standardized and risk-adjusted episode payments, post-acute care utilization rates, pay-for-performance (P4P) metrics, and cardiac rehab performance metrics. These data combine information from BCBSM, BCN, Medicare FFS, and Michigan Medicaid claims. Across the registry, individuals can choose to benchmark their site's performance against comparison groups that include the collaborative-wide MVC All, general acute care hospitals or Critical Access Hospitals, rural hospitals, hospitals with the same adult trauma level designation, or hospitals in the same cohort for P4P according to bed size and case mix index.

Data Use and Limitations

MVC has agreements in place with CMS, BCBSM, and the Michigan Department of Health and Human Services (MDHHS) around how the data in the MVC registry can be used and what can be shown. MVC members are required to sign a confidentiality agreement before being given access to the MVC data registry. In general, for both Medicare FFS and Michigan Medicaid data, MVC is not permitted to show patient-level information or display any cell with fewer than 11 patients.

In October 2021, MVC - in partnership with the University of Michigan - officially became a federally recognized qualified entity under the CMS Qualified Entity Certification Program (QECF). QECF status allows MVC to share additional Medicare FFS patient-level data with authorized hospital providers. MVC's QECF Medicare data is limited to the most recent 1.5 years of episodes and allows authorized users to view small case counts and other Medicare FFS data that would otherwise be suppressed under Medicare DUA requirements. QECF Medicare registry reports are now available for MVC hospital members with signed QECF confidentiality agreement forms on file with MVC.

Please note that MVC data is only able to be used for quality improvement purposes and is not available for work categorized as research.

Race and Ethnicity Data

MVC combines several sources of data to analyze patient outcomes by reported race/ethnicity values. For patients insured by Medicare FFS and Michigan Medicaid, indicators of race/ethnicity come from enrollment information. For patients with plans through BCBSM and BCN, MVC gleans race/ethnicity information using a patient-level probabilistic match between claim identifiers and patient information available in Admit-Discharge-Transfer (ADT) feeds starting in 2018. Although the underlying data differ by source, MVC categorizes each beneficiary into the best fitting race/ethnicity category based on the data that are available. For instances in which a member_id is associated with multiple race or ethnicity values over time, our approach categorizes that patient in the recorded race/ethnicity group which is less prevalent in the US according to the US Census Bureau. A combined race/ethnicity category is used across MVC reporting, with each beneficiary categorized as one of the following: American Indian or Alaska Native, Asian or Pacific Islander, Black, Hispanic, White, or Other/Unknown.

Metric Interpretation

Prevalence Rates

When reporting on healthcare utilization, MVC often presents data in the form of prevalence rates. A prevalence rate is a straightforward metric that describes the percentage of a population that meets a set of criteria. Common examples of prevalence rates reported by MVC include rates of follow-up care, readmission rates, and rates of post-acute home health care. “30-day rates” refer to outcomes assessed in the 0-30 days following an index event, and 90-day rates assess care received in the 0-90 days following an index event.

MVC prevalence rates typically assess whether a patient received *any* of a given type of care, and do not count the number of times that the category of care was received by a single patient during an episode. For example, a 30-day readmission rate of 20% indicates that 1 in 5 patients in a given cohort had at least one inpatient readmission in the 30 days following their index event. This rate does not indicate whether some patients may have had more than one readmission, and it also does not indicate at what point during the 30-day post-index period the readmissions occurred.

When interpreting prevalence rates, the goal is to see a high rates (towards 100%) of high-value care like cardiac rehab, and low rates (towards 0%) of low-value care such as unplanned readmissions.

Average Episode Payments

Healthcare utilization can also be measured in terms of average episode payments. This metric provides information on the per-episode average claim-based payments associated with a given category of care. Since MVC payment data is always price-standardized and therefore not impacted by contractual payment differences, average episode payment data measures utilization (amount and type of care) rather than exact dollars. When comparing average episode payments across episodes or across hospitals, those with higher average price-standardized episode payments identify patients who received more care or more complex care.

Total Episode Payments

A common category of episode payments reported by MVC is referred to as “total episode payments”. Total episode payments represent the summed total of all price-standardized payments across medical facility and professional claims within a given episode of care, inclusive of the index event and any care billed on claims in the following 30 or 90 days.

Examples

For example, a CHF episode with a \$20,000 price-standardized 30-day total episode payment means that \$20,000 was the summed total for this episode across standardized claim payments for the index inpatient hospitalization for CHF, professional services billed during the index event or following 30-days, post-acute care received in the following 30-days, and any inpatient readmissions in the following 30-days.

As another example, an average price-standardized 30-day total episode payment of \$15,000 for CHF patients at Hospital A can be interpreted as the following: for patients whose episode of care began with an inpatient hospitalization for CHF at Hospital A, the per-episode average of the summed facility and professional claim standardized payments during each 30-day episode was \$15,000.

ED-Based Episodes Data

The data on the MVC registry and as described in the majority of the data guide above are for episodes of care initialized by inpatient hospitalizations or surgical events. Starting in 2023, MVC also now maintains episodes of care data initialized by patient visits to the emergency department (ED) associated with several high-volume ED-relevant conditions. These ED-based episodes of care data do not appear on the MVC registry but may be used for MVC reporting and analytics. ED-based episodes are non-overlapping 30-day episodes with the same episode components as other MVC episodes: an index event, professional services, readmissions, and post-acute care. These episodes incorporate claims data from BCBSM/BCN, Medicare FFS, and Michigan Medicaid back to January 1, 2017. An ED-based episode may be initialized by any claim containing an ED revenue code (045X; the “index event” claim), regardless of whether the index claim also indicates an inpatient admission. The majority of the ED-based episode conditions have been designed to capture patients of all ages, with a few exceptions. ED-based episodes are grouped into clinically similar conditions based on primary diagnosis code of the index ED visit. Please see below for a full list of conditions and condition-specific age ranges for which MVC has created available ED-based episodes data.

MVC ED-Based Episode Conditions

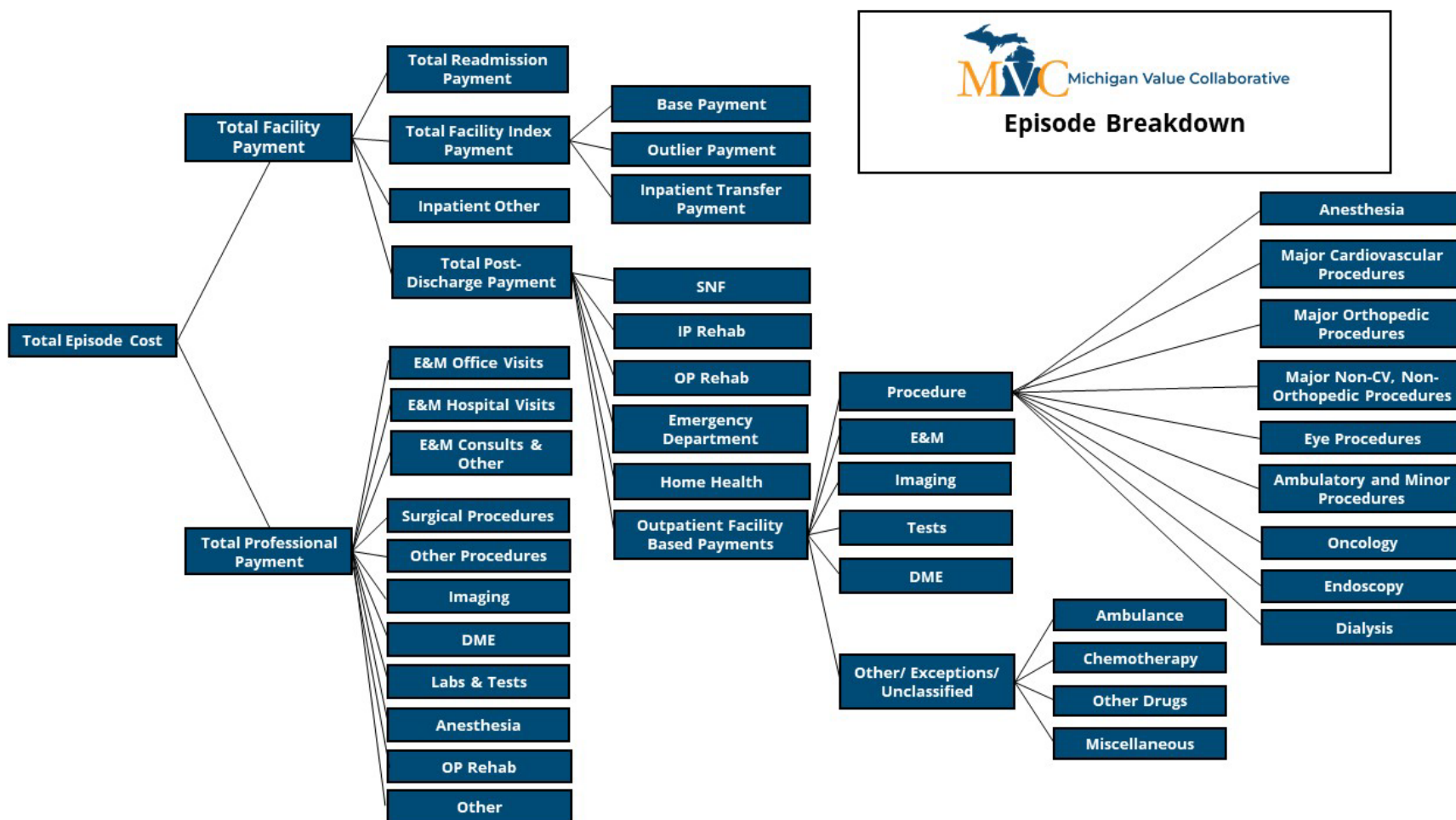
Condition	Age Group Included in Episodes
Abdominal Pain	All (pediatric and adult)
Asthma	All (pediatric and adult)
Atrial fibrillation	All (pediatric and adult)
Cellulitis	All (pediatric and adult)
Chest pain (nonspecific)	All (pediatric and adult)
Chronic obstructive pulmonary disease (COPD)	All (pediatric and adult)
Congestive heart failure (CHF)	All (pediatric and adult)
Deep venous thrombosis	All (pediatric and adult)
Diabetes mellitus long-term complications	All (pediatric and adult)
Diabetes mellitus short-term complications	All (pediatric and adult)
Gastrointestinal bleed	All (pediatric and adult)
Pneumonia	All (pediatric and adult)
Pulmonary embolism	All (pediatric and adult)
Urinary Tract Infection	All (pediatric and adult)
Syncope	All (pediatric and adult)
Accidental Opioid Overdose	Adults 18+
Opioid Use Disorder	Adults 18+

If you are a MVC hospital or physician organization member who would like more information on MVC's ED-based episodes or would like to request an analysis of your attributed patients' ED-based episodes, please contact the MVC Coordinating Center at Michigan-Value-Collaborative@med.umich.edu

Appendix A. MVC Inpatient/Surgery-Based Episode Conditions

Service Line	Condition/Procedure	Setting of Index Event
Bariatric Surgery	Gastric Bypass (RYGB)	Inpatient
	Sleeve Gastrectomy	Inpatient
Cardiac Surgery	Coronary Artery Bypass Graft (CABG) Surgery	Inpatient
	Surgical Aortic Valve Repair (SAVR)	Inpatient
	Transcatheter Aortic Valve Repair (TAVR)	Inpatient
Cancer (Other)	Lumpectomy	Inpatient or Outpatient
	Mastectomy	Inpatient or Outpatient
Endocrine Surgery	Thyroidectomy	Inpatient or Outpatient
Gastrointestinal Surgery	Appendectomy	Inpatient or Outpatient
	Cholecystectomy	Inpatient or Outpatient
	Colectomy (Non-Cancer)	Inpatient
	Colorectal Cancer Resection	Inpatient
	Complex Cancer Surgery: Gastrectomy	Inpatient
	Hernia Repair - Abdominal	Inpatient or Outpatient
	Hernia Repair - Groin	Inpatient or Outpatient
	Complex Cancer Surgery: Pancreatectomy	Inpatient
Interventional Cardiology	Percutaneous Coronary Intervention (PCI)	Inpatient or Outpatient
Medical (Hospital-Based Care)	Acute Myocardial Infarction (AMI)	Inpatient
	Atrial Fibrillation	Inpatient
	Congestive Heart Failure (CHF)	Inpatient
	Chronic Obstructive Pulmonary Disease (COPD)	Inpatient
	Endocarditis	Inpatient
	Pneumonia	Inpatient
	Sepsis	Inpatient
	Small Bowel Obstruction	Inpatient
	Stroke	Inpatient
Major Orthopedics	Joint Replacement (Hip and Knee)	Inpatient or Outpatient
Obstetrics & Gynecology	Cesarean Delivery	Inpatient
	Hysterectomy	Inpatient or Outpatient
	Vaginal Delivery	Inpatient
Spine Surgery	Disc Herniation Repair	Inpatient or Outpatient
	Other Spine Surgery	Inpatient or Outpatient
Thoracic Surgery	Complex Cancer Surgery: Esophagectomy	Inpatient
	Lung Cancer Resection	Inpatient
Trauma	Burn Trauma Admission	Inpatient
	Hip Fracture Repair	Inpatient or Outpatient
	Other Trauma Admission	Inpatient
Urology	Kidney Stone Surgery	Inpatient or Outpatient
	Nephrectomy	Inpatient or Outpatient
	Prostatectomy	Inpatient or Outpatient
Vascular Surgery	Carotid Endarterectomy	Inpatient
	Lower Extremity Bypass for Claudication	Inpatient

Appendix B. Episode Breakdown



Appendix C. MVC Claim Categorization Rules

Facility Claim Type	Definition
Inpatient	(1) Bill Type = 11 (or 12 if DRG present) and (2) DRG* is not a rehab code (945, 946, 949, 950) and (3) Revenue code is not an IP rehab code (118, 128, 138, 148, 158) and (4) Billing facility does not have LTACH taxonomy code (282E00000X)
SNF	Bill Type in (18, 21)
Emergency Dept.	(1) Bill Type = 1x or Bill Type = 85 and (2) Revenue code is an ED code (450, 451, 452, 456, 459)
Home Health	Bill Type in (31, 32, 33, 34)
Inpatient Rehab	(1) Bill Type = 11 and (2) DRG* is a rehab DRG (945, 946, 949, 950) or revenue code is an IP rehab code (118, 128, 138, 148, 158)
Outpatient Rehab	(1) Revenue code is an OP rehab code (41X, 42X, 43X, 44X, 940, 941, 943, 944, 945, 948) or (2) CPT is a rehab CPT or (3) Bill Type in (74, 75)
LTACH	(1) Bill Type = 11 and (2) Billing facility primary taxonomy code = 282E00000X
Outpatient / Other	Everything else

*Regrouped DRG

Appendix D. Hierarchical Condition Categories Used in Risk-Adjustment

Condition Categories	
Acute Myocardial Infarction	Hip Fracture/Dislocation
Acute Renal Failure	HIV/AIDS
Amputation Status Complications	Inflammatory Bowel Disease
Amyotrophic Lateral Sclerosis	Intestinal Obstruction/Perforation
Angina Pectoris	Ischemic or Unspecified Stroke
Artificial Openings for Feeding or Elimination	Lung and Other Severe Cancers
Aspiration and Specified Bacterial Pneumonias	Lymphoma and Other Cancers
Atherosclerosis of the Extremities	Major Head Injury
Bone/Joint/Muscle Infections/Necrosis	Major Organ Transplant or Replacement Status
Breast, Prostate, and Other Cancers	Metastatic Cancer and Acute Leukemia
Cardio-Respiratory Failure and Shock	Monoplegia, Other Paralytic Syndromes
Cerebral Hemorrhage	Morbid Obesity
Cerebral Palsy	Multiple Sclerosis
Chronic Hepatitis	Muscular Dystrophy
Chronic Kidney Disease, Stage 4	Myasthenia Gravis/Myoneural Disorders
Chronic Kidney Disease, Stage 5	Opportunistic Infections
Chronic Obstructive Pulmonary Disease	Paraplegia
Chronic Pancreatitis	Parkinson's and Huntington's Diseases
Chronic Ulcer of Skin, Except Pressure	Pneumococcal Pneumonia, Empyema, Lung Abscess
Cirrhosis of Liver	Pressure Ulcer of Skin with Full Skin Loss
Coagulation Defects	Pressure Ulcer of Skin with Necrosis
Colorectal, Bladder, and Other Cancers	Protein-Calorie Malnutrition
Coma, Brain Compression	Quadriplegia
Complications of Implanted Device	Respirator Dependence
Congestive Heart Failure	Respiratory Arrest
Cystic Fibrosis	Rheumatoid Arthritis
Depressive, Bipolar, and Paranoid Disorders	Schizophrenia
Diabetes with Acute Complications	Seizure Disorders and Convulsions
Diabetes with Chronic Complications	Septicemia or Sepsis
Diabetes without Complication	Severe Head Injury
Diabetic Retinopathy and Vitreous Hemorrhage	Severe Hematological Disorders
Dialysis Status	Severe Skin Burn or Condition
Disorders of Immunity	Specified Heart Arrhythmias
Drug/Alcohol Dependence	Spinal Cord Disorders/Injuries
Drug/Alcohol Psychosis	Traumatic Amputations and Complications
Endocrine and Metabolic Disorders	Unstable Angina, Acute Ischemic Heart Disease
End-Stage Liver Disease	Vascular Disease
Exudative Macular Degeneration	Vascular Disease with Complications
Fibrosis of Lung	Vertebral Fractures
Hemiplegia/Hemiparesis	

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