Michigan Value Collaborative
Data Users Guide

Developed by

Michigan Value Collaborative

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Purpose

The purpose of this document is to provide information about the Michigan Value Collaborative's (MVC) data structure to MVC members who utilize our data for quality improvement purposes. MVC data consists of de-identified claims data from Blue Cross Blue Shield of Michigan (BCBSM), Blue Care Network (BCN), and the Centers for Medicare and Medicaid Services (CMS). MVC maintains claims from these payers going back to January 1, 2012.

Data Guide

I. Background

The Michigan Value Collaborative (MVC) is a partnership between Michigan hospitals, physician organizations, and Blue Cross Blue Shield of Michigan/Blue Care Network. MVC is a 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 de-identified claims data from Blue Cross Blue Shield of Michigan (BCBSM), Blue Care Network (BCN), and the Centers for Medicare and Medicaid Services (CMS). These claims are then used to create 30- or 90-day episodes of care for 11 service lines containing over 34 different conditions. MVC maintains claims from these payers going back to January 1, 2012.

II. Defining Episodes of Care

Conditions and Index Events

MVC has organized claims into episodes of care for over 34 different surgical and medical conditions. An episode begins with an index event and includes all 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 payment, post-acute care payment, and readmission payment. These components, and their sub-components, can be seen in Figure 1 below. Please refer to Appendix A for a more detailed episode component breakdown and Appendix B for the MVC Claim Categorization Rules.

Figure 1. Episode of Care Payment Components

1. Facility Index
2. Professional Payment
3. Post-Acute Care (PAC) Payment
4. Readmission Payment
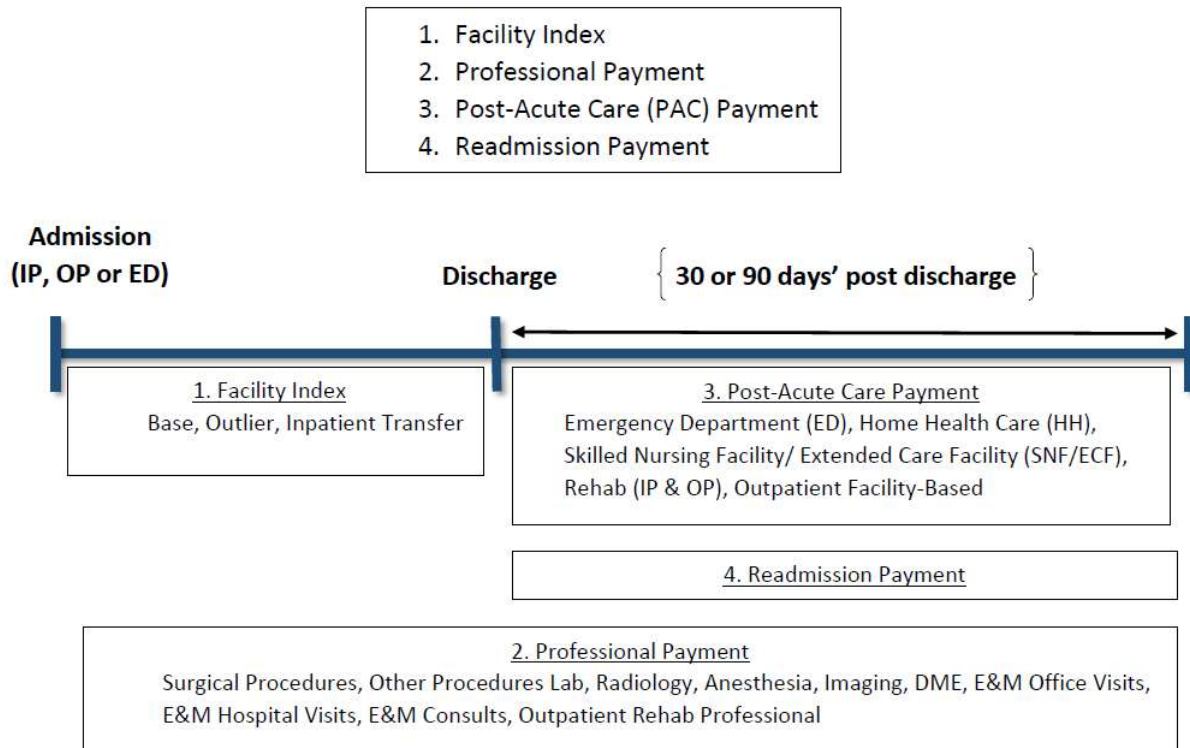
Episode Definitions (Based on Index Event)

MVC defines each episode using International Classification of Diseases 9/10 (ICD9/ICD10) procedure and diagnosis codes or Current Procedural Terminology (CPT) codes. We use this method in order to create clinically meaningful cohorts rather than those based on diagnosis related groups (DRG) which are assigned by billing departments. In creating the episodes, the first diagnosis code is considered for medical conditions, while all diagnosis codes are evaluated for surgical conditions. The transition to ICD-10 coding was successful using CMS' General Equivalence Mappings (GEMs) and was verified based on clinical expertise. With each data update, we look at data trends and have observed no unexpected deviations. Certain exclusion criteria are applied to ensure that the patients attributed to each condition are comparable across hospitals. For a full list of MVC episode definitions, please refer to the Resources section on the registry.

Related and Unrelated Claims (Based on Post-Discharge Period)

Only claims deemed related contribute to the total episode payment. All SNF, rehab, and home health claims are considered related to the index event. Additionally, there are standard related and unrelated criteria that are applicable across all episodes (Appendix C and D). However, there are also condition-specific related and unrelated criteria applied to each episode. For each claim in the post-discharge period, the first and second diagnosis code are examined against a

condition-specific document that was created based on expert clinician input in order to determine if that claim should be related or unrelated to the index event.

Transfer Cases

MVC attributes transfer patients to the hospital where the index admission began. However, if a patient is transferred from the originating hospital before an MVC episode has been triggered, then the patient is attributed to the receiving hospital. MVC episodes are triggered by an index admission 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 analytics ensures this population's outcomes have the ability to be measured and improved as part of overall quality improvement.

Validity

We validated our methodology for claim categorization and attribution during the 2015 MVC Validation Project, where we compared MVC claims data with electronic medical record data across all participating hospitals. As a result, we made significant improvements to MVC methodology. This validation study was published in the Journal of Managed Care in 2017.[1] We continue to evaluate and refine our methodology on a regular basis.

III. Price Standardization

MVC has developed a process to standardize medical claim payments for the purpose of 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 contracts, wage index, region, payer, or hospital characteristics. The standard price applied to each service is based on all available Medicare FFS data. This method would tend to overstate the payments at small, rural hospitals and understate the payments at large, urban hospitals. Therefore, the 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, so as to ensure 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 divides up the data into three parts. Facility claims are comprised of 1) inpatient facility claims and 2) other facility claims, while 3) professional claims are treated as one group. This document will describe price standardization for each group separately.

Inpatient Facility Claims

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

Diagnosis Related Group (DRG) Base Payment

Inpatient claims are assigned payments by Diagnosis Related Group (DRG). Each DRG is assigned an average price based on Medicare data. 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 third party DRG grouping software. This takes information from five data elements (patient sex, patient age, patient discharge disposition, ICD9/ICD10 diagnoses, ICD9/ICD10 procedures) and defines DRGs for each inpatient claim.

Outlier Payment

Outlier payments are made separately from the base payment to providers to compensate 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 triggered when the claim's length of stay is significantly longer than the average length of stay for its DRG.

Our outlier payment calculation uses information from TRICARE, the civilian component of the military health system, to standardize patients. The TRICARE DRG schedule includes a national long stay threshold. Inpatient claims associated with lengths of stay that exceed the national long stay threshold will be flagged as outliers. The outlier payment 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**

IV. Post-Acute Care Claims

IP Rehab Claims

Inpatient rehab claims are priced based on DRG.

Skilled Nursing Facility (SNF) Claims

For CMS patients, SNF payments are calculated based on length of stay and the Resource Utilization Groups (RUG) reported in the individual SNF claims. For BCBSM patients, SNF payments are calculated based on length of stay and the average RUG payment.

OP Rehab Claims

Outpatient rehab claims are priced based on CPT codes.

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 less 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.

ED Claims

ED claims are priced based on CPT codes.

Other Outpatient Facility Claims

These constitute the wide variety of facility claims that are not categorized elsewhere. When possible, we use the CPT code associated with the claim. In cases where the 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

Professional Claims

This process is similar to the one used for Other Outpatient Facility Claims, with the only difference being that all claims have CPT codes. Each professional claim is associated with a CPT code, quantity, and unit which are used to calculate the total payment. Additionally, we incorporate CPT modifier codes when present.

IV. Risk Adjustment

What is risk-adjustment?

Hospitals treat a variety of patients, and some patients 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 type of patients that they treat. Risk-adjustment is a statistical method that "levels the playing field" by accounting for differences in case-mix.

How does MVC calculate risk-adjusted episode payments?

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

How does MVC calculate expected payments?

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

Required variables

The following required variables are always included in the final model: age, gender, insurance type, history of prior high spending, and end-stage renal disease.

Non-required variables

Non-required variables include 79 comorbidities based on hierarchical condition categories (HCC) (Appendix E), and condition specific risk adjusters (see Episode Definition file).

Non-required variables 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.

The MVC risk-adjustment models now employ the 79 Hierarchical Condition Categories (HCCs) that CMS has empirically shown to be predictive of expenditures for Medicare beneficiaries. 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.

Condition Specific Risk Adjustment Variables (CSRAV)

MVC incorporates several condition-specific variables into our risk-adjustment model which are suggested 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.		

Appendix A. Episode Breakdown
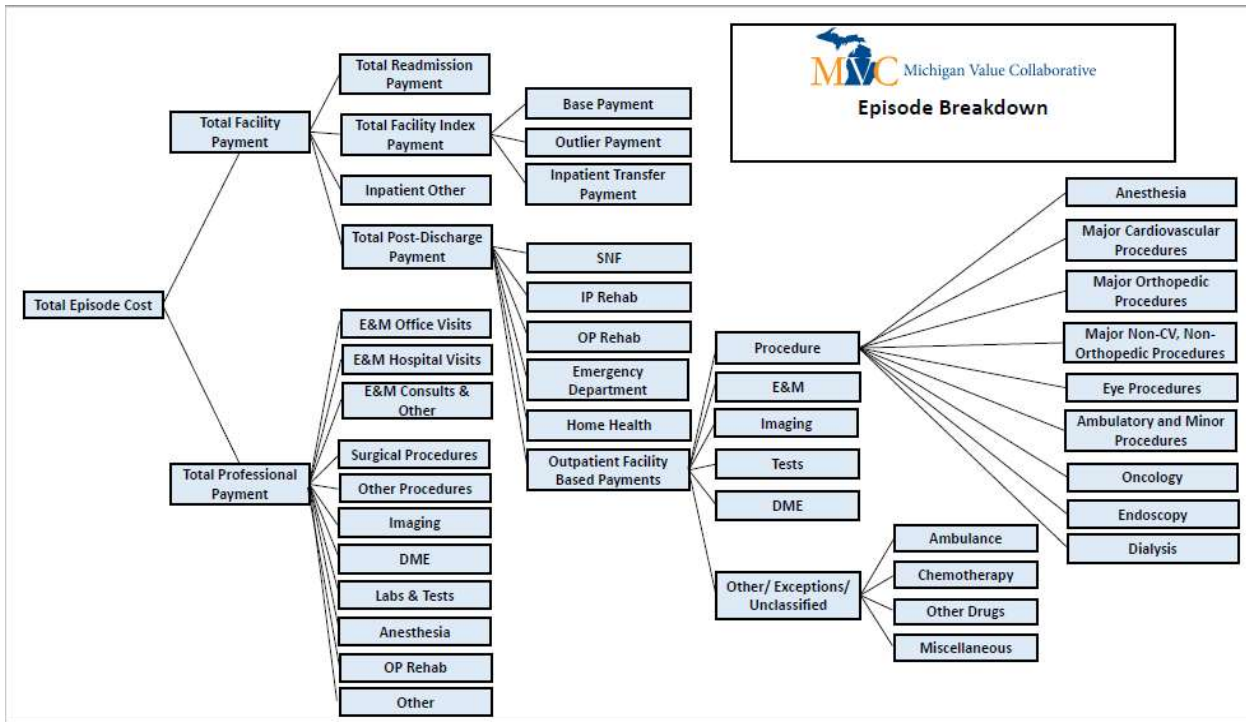
Appendix B. Claims Categorization Rules

Facility Claim Type	New Definition
Inpatient	(1) Bill Type = 11 **and** (2) DRG* is not a rehab code (945, 946, 949, 950) **and** (3) Revenue code is not an IP rehab code
SNF	Bill Type in (18, 21)
Emergency Dept.	(1) Bill Type = 1x **or** Bill Type = 85 **and** (2) Revenue code is an ED code
Home Health	Bill Type in (31, 32, 33, 34)
Inpatient Rehab	(1) Bill Type = 11 **and** (2) DRG* is a rehab DRG **or** revenue code is an IP rehab code.
Outpatient Rehab	(1) Revenue code is an OP rehab code **or** (2) CPT is a rehab CPT **or** (3) Bill Type in (74, 75)
Outpatient / Other	Everything else

*Regrouped DRG

Appendix C: Standard Related Codes in Post-Discharge Period

Stroke + Transient Ischemic Attack (TIA)				
43300	43321	43390	43411	4352
43301	43330	43391	43490	4353
43310	43331	43400	43491	4358
43311	43380	43401	4350	4359
43320	43381	43410	4351	436

Sepsis/Infection				
00845	03841	04102	0417	6868
0090	03842	04103	04183	6869
0380	03843	04104	04184	78552
03810	03844	04105	04185	78559
03811	03849	04109	04189	7907
03812	0388	04110	0419	99591
03819	0389	04119	4210	99592
0382	0390	0412	4211	99593
0383	04100	0414	5670	99594
03840	04101	0416	56739	

Urinary Tract Infection (UTI)				
5909	5950	5959	5990	

Acute Myocardial Infarction (AMI)				
41000	41021	41050	41071	4110
41001	41030	41051	41080	4111
41010	41031	41060	41081	41181
41011	41040	41061	41090	41189
41020	41041	41070	41091	42292

Pneumonia

4658	4808	48231	48281	4831
4659	4809	48232	48282	4838
46619	481	48239	48283	4848
4800	4820	48240	48284	485
4801	4821	48241	48289	486
4802	4822	48242	4829	4870
4803	48230	48249	4830	

Pulmonary Embolism (PE) Deep Vein Thrombosis (DVT)

41511	45381	45386	45111	45183
41512	45382	45387	45119	45184
41519	45383	45389	4512	45189
45340	45384	4539	45181	4519
45341	45385	4510	45182	4536
45342				

Acute gastrointestinal ulcerative disease

53100	53131	53230	53321	53420
53101	53200	53231	53330	53421
53110	53201	53300	53331	53430
53111	53210	53301	53400	53431
53120	53211	53310	53401	538
53121	53220	53311	53410	5789
53130	53221	53320	53411	

Pressure Ulcers

70700	70703	70706	70720	70723
70701	70704	70707	70721	70724
70702	70705	70709	70722	70725

Electrolyte Imbalance				
2760	2763	27651	2766	2768
2761	2764	27652	2767	2769
2762	27650			

Debility, malaise, fatigue, weakness				
7197	72887	78079	7812	7993

Complications of surgical and medical care, not elsewhere classified				
997-999	37960	5187	51852	99665
E870-79	37961	51881	58153	99666
2440	37962	99659	99660	99667
28984	37963	2851	99661	99668
2910	4275	78820	99662	99669
29181	5070	72888	99663	99670
33818	5185	51851	99664	

Pneumothorax, plural effusions				
51189	5119	5121	5128	51289

Medication effects				
693	9954	99586	99522	99523
9952				

Aftercare			
V5789	V571	V5849	

Acute exacerbations of chronic diseases

Diabetes Mellitus (DM)				
24910	24930	25012	25022	25032
24911	24931	25013	25023	25033
24920	25010	25020	25030	2510
24921	25011	25021	25031	2513

Asthma

49301	49311	49321	49391	49392
49302	49312	49322		

Chronic Obstructive Pulmonary Disease (COPD)

49121	49122

Congestive Heart Failure (CHF)

4150	42823	42833	42841	42843
42821	42831			

Renal failure

5845	5846	5847	5848	5849

Hypertension

4010	40200	40201

Appendix D. Standard Unrelated Codes for Post-Discharge Period

ICD 9	DX CC	ICD9 CODE DESCRIPTION
V580	45	Radiotherapy encounter
V581	45	Chemotherapy encounter (End 2005)
V5811	45	Antineoplastic chemotherapy encounter (Begin 2005)
V5812	45	Immunotherapy encounter (Begin 2005)
V661	45	Radiotherapy convalescence
V662	45	Chemotherapy convalescence
V671	45	Radiotherapy follow-up
V672	45	Chemotherapy follow-up
Z510	45	Encounter for antineoplastic radiation therapy
Z5111	45	Encounter for antineoplastic chemotherapy
Z5112	45	Encounter for antineoplastic immunotherapy

Appendix E: Hierarchical Condition Categories

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

Diabetic Retinopathy and Vitreous Hemorrhage	Severe Head Injury
Dialysis Status	Severe Hematological Disorders
Disorders of Immunity	Severe Skin Burn or Condition
Drug/Alcohol Dependence	Specified Heart Arrhythmias
Drug/Alcohol Psychosis	Spinal Cord Disorders/Injuries
Endocrine and Metabolic Disorders	Traumatic Amputations and Complications
End-Stage Liver Disease	Unstable Angina, Acute Ischemic Heart Disease
Exudative Macular Degeneration	Vascular Disease
Fibrosis of Lung	Vascular Disease with Complications
	Vertebral Fractures

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