

**Market Shift Adjustments  
under Global Revenue and Total Patient Revenue Models  
Technical Report RY 2016**

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*This document, prepared in conjunction with the Payment Models Work Group, contains principles for consideration as market shift adjustments to Maryland hospital global budgets are developed and applied. It is a work in progress and may be modified as the approaches and calculations for adjustments are finalized.*

## 1. INTRODUCTION

In January 2014, the Center for Medicare & Medicaid Innovation (CMMI) approved the implementation of a new All-Payer Model for Maryland. In contrast to the previous Medicare waiver that focused on controlling increases in Medicare inpatient payments per case, the new All-Payer Model focuses on controlling increases in total hospital revenue per capita. Central to the All-Payer Model is the Global Budget Revenue (GBR) methodology, which encourages hospitals to focus on population-based health management by prospectively establishing an annual revenue cap for each GBR hospital. Under the GBR methodology, each hospital's total annual revenues are known at the beginning of the year, and annual revenue is determined from a historical base period that is adjusted to account for a number of factors, including market shifts.

The Market Shift Adjustments (MSAs) mechanism is part of a much broader set of tools that links global budgets to populations and patients under the State's new All-Payer Model. The specific purpose of the MSA is to provide criteria for increasing or decreasing the approved regulated revenue of Maryland hospitals operating under GBR or TPR (Total Patient Revenue) rate arrangements. Providing these criteria is important for ensuring that revenue is appropriately reallocated when shifts in patient volumes occur between hospitals as a result of efforts to achieve the Triple Aim of better care, better health, and lower costs. MSAs under GBR arrangements are fundamentally different from volume adjustments. Hospitals under a population-based payment system, such as GBR, have a fixed budget for providing services to the population in their service area. Therefore, it is imperative that MSAs reflect shifts in patient volume independent of general volume increases in the market.

The purpose of this document is to describe the principles governing the development of MSA mechanisms that will be applied as part of Maryland's global budget system and provide a brief overview of the methodology. The Appendices provide more detailed information about the methodology and include public comments.

## 2. OVERVIEW

An MSA should contain the following features:

- A specified population from which hospitals' market shifts will be calculated
- A defined set of covered services
- An approach that is budget neutral to the maximum extent practicable and/or results in demonstrably higher quality of care

The MSA should complement the GBR incentives to eliminate marginal services that do not add value, are unnecessary, or result from better community-based care. Therefore, MSAs should not be applied to appropriate reductions in utilization.

MSAs are one of the global budget tools necessary to account for changes in utilization levels and patterns. GBR agreements contain other mechanisms intended to ensure the continued provision of needed services for Maryland patients, including:

- **Population/Demographic Adjustments:** Changing demographics could result in a growth in the demand for hospital services. Currently, the annual update factor adjusts revenue to capture changes in the overall population. Annual hospital-level population adjustments will capture changes in total population/demographics in each hospital's service area.
- **Annual Update Provides Flexibility to Fund Innovation/New Services/Growth in Selected Quaternary Services:** Targeted funding could be provided through the update process. For example, the new Holy Cross Germantown Hospital is partially funded from the general update process. Consideration is given to annual budget changes for quaternary services, such as transplants, burns, and highly specialized cancer care, for Johns Hopkins Hospital and University of Maryland Hospital Center under their global budget agreements.
- **Transfers to Johns Hopkins Hospital, University of Maryland Hospital Center, and Shock Trauma Center:** Adjustments will be made for changes in patient transfers to respective centers to ensure that resources are available to treat patients needing the specialized care provided in these settings.
- **Potentially Avoidable Utilization (PAU):** PAU is excluded from the MSAs and will be analyzed separately. This exclusion prevents the possibility of rewarding a hospital that increased its PAU at the expense of a hospital that appropriately reduced its PAU. A PAU-focused analysis, when warranted, will allow an assessment of PAU reductions that are not driven by improvements in population health, such as diversion of patients to an unregulated setting, transfer of patients due to changes in referral patterns by purchasers, or a less favorable change in service delivery (such as eliminating or contracting service lines that have high PAU volumes) that should not be rewarded.

The basis for distinguishing between desirable and undesirable utilization changes is the Triple Aim of the new system: to improve health care outcomes, enhance patient experiences, and control costs. MSAs, together with other global budget agreement provisions and Health Services Cost Review Commission (HSCRC) policies, will need to focus on efforts that support the Triple Aim. Examples of actions that help achieve the Triple Aim are those that result from:

- Providing high quality hospital care resulting in fewer hospital-acquired conditions
- Making efforts to improve care coordination and patient discharge planning resulting in fewer re-hospitalizations

- Promoting the provision of care in the most appropriate setting, resulting in fewer initial hospitalizations for ambulatory care sensitive conditions and conditions that can be treated equally effectively in other settings at lower cost
- Providing services in lower cost settings without compromising patient care.

Possible examples of actions that undermine the Triple Aim and should be avoided include:

- Prompting patients with unprofitable service needs to seek care elsewhere, or reducing the volume of non-profitable services below the amount needed by patients within the hospital's service area
- Reducing capacity or service ability to the point of creating long waiting lists or delays
- Under-investing in new technology or modes of care proven to be efficient ways of improving patient health, safety, or quality
- Reducing the total level of a hospital's medical staff or the quality of affiliated providers to the point of compromising patient care

Similarly, MSAs, together with other mechanisms and policies, must distinguish between increases in utilization at any given hospital that should be recognized and those that should not be recognized. For example, hospitals should receive increases to their approved regulated revenue in circumstances that result in a shift of patient volumes that are beyond the hospital's control, such as the closure of a service at a particular hospital and resulting relocation of patients receiving that service to another facility, or other discrete and readily identifiable events. As long as the financial drivers of the shift are transparent and value-based, hospitals should also receive an MSA if organizations such as health maintenance organizations (HMOs), accountable care organizations (ACOs), or primary care medical homes (PCMHs) direct their members to the facility to improve efficiency, cost-effectiveness, and quality.

The MSA policy should not encourage shifts in volume that are not clearly relatable to improvements in the overall value of care, such as marketing or acquisition strategies that merely shift the location or ownership of resources without increasing access, improving outcomes, or reducing costs in a geographic area. In February 2014, the Commission reduced the variable cost factor for volume changes from 85 percent to 50 percent for services provided outside of GBR arrangements, yet subject to the All-Payer Model. Applying this lower variable cost factor to MSAs will contribute to limiting incentives to increase volume through strategies that do not improve care or value.

### **3. GUIDING PRINCIPLES**

In developing its MSA approach, the HSCRC should follow the following guiding principles:

#### **1. Provide clear incentives.**

- 1.1. Promote the Triple Aim
- 1.2. Emphasize value, recognizing that this concept will take some time to develop

- 1.3. Promote investments in care coordination
- 1.4. Encourage appropriate utilization and delivery of high quality care
- 1.5. Avoid paying twice for the same service

**2. Reinforce the maintenance of services to the community.**

- 2.1. Encourage competition to promote responsive provision of services
- 2.2. Competition should be based on value
- 2.3. Revenue should generally follow the patient
- 2.4. Support strategies pursued by entities such as ACOs, PCMHs, and managed care organizations (MCOs) seeking to direct patients to low-cost, high-quality settings

**3. Clearly define changes constituting a market shift.**

- 3.1. Volume increase alone is not a market shift change
- 3.2. Market shift should be evaluated in combination with the overall volume trend to ensure that a shift—rather than volume growth—has occurred
- 3.3. If one hospital has higher volume and other hospitals serving the same area do not have corresponding declines in volume, a market shift should not be awarded
- 3.4. Increases in the global budget of one hospital should be funded fully by the decrease in other hospitals' budgets
- 3.5. Market shift changes should reflect services provided by the hospital
- 3.6. Substantial reductions at a facility may result in a global budget reduction even if they are not accompanied by shift to other facilities in the service area (Investigate shifts to unregulated facilities and limitations on types of procedures)
- 3.7. Closures of services or discrete and readily identifiable events should result in a global budget adjustment and an MSA as needed
- 3.8. Market shifts in PAU should be evaluated separately<sup>1</sup>

## 4. MARKET SHIFT CALCULATIONS

### 4.1 Market Shift Algorithm

Based on the principles listed above, HSCRC developed an algorithm to calculate MSAs for a specific service area (e.g., orthopedic surgery) and a defined geographic location (e.g., ZIP code). The algorithm compares the growth in volumes at hospitals with utilization increases to the decline in volumes at hospitals with utilization decreases. Adjustments are capped at the lesser of the growth for volume gains or the decline for volume losses. This approach separates market shifts from collective changes in volume in the service area and removes incentives for driving up volume in the service area.

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<sup>1</sup> There are limited circumstances in which HSCRC might want to recognize a market shift in PAUs. For example, if an HMO moved all of its patients from one facility to another, there may be an appropriate shift in revenue for some level of PAU cases. Similarly, if a PCMH changed its hospital affiliation, there may be a shift in PAU volumes from one facility to another.

Table 1 provides an illustration of the market shift calculation for ZIP code 21000 and the General Surgery service line. Within this ZIP code, the total volume increase is 654 equivalent case-mix adjusted discharges (ECMADs), and the decline is 129 ECMADs. Applying the “lesser of the two” rule, the allowed market shift is limited to 129 ECMADs, which is allocated to other hospitals with volume increases proportional to this hospital’s volume increase in total utilization. In the end, the net impact of market shifts in each ZIP code and service line combination equals zero.

**Table 1. Example Calculation of the Market Shift Algorithm**

<b>ZIP Code 21000 General Surgery</b>	<b>Volume CY13</b>	<b>Volume CY14</b>	<b>Volume Growth</b>	<b>Hospital’s Proportion of Total Increase/Decline</b>	<b>Market Shift</b>
	<b>A</b>	<b>B</b>	<b>C=B-A</b>	<b>D=C/Subtotal C</b>	<b>E=D*Allowed Market Shift</b>
Hospital A	1,000	1,500	500	76%	99
Hospital B	500	600	100	15%	20
Hospital C	50	100	50	8%	10
Hospital D	-	4	4	1%	1
<b>Utilization Increase</b>	<b>1,550</b>	<b>2,204</b>	<b>654</b>	<b>100%</b>	<b>129</b>
Hospital E	500	400	(100)	78%	(100)
Hospital F	50	25	(25)	19%	(25)
Hospital G	4	-	(4)	3%	(4)
<b>Utilization Decline</b>	<b>554</b>	<b>425</b>	<b>(129)</b>	<b>100%</b>	<b>(129)</b>
<b>ZIP Code Total</b>	<b>2,104</b>	<b>2,629</b>	<b>525</b>	<b>-</b>	<b>0</b>
<b>Allowed Market Shift</b>			<b>129</b>		

## 4.2 Geographic Area Definitions

Market shift is focused on movement of patients and services between Maryland hospitals. Narrowly defined geographic regions are ideal for calculating market shift because the individual hospitals serving the region are not likely to be differentially impacted by population growth or demographically driven changes in utilization rates. Calculating market shift at the statewide level, in contrast, would result in the movement of dollars to hospitals in regions experiencing population growth at the expense of other regions. Adjustments for changes in population and demographics are already addressed by annual demographic adjustments to each hospital’s global budget.

In densely populated regions of the state where there is significant competition among hospitals, market shift calculations are performed at the ZIP code level. However, ZIP code level calculations introduce random variation to the measurement in small geographic areas where the population density is low, and the health care market is concentrated. Such ZIP codes are

aggregated to limit the impact of small cell sizes on the calculations. ZIP codes in the following jurisdictions are aggregated at the county level:

Garrett, Allegany, Washington, Cecil, Kent, Queen Anne's, Caroline, Talbot, Dorchester, Wicomico, Somerset, Calvert, Charles, Saint Mary's, Worcester

In calculating market shifts, all hospitals will have the same geographic definitions. For example, to calculate volume changes in Garrett County, all ZIP codes in Garrett County will be added together for each hospital with volume in Garrett County. The calculations of volume changes will be based on ZIP code-level analysis for the remaining jurisdictions that are not aggregated, such as Baltimore City.

### 4.3 Service Line Definitions

Narrow definitions of service lines are proposed to prevent utilization growth for one component of the service line from masking a shift in patients for another service line. For instance, a service line that captures all surgical procedures might be growing at every hospital in a region due to increasing demand for orthopedic surgery and thereby masking the shift of 50 cardiac surgical procedures from one hospital to another.

Movement of cases from inpatient to outpatient settings and utilization of observation units creates a challenge in differentiating shifts from one hospital to another, or shifts from a hospital's inpatient to outpatient service settings. Staff has started to address this issue by counting and weighting all observation room cases of 24 or more hours as inpatient. Staff is planning to continue to work on combining other outpatient cases with inpatient cases for future year adjustments and evaluating the impact of shifts from inpatient to outpatient services on a case by case basis.

Inpatient service lines are developed using the existing 3M methodology to group all patient refined-diagnosis related groups (APR-DRGs) to specific service lines with a few modifications. See Appendix I for a cross walk of APR-DRGs to service lines.

While inpatient service lines have been widely used and easily understood due to the availability of APR-DRGs, outpatient service lines are more difficult to develop. Conceptually, staff uses an inpatient-like logic and assigns the visits based on the reasons for acquiring services. For example, all services provided for emergency department (ED) patients are grouped under the ED service line. Appendix II provides the hierarchy of outpatient service lines.

### 4.4 Exclusions

The following services or cases are excluded from the market shift calculations:

1. PAU: As hospitals improve care and population health, trends in PAU could reflect differential performance among hospitals rather than market shifts. In other words, one hospital may perform better than others and reduce its PAU, while another hospital



serving a similar market may have an increase in PAU. For the rate year 2016 adjustments, staff included only readmissions and prevention quality indicators (PQIs) developed by the Agency for Healthcare Research and Quality (AHRQ) that were measured in both inpatient and observation cases equaling or exceeding 24 hours. Appendices III and IV provide overviews of readmission indicators and PQIs.

2. Categorical exclusions: These cases represent the most specialized services received at academic medical centers (AMCs) and are based on actual trends in these hospitals under their global budgets. Appendix V provides the definitions of categorical cases.

#### 4.5 Timing Adjustments

To accommodate the HSCRC case-mix data submission timelines, there will be a six month lag between the measurement period and the rate adjustments. The rate year 2016 adjustments will be based on comparing the measurement period of July 2014 through December 2014 to a base year period of July 2013 through December 2013. After this initial measurement period, a full calendar year will be used to calculate MSAs. Accordingly, rate year 2017 adjustments will be based on January through December 2015, compared with January through December 2014.

#### 4.6 Case Weights and Equivalent Case-Mix Adjusted Discharges

To measure utilization, HSCRC developed ECMADs as a method to quantify inpatient and outpatient hospital volume into a single measure. A hospital's ECMAD count includes case-mix adjusted inpatient discharges, as well as equivalent adjusted outpatient case-mix discharges, which are based on case-mix adjusted outpatient visits converted to inpatient discharges by the ratio of the average inpatient visit charge per discharge to the average outpatient charge per visit.

Inpatient weights are developed using the Hospital Specific Relative Value (Iterative Weights) methodology. Appendix VI provides the detailed steps for calculating inpatient weights. Historically, HSCRC has been modifying the 3M APR-DRGs to account for differences in resource use within the rehabilitation (860) and psychiatric DRGs (voluntary and involuntary). Staff evaluated the impact of these modifications and found that the differences between national APR-DRGs and the Maryland-specific DRGs were very limited. Further, staff expects that the transition to International Classification of Disease-10<sup>th</sup> edition (ICD-10) will create inaccuracies in defining these modifications, and 3M will improve the APR-DRG classifications using more granular information from ICD-10 codes. Based on these considerations, HSCRC will use the national 3M APR-DRGs for all adjustments starting with rate year 2016.

Outpatient weights primarily rely on 3M's enhanced ambulatory outpatient grouping (EAPG) system. After EAPG weights are assigned to each Current Procedural Terminology (CPT) code in the patient records, a principal record type is assigned to differentiate types of visits into four main categories:

- Principle EAPG Type A: Radiation, Chemotherapy, and Major Infusion
- Principal EAPG Type 2: Significant Procedures

- Principal EAPG Type 3: Medical Visit
- Principal EAPG Type 4: All Other (Ancillary, Incidental, Drug, Durable Medical Equipment, and Unassigned EAPG Types)

Once each record is grouped into these four principal EAPG types, singleton weights<sup>2</sup> are developed within each group and normalized. Singleton weights assign the highest EAPG that in turn determines the assignment of the APG category for that record. Afterwards, these EAPGs are mapped to initial service lines (see Appendix VII). Service lines used for market shifts are determined using a hierarchy aiming to group the visits in accordance with the purpose of the patient visit. Appendix VIII provides the technical documentation on outpatient weights.

## 5. MARKET SHIFT REVENUE CALCULATIONS

HSCRC staff evaluated several options in calculating the cost associated with market shift changes using the algorithm described above. Two viable alternatives emerged:

- The hospital specific average charge per ECMAD
- Each hospital's service line specific average charge per ECMAD

Service line-specific cost calculations have an advantage of overcoming the variation in outpatient services within each service line. Inpatient DRG weights and prices have the advantage of decades of refinement, while outpatient weights are relatively new. Hospital-specific charges per ECMAD have the advantage of overcoming some of the underlying variation in charges for equivalent cases on the outpatient side as further refinements are made over time. The Maryland Hospital Association sent a letter to staff indicating that the hospital industry supports use of the hospital service line average charge per ECMAD. Staff performed a detailed review of the results using this approach (compared to the alternative approach), and are satisfied with the results. Therefore, HSCRC is using service line ECMAD average charges to develop the adjustments for each hospital. Consistent with initial policy implementation for the new All-Payer Model, staff plans to use a 50 percent variable cost factor for MSAs between regulated hospitals.

## 6. POTENTIALLY AVOIDABLE UTILIZATION MODIFICATIONS

Based on the discussion at the May Commission meeting, the implementation of the market shift adjustments will be modified to allow for staff adjustments to the MSA amounts in the event that a hospital can produce evidence that its decline in utilization was due to an intervention to reduce avoidable utilization rather than a shift to another hospital. Hospitals are required to submit a request for the modifications. The request must include information about the interventions implemented, the impact by service-line and ZIP code, the impact on the statewide market shift

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<sup>2</sup> Singleton weights are average or medians weights calculated using visits that have only one procedure performed.

calculations, and other related data supporting the adjustment. The deadline for the modification request will be 15 days after the publication of the MSAs.

## **7. PAYER DRIVEN MARKET SHIFTS**

To support strategies pursued by entities such as ACOs, PCMHs, and managed care organizations (MCOs) seeking to direct patients to low-cost, high-quality settings, HSCRC staff will be reviewing requests from hospitals to adjust the market shift calculations based on specific circumstances of such strategies and reconciling the projections using the market shift methodology described above.

**APPENDICES:**  
**TECHNICAL SPECIFICATIONS FOR MARKET SHIFT CALCULATIONS FOR RATE YEAR**  
**2016**

- I. APR-DRG Service Line Map
- II. Outpatient Service Line Assignment Hierarchy
- III. 30-Day Readmission Definition Overview
- IV. PQI Overview
- V. Categorical Case Exclusions
- VI. Steps for Calculating APR-DRG Weights
- VII. EAPG Service Line Map
- VIII. Steps in Calculating Outpatient Weights
- IX. Public Comments

**Appendix I: APR-DRG Service Line Map (APR-DRG version 32)**

The following table summarizes the APR-DRGs used to define each inpatient service line.

<b>APR-DRG</b>	<b>Description</b>	<b>Product Category</b>	<b>Product Line</b>
1	Liver transplant &/or intestinal transplant	Transplant Surgery	40
2	Heart &/or lung transplant	Transplant Surgery	40
3	Bone marrow transplant	Transplant Surgery	40
4	ECMO or tracheostomy w long term mechanical ventilation w extensive procedure	Ventilator Support	45
5	Tracheostomy w long term mechanical ventilation w/o extensive procedure	Ventilator Support	45
6	Pancreas transplant	Transplant Surgery	40
20	Craniotomy for trauma	Neurological Surgery	23
21	Craniotomy except for trauma	Neurological Surgery	23
22	Ventricular shunt procedures	Neurological Surgery	23
23	Spinal procedures	Spinal Surgery	37
24	Extracranial vascular procedures	Neurological Surgery	23
26	Other nervous system & related procedures	Neurological Surgery	23
40	Spinal disorders & injuries	Neurology	24
41	Nervous system malignancy	Oncology	26
42	Degenerative nervous system disorders exc mult sclerosis	Neurology	24
43	Multiple sclerosis & other demyelinating diseases	Neurology	24
44	Intracranial hemorrhage	Neurology	24
45	CVA & precerebral occlusion w infarct	Neurology	24
46	Nonspecific CVA & precerebral occlusion w/o infarct	Neurology	24
47	Transient ischemia	Neurology	24
48	Peripheral, cranial & autonomic nerve disorders	Neurology	24
49	Bacterial & tuberculous infections of nervous system	Infectious Disease	17
50	Non-bacterial infections of nervous system exc viral meningitis	Infectious Disease	17
51	Viral meningitis	Infectious Disease	17
52	Nontraumatic stupor & coma	Neurology	24
53	Seizure	Neurology	24
54	Migraine & other headaches	Neurology	24
55	Head trauma w coma >1 hr or hemorrhage	Neurology	24

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

APR-DRG	Description	Product Category	Product Line
56	Brain contusion/laceration & complicated skull Fx, coma < 1 hr or no coma	Neurology	24
57	Concussion, closed skull Fx nos,uncomplicated intracranial injury, coma < 1 hr or no coma	Neurology	24
58	Other disorders of nervous system	Neurology	24
70	Orbital procedures	Ophthalmologic Surg	27
73	Eye procedures except orbit	Ophthalmologic Surg	27
80	Acute major eye infections	Ophthalmology	28
82	Eye disorders except major infections	Ophthalmology	28
89	Major cranial/facial bone procedures	ENT Surgery	8
90	Major larynx & trachea procedures	ENT Surgery	8
91	Other major head & neck procedures	ENT Surgery	8
92	Facial bone procedures except major cranial/facial bone procedures	ENT Surgery	8
93	Sinus & mastoid procedures	ENT Surgery	8
95	Cleft lip & palate repair	ENT Surgery	8
97	Tonsil & adenoid procedures	ENT Surgery	8
98	Other ear, nose, mouth & throat procedures	ENT Surgery	8
110	Ear, nose, mouth, throat, cranial/facial malignancies	Oncology	26
111	Vertigo & other labyrinth disorders	Otolaryngology	32
113	Infections of upper respiratory tract	Otolaryngology	32
114	Dental & oral diseases & injuries	Dental	3
115	Other ear, nose, mouth, throat & cranial/facial diagnoses	Otolaryngology	32
120	Major respiratory & chest procedures	Thoracic Surgery	39
121	Other respiratory & chest procedures	Thoracic Surgery	39
130	Respiratory system diagnosis w ventilator support 96+ hours	Pulmonary	34
131	Cystic fibrosis - pulmonary disease	Pulmonary	34
132	BPD & oth chronic respiratory diseases arising in perinatal period	Pulmonary	34
133	Pulmonary edema & respiratory failure	Pulmonary	34
134	Pulmonary embolism	Pulmonary	34
135	Major chest & respiratory trauma	Trauma	41
136	Respiratory malignancy	Oncology	26
137	Major respiratory infections & inflammations	Pulmonary	34
138	Bronchiolitis & RSV pneumonia	Pulmonary	34
139	Other pneumonia	Pulmonary	34
140	Chronic obstructive pulmonary disease	Pulmonary	34
141	Asthma	Pulmonary	34

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

APR-DRG	Description	Product Category	Product Line
142	Interstitial lung disease	Pulmonary	34
143	Other respiratory diagnoses except signs, symptoms & minor diagnoses	Pulmonary	34
144	Respiratory signs, symptoms & minor diagnoses	Pulmonary	34
160	Major cardiothoracic repair of heart anomaly	Cardiothoracic Surgery	2
161	Cardiac defibrillator & heart assist implant	Cardiothoracic Surgery	2
162	Cardiac valve procedures w cardiac catheterization	Cardiothoracic Surgery	2
163	Cardiac valve procedures w/o cardiac catheterization	Cardiothoracic Surgery	2
165	Coronary bypass w cardiac cath or percutaneous cardiac procedure	Cardiothoracic Surgery	2
166	Coronary bypass w/o cardiac cath or percutaneous cardiac procedure	Cardiothoracic Surgery	2
167	Other cardiothoracic procedures	Cardiothoracic Surgery	2
169	Major thoracic & abdominal vascular procedures	Vascular Surgery	44
170	Permanent cardiac pacemaker implant w AMI, heart failure or shock	EP/Chronic Rhythm Mgmt	9
171	Perm cardiac pacemaker implant w/o AMI, heart failure or shock	EP/Chronic Rhythm Mgmt	9
173	Other vascular procedures	Vascular Surgery	44
174	Percutaneous cardiovascular procedures w AMI	Invasive Cardiology	19
175	Percutaneous cardiovascular procedures w/o AMI	Invasive Cardiology	19
176	Cardiac pacemaker & defibrillator device replacement	EP/Chronic Rhythm Mgmt	9
177	Cardiac pacemaker & defibrillator revision except device replacement	EP/Chronic Rhythm Mgmt	9
180	Other circulatory system procedures	Cardiothoracic Surgery	2
190	Acute myocardial infarction	Myocardial Infarction	20
191	Cardiac catheterization w circ disord exc ischemic heart disease	Invasive Cardiology	19
192	Cardiac catheterization for ischemic heart disease	Invasive Cardiology	19
193	Acute & subacute endocarditis	Cardiology	1
194	Heart failure	Cardiology	1
196	Cardiac arrest	Cardiology	1

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

APR-DRG	Description	Product Category	Product Line
197	Peripheral & other vascular disorders	General Medicine	11
198	Angina pectoris & coronary atherosclerosis	Cardiology	1
199	Hypertension	Cardiology	1
200	Cardiac structural & valvular disorders	Cardiology	1
201	Cardiac arrhythmia & conduction disorders	Cardiology	1
203	Chest pain	Cardiology	1
204	Syncope & collapse	Cardiology	1
205	Cardiomyopathy	Cardiology	1
206	Malfunction, reaction, complication of cardiac/vasc device or procedure	Cardiology	1
207	Other circulatory system diagnoses	Cardiology	1
220	Major stomach, esophageal & duodenal procedures	General Surgery	12
221	Major small & large bowel procedures	General Surgery	12
222	Other stomach, esophageal & duodenal procedures	General Surgery	12
223	Other small & large bowel procedures	General Surgery	12
224	Peritoneal adhesiolysis	General Surgery	12
225	Appendectomy	General Surgery	12
226	Anal procedures	General Surgery	12
227	Hernia procedures except inguinal, femoral & umbilical	General Surgery	12
228	Inguinal, femoral & umbilical hernia procedures	General Surgery	12
229	Other digestive system & abdominal procedures	General Surgery	12
240	Digestive malignancy	Oncology	26
241	Peptic ulcer & gastritis	Gastroenterology	10
242	Major esophageal disorders	Gastroenterology	10
243	Other esophageal disorders	Gastroenterology	10
244	Diverticulitis & diverticulosis	Gastroenterology	10
245	Inflammatory bowel disease	Gastroenterology	10
246	Gastrointestinal vascular insufficiency	Gastroenterology	10
247	Intestinal obstruction	Gastroenterology	10
248	Major gastrointestinal & peritoneal infections	Gastroenterology	10
249	Non-bacterial gastroenteritis, nausea & vomiting	Gastroenterology	10
251	Abdominal pain	Gastroenterology	10
252	Malfunction, reaction & complication of GI device or procedure	Gastroenterology	10
253	Other & unspecified gastrointestinal hemorrhage	Gastroenterology	10
254	Other digestive system diagnoses	Gastroenterology	10
260	Major pancreas, liver & shunt procedures	General Surgery	12
261	Major biliary tract procedures	General Surgery	12
262	Cholecystectomy except laparoscopic	General Surgery	12



Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

APR-DRG	Description	Product Category	Product Line
263	Laparoscopic cholecystectomy	General Surgery	12
264	Other hepatobiliary, pancreas & abdominal procedures	General Surgery	12
279	Hepatic coma & other major acute liver disorders	Gastroenterology	10
280	Alcoholic liver disease	Gastroenterology	10
281	Malignancy of hepatobiliary system & pancreas	Oncology	26
282	Disorders of pancreas except malignancy	Gastroenterology	10
283	Other disorders of the liver	Gastroenterology	10
284	Disorders of gallbladder & biliary tract	Gastroenterology	10
301	Hip joint replacement	Orthopedic Surgery	29
302	Knee joint replacement	Orthopedic Surgery	29
303	Dorsal & lumbar fusion proc for curvature of back	Orthopedic Surgery	29
304	Dorsal & lumbar fusion proc except for curvature of back	Orthopedic Surgery	29
305	Amputation of lower limb except toes	Orthopedic Surgery	29
308	Hip & femur procedures for trauma except joint replacement	Orthopedic Surgery	29
309	Hip & femur procedures for non-trauma except joint replacement	Orthopedic Surgery	29
310	Intervertebral disc excision & decompression	Orthopedic Surgery	29
312	Skin graft, except hand, for musculoskeletal & connective tissue diagnoses	Orthopedic Surgery	29
313	Knee & lower leg procedures except foot	Orthopedic Surgery	29
314	Foot & toe procedures	Orthopedic Surgery	29
315	Shoulder, upper arm & forearm procedures	Orthopedic Surgery	29
316	Hand & wrist procedures	Orthopedic Surgery	29
317	Tendon, muscle & other soft tissue procedures	Orthopedic Surgery	29
320	Other musculoskeletal system & connective tissue procedures	Orthopedic Surgery	29
321	Cervical spinal fusion & other back/neck proc exc disc excis/decomp	Spinal Surgery	37
340	Fracture of femur	Orthopedics	30
341	Fracture of pelvis or dislocation of hip	Orthopedics	30
342	Fractures & dislocations except femur, pelvis & back	Orthopedics	30
343	Musculoskeletal malignancy & pathol fracture d/t muscskel malig	Oncology	26
344	Osteomyelitis, septic arthritis & other musculoskeletal infections	Infectious Disease	17
346	Connective tissue disorders	Rheumatology	36
347	Other back & neck disorders, fractures & injuries	Orthopedics	30
349	Malfunction, reaction, complic of orthopedic device or procedure	Orthopedics	30
351	Other musculoskeletal system & connective tissue diagnoses	Rheumatology	36
361	Skin graft for skin & subcutaneous tissue diagnoses	General Surgery	12
362	Mastectomy procedures	General Surgery	12
363	Breast procedures except mastectomy	General Surgery	12

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

APR-DRG	Description	Product Category	Product Line
364	Other skin, subcutaneous tissue & related procedures	General Surgery	12
380	Skin ulcers	Dermatology	4
381	Major skin disorders	Dermatology	4
382	Malignant breast disorders	Oncology	26
383	Cellulitis & other bacterial skin infections	Infectious Disease	17
384	Contusion, open wound & other trauma to skin & subcutaneous tissue	Dermatology	4
385	Other skin, subcutaneous tissue & breast disorders	Dermatology	4
401	Pituitary & adrenal procedures	Endocrinology Surgery	7
403	Procedures for obesity	Endocrinology Surgery	7
404	Thyroid, parathyroid & thyroglossal procedures	Endocrinology Surgery	7
405	Other procedures for endocrine, nutritional & metabolic disorders	Endocrinology Surgery	7
420	Diabetes	Diabetes	5
421	Malnutrition, failure to thrive & other nutritional disorders	Endocrinology	6
422	Hypovolemia & related electrolyte disorders	Endocrinology	6
423	Inborn errors of metabolism	Endocrinology	6
424	Other endocrine disorders	Endocrinology	6
425	Electrolyte disorders except hypovolemia related	Endocrinology	6
440	Kidney transplant	Transplant Surgery	40
441	Major bladder procedures	Urological Surgery	42
442	Kidney & urinary tract procedures for malignancy	Oncology	26
443	Kidney & urinary tract procedures for nonmalignancy	Urological Surgery	42
444	Renal dialysis access device procedure only	Urological Surgery	42
445	Other bladder procedures	Urological Surgery	42
446	Urethral & transurethral procedures	Urological Surgery	42
447	Other kidney, urinary tract & related procedures	Urological Surgery	42
460	Renal failure	Nephrology	22
461	Kidney & urinary tract malignancy	Oncology	26
462	Nephritis & nephrosis	Nephrology	22
463	Kidney & urinary tract infections	Nephrology	22
465	Urinary stones & acquired upper urinary tract obstruction	Urology	43
466	Malfunction, reaction, complic of genitourinary device or proc	Nephrology	22
468	Other kidney & urinary tract diagnoses, signs & symptoms	Nephrology	22
480	Major male pelvic procedures	Urological Surgery	42

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

APR-DRG	Description	Product Category	Product Line
481	Penis procedures	Urological Surgery	42
482	Transurethral prostatectomy	Urological Surgery	42
483	Testes & scrotal procedures	Urological Surgery	42
484	Other male reproductive system & related procedures	General Surgery	12
500	Malignancy, male reproductive system	Oncology	26
501	Male reproductive system diagnoses except malignancy	Urology	43
510	Pelvic evisceration, radical hysterectomy & other radical GYN procs	Gynecological Surg	13
511	Uterine & adnexa procedures for ovarian & adnexal malignancy	Oncology	26
512	Uterine & adnexa procedures for non-ovarian & non-adnexal malig	Oncology	26
513	Uterine & adnexa procedures for non-malignancy except leiomyoma	Gynecological Surg	13
514	Female reproductive system reconstructive procedures	Gynecological Surg	13
517	Dilation & curettage for non-obstetric diagnoses	Gynecological Surg	13
518	Other female reproductive system & related procedures	Gynecological Surg	13
519	Uterine & adnexa procedures for leiomyoma	Gynecological Surg	13
530	Female reproductive system malignancy	Oncology	26
531	Female reproductive system infections	Gynecology	14
532	Menstrual & other female reproductive system disorders	Gynecology	14
540	Cesarean delivery	Obstetrics/Delivery	25
541	Vaginal delivery w sterilization &/or D&C	Obstetrics/Delivery	25
542	Vaginal delivery w complicating procedures exc sterilization &/or D&C	Obstetrics/Delivery	25
544	D&C, aspiration curettage or hysterotomy for obstetric diagnoses	Other Obstetrics	31
545	Ectopic pregnancy procedure	Gynecological Surg	13
546	Other O.R. proc for obstetric diagnoses except delivery diagnoses	Other Obstetrics	31
560	Vaginal delivery	Obstetrics/Delivery	25
561	Postpartum & post abortion diagnoses w/o procedure	Other Obstetrics	31
563	Threatened abortion	Other Obstetrics	31
564	Abortion w/o D&C, aspiration curettage or hysterotomy	Other Obstetrics	31
565	False labor	Other Obstetrics	31
566	Other antepartum diagnoses	Other Obstetrics	31
580	Neonate, transferred <5 days old, not born here	Neonatology	21
581	Neonate, transferred < 5 days old, born here	Neonatology	21
583	Neonate w ECMO	Neonatology	21
588	Neonate bwt <1500g w major procedure	Neonatology	21
589	Neonate bwt <500g	Neonatology	21
591	Neonate birthwt 500-749g w/o major procedure	Neonatology	21
593	Neonate birthwt 750-999g w/o major procedure	Neonatology	21
602	Neonate bwt 1000-1249g w resp dist synd/oth maj resp or maj anom	Neonatology	21

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

APR-DRG	Description	Product Category	Product Line
603	Neonate birthwt 1000-1249g w or w/o other significant condition	Neonatology	21
607	Neonate bwt 1250-1499g w resp dist synd/oth maj resp or maj anom	Neonatology	21
608	Neonate bwt 1250-1499g w or w/o other significant condition	Neonatology	21
609	Neonate bwt 1500-2499g w major procedure	Neonatology	21
611	Neonate birthwt 1500-1999g w major anomaly	Neonatology	21
612	Neonate bwt 1500-1999g w resp dist synd/oth maj resp cond	Neonatology	21
613	Neonate birthwt 1500-1999g w congenital/perinatal infection	Neonatology	21
614	Neonate bwt 1500-1999g w or w/o other significant condition	Neonatology	21
621	Neonate bwt 2000-2499g w major anomaly	Neonatology	21
622	Neonate bwt 2000-2499g w resp dist synd/oth maj resp cond	Neonatology	21
623	Neonate bwt 2000-2499g w congenital/perinatal infection	Neonatology	21
625	Neonate bwt 2000-2499g w other significant condition	Neonatology	21
626	Neonate bwt 2000-2499g, normal newborn or neonate w other problem	Neonatology	21
630	Neonate birthwt >2499g w major cardiovascular procedure	Neonatology	21
631	Neonate birthwt >2499g w other major procedure	Neonatology	21
633	Neonate birthwt >2499g w major anomaly	Neonatology	21
634	Neonate, birthwt >2499g w resp dist synd/oth maj resp cond	Neonatology	21
636	Neonate birthwt >2499g w congenital/perinatal infection	Neonatology	21
639	Neonate birthwt >2499g w other significant condition	Neonatology	21
640	Neonate birthwt >2499g, normal newborn or neonate w other problem	Normal Newborn	48
650	Splenectomy	General Surgery	12
651	Other procedures of blood & blood-forming organs	General Surgery	12
660	Major hematologic/immunologic diag exc sickle cell crisis & coagul	Hematology	15
661	Coagulation & platelet disorders	Hematology	15
662	Sickle cell anemia crisis	Hematology	15
663	Other anemia & disorders of blood & blood-forming organs	Hematology	15
680	Major O.R. procedures for lymphatic/hematopoietic/other neoplasms	General Surgery	12
681	Other O.R. procedures for lymphatic/hematopoietic/other neoplasms	General Surgery	12
690	Acute leukemia	Oncology	26
691	Lymphoma, myeloma & non-acute leukemia	Oncology	26
692	Radiotherapy	Oncology	26
693	Chemotherapy	Oncology	26
694	Lymphatic & other malignancies & neoplasms of uncertain behavior	Oncology	26
710	Infectious & parasitic diseases including HIV w O.R. procedure	General Surgery	12
711	Post-op, post-trauma, other device infections w O.R. procedure	General Surgery	12
720	Septicemia & disseminated infections	Infectious Disease	17
721	Post-operative, post-traumatic, other device infections	General Surgery	12

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

APR-DRG	Description	Product Category	Product Line
722	Fever	Infectious Disease	17
723	Viral illness	Infectious Disease	17
724	Other infectious & parasitic diseases	Infectious Disease	17
740	Mental illness diagnosis w O.R. procedure	General Surgery	12
750	Schizophrenia	Psychiatry	33
751	Major depressive disorders & other/unspecified psychoses	Psychiatry	33
752	Disorders of personality & impulse control	Psychiatry	33
753	Bipolar disorders	Psychiatry	33
754	Depression except major depressive disorder	Psychiatry	33
755	Adjustment disorders & neuroses except depressive diagnoses	Psychiatry	33
756	Acute anxiety & delirium states	Psychiatry	33
757	Organic mental health disturbances	Psychiatry	33
758	Childhood behavioral disorders	Psychiatry	33
759	Eating disorders	Psychiatry	33
760	Other mental health disorders	Psychiatry	33
770	Drug & alcohol abuse or dependence, left against medical advice	Substance Abuse	38
772	Alcohol & drug dependence w rehab or rehab/detox therapy	Substance Abuse	38
773	Opioid abuse & dependence	Substance Abuse	38
774	Cocaine abuse & dependence	Substance Abuse	38
775	Alcohol abuse & dependence	Substance Abuse	38
776	Other drug abuse & dependence	Substance Abuse	38
791	O.R. procedure for other complications of treatment	Injuries/complic. of prior care	18
811	Allergic reactions	General Medicine	11
812	Poisoning of medicinal agents	General Medicine	11
813	Other complications of treatment	Injuries/complic. of prior care	18
815	Other injury, poisoning & toxic effect diagnoses	General Medicine	11
816	Toxic effects of non-medicinal substances	General Medicine	11
841	Extensive 3rd degree burns w skin graft	General Medicine	11
842	Full thickness burns w skin graft	General Medicine	11
843	Extensive 3rd degree or full thickness burns w/o skin graft	General Medicine	11
844	Partial thickness burns w or w/o skin graft	General Medicine	11
850	Procedure w diag of rehab, aftercare or oth contact w health service	General Surgery	12
860	Rehabilitation	Rehabilitation	35
861	Signs, symptoms & other factors influencing health status	General Medicine	11
862	Other aftercare & convalescence	General Medicine	11

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

<b>APR-DRG</b>	<b>Description</b>	<b>Product Category</b>	<b>Product Line</b>
863	Neonatal aftercare	General Medicine	11
890	HIV w multiple major HIV related conditions	HIV	16
892	HIV w major HIV related condition	HIV	16
893	HIV w multiple significant HIV related conditions	HIV	16
894	HIV w one signif HIV cond or w/o signif related cond	HIV	16
910	Craniotomy for multiple significant trauma	Trauma	41
911	Extensive abdominal/thoracic procedures for mult significant trauma	Trauma	41
912	Musculoskeletal & other procedures for multiple significant trauma	Trauma	41
930	Multiple significant trauma w/o O.R. procedure	Trauma	41
950	Extensive procedure unrelated to principal diagnosis	General Surgery	12
951	Moderately extensive procedure unrelated to principal diagnosis	General Surgery	12
952	Nonextensive procedure unrelated to principal diagnosis	General Surgery	12
955	Invalid	Invalid	46
956	Ungroupable	Ungroupable	47

## Appendix II: Outpatient Service Line Assignment Hierarchy

Because definitions of outpatient services lines are not widely used, HSCRC used an inpatient-like logic to assign outpatient visits to service lines based upon the reasons for acquiring services. For example, all services provided for ED patients are grouped under the ED service line. The following hierarchy is used for these classifications:

1. **Radiation Therapy/Infusion/Chemotherapy/Oncology:** This includes patient records where the following radiation and chemotherapy EAPGs (1, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 431, 432, 433, 434, 441, 443, 460, 461, 462, 463, 464, 465, 476, 477, 478, 482, 483, 484, 802, and 803) show radiology charges (rctchg45 & rctchg46) exceeding operating room charges (rctchg40). This also includes patient records where infusion EAPGs (110, 111, 117) show operating room charges (rctchg40) that are less than drug charge (rctchg67). To be included in this classification, these patient records should display zero charges for emergency services, free standing emergency services, or trauma.
2. **ED:** This includes patient records where emergency (rctchg28), free standing center (rctchg34), or trauma resuscitation rate center charges (rctchg90) are greater than zero. In addition, it includes all ED free-standing center (Queen Anne, Bowie Health, and Germantown) services.
3. **Drug:** This includes patient records where EAPGs are assigned to a drug service line.
4. **Major Surgery:** This includes patient records where EAPGs are assigned to a major surgery service line.
5. **Cardiovascular:** This includes patient records where EAPGs are assigned to a cardiovascular service line.
6. **Minor Surgery:** This includes patient records where EAPGs are assigned to a minor surgery service line.
7. **Psychiatry:** This includes patient records where EAPGs are assigned to a psychiatry service line.
8. **Rehab & Therapy:** This includes cases where EAPGs are assigned to a rehabilitation and therapy service line.
9. **Clinic:** This includes patient records where clinic (rctchg29), clinic services primary (rctchg30), oncology clinic (rctchg35), operating room clinic (rctchg79), University of Maryland Shock Trauma clinic (rctchg81), or Shock Trauma O/P (rctchg37) are greater than zero.
10. **Unassigned:** This includes patient records where the high weight EAPG equals zero.
11. **Other:** Patient records where EAPGs are assigned various services: other, lab, pathology, CT/MRI/PET, or radiology.

Note: Rctchg=Rate Center Charge

### Appendix III: 30-Day Readmission Definition Overview

Readmissions are excluded from the market shift calculation. The methodology for the readmission indicator is based on definitions in the Maryland Readmission Reduction Incentive Program. Readmissions are based on 30-day all-payer all-hospital (both intra and inter hospital) readmission rates. The readmission logic includes both inpatient and observation stays with a length of stay of 24 or more hours.

The following exclusions are applied for CY 2015:

- Planned readmissions are excluded from the numerator based upon the CMS Planned Readmission Algorithm V. 3. The HSCRC also added all vaginal and C-section deliveries as planned using the APR-DRGs, rather than principal diagnosis (APR-DRGs 540, 541, 542, 560). Planned admissions are counted in the denominator because they could have an unplanned readmission.
- All newborn APR-DRG discharges are NOT eligible for a readmission.
- A hospitalization within 30 days of a hospital discharge where a patient dies is counted as a readmission; however, the readmission is removed from the denominator because there cannot be a subsequent readmission.
- Admissions that result in transfers, defined as cases where the discharge date of the admission is on the same day as the subsequent admission, are removed from the denominator counts. Thus, only one admission is counted in the denominator, and that is the admission to the transfer hospital. The discharge date is used to calculate the 30-day readmission window.
  - In addition the following data cleaning edits are applied:
    - Cases with null or missing Chesapeake Regional Information System unique patient identifiers (CRISP EIDs) are excluded.
    - Duplicates are removed.
    - Cases with negative interval days are removed.

HSCRC staff is revising case-mix data edits to prevent submission of duplicates and negative intervals, which are very rare. In addition, CRISP EID matching benchmarks are closely monitored. Currently, ninety-nine percent of inpatient discharges have a CRISP EID.



## Appendix IV: PQI Overview

PQIs are a set of measures that can be used with hospital inpatient discharge data to identify quality of care for “ambulatory care sensitive conditions.” These are conditions for which good outpatient care can potentially prevent the need for hospitalization, or for which early intervention can prevent complications or more severe disease. PQIs are population based and adjusted for factors such as age and severity of illness.

PQIs are excluded from the market shift calculation. PQIs include discharges for patients aged 18 years and older, that meet the numerator criteria in any of the following measures:

- PQI #1 Diabetes Short-Term Complications
- PQI #3 Diabetes Long-Term Complications
- PQI #5 Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults
- PQI #7 Hypertension
- PQI #8 Heart Failure
- PQI #10 Dehydration
- PQI #11 Bacterial Pneumonia
- PQI #12 Urinary Tract Infection
- PQI #13 Angina Without Procedure
- PQI #14 Uncontrolled Diabetes
- PQI #15 Asthma in Younger Adults Admission Rate
- PQI #16 Lower-Extremity Amputation among Patients with Diabetes

Discharges that meet the inclusion and exclusion rules for the numerator in more than one of the above PQIs are counted only once in the composite numerator. Additional information on the PQI definitions can be accessed at:

[http://www.qualityindicators.ahrq.gov/modules/pqi\\_resources.aspx](http://www.qualityindicators.ahrq.gov/modules/pqi_resources.aspx)

## Appendix V: Categorical Case Exclusions

Categorical cases represent the most specialized services received at academic medical centers and are excluded from the market shift calculation. The following list summarizes the categorical case exclusions:

1. Categorical Case Exclusions
  - 1.1. Solid Organ Transplants - APR-DRGS = 001, 002, 003, 006 or 440  
(any procedure = 5280, 5282, or 5283; or any procedure = 5280, 5282, 5283, 4100, 4101, 4102, 4103, 4104, 4105, 4106, 4107, 4108 or 3751; Heart Transplantation 4109 or 336 or 3350 , 3351, 3352, 5569, 5561, 5281, 5051, or 5059)
  - 1.2. Melodysplastic - Any Diagnosis = 2387 for Johns Hopkins Oncology Center
  - 1.3. Johns Hopkins Pediatric Burn Cases (Age < 18) - 3rd Degree Burns
  - 1.4. Johns Hopkins and University of Maryland Oncology Center:
    - 1.4.1. Transplant Cases (Reserve Flag = 1)
    - 1.4.2. Research Cases (Reserve Flag = 2)
    - 1.4.3. Hematological Cases (Reserve Flag = 3)
    - 1.4.4. Transfer in Cases (Reserve Flag = 4)
  - 1.5. Northwest Hospital hospice cases- (Dailyservice=10)

## Appendix VI: Steps for Calculating APR-DRG Weights

### *The Creation of Maryland Hospital-Specific Relative Weights for Inpatient Services*

Relative weights are measures of relative cost or resources needed to treat a mix of patients at a given Maryland hospital using specific APR-DRG/severity of illness levels. In addition, they identify how resource needs vary across groups of patients and hospitals. The case-mix index (CMI) is the average value of the relative weights for the patients at a given hospital.

The calculation of relative weights used by Maryland hospitals, since the adoption of the APR-DRG Grouper, are as follows:

1. Remove excluded cases from the data.
2. Use the outlier trim methodology to adjust charges for outlier cases so that the maximum charge equals the trim limit (as described in the section “Steps in Determining Outliers”).
3. Calculate an average charge per case in each APR-DRG/severity category.
4. Calculate a statewide average charge per case (CPC).
5. Divide the cell average by the statewide average to generate the cell weight.
6. Calculate hospital-specific relative weights as follows:
  - a. For each hospital  $i$ , calculate the average charge per case-mix adjusted discharge:  $C(i)$ .
  - b. For the state as a whole, calculate the average charge per case-mix adjusted discharge:  $C$ .
  - c. For each hospital, calculate a standardizing factor:  $S(i) = C(i) / C$ .
  - d. For each hospital, adjust its charges to the state level by dividing by  $S(i)$ .
  - e. Recalculate the case-mix weights using the standardized charges.
  - f. Go back to step 6a and repeat until the changes in weights are minimal or non-existent.
7. Calculate the average weight per APR-DRG/severity category.
8. Adjust the weights in low volume cells (cells with less than 30 cases) by blending the average weight per APR-DRG/severity category in step 7 with the 3M National Relative Weights.
9. Adjust the weights to be monotonically increasing by severity of illness.
10. Normalize the weights to a statewide CMI of 1.00.

The “Outlier Trim” methodology by itself is almost as elaborate as the one described above and follows similar processes of determination.

### *Steps in Determining Outliers*

Table 1 provides the steps in calculating each hospital’s trim points and outlier cases. Additional details are provided to better understand each step of the process.

**Table 1. Outlier Methodology**

Hospital-Specific Outliers and Trim	Details
1. <b>Remove all categorical exclusions from the case-mix data.</b>	This includes research, organ transplants, and pediatric burn cases, for example.
2. <b>Create a statewide charge-based weight:</b> Divide each APR-DRG SOI average charge by the statewide average charge.	Uses the geometric mean for charges instead of the arithmetic mean to limit the effect of extreme charges.
3. <b>Adjust the statewide APR-DRG SOI weights:</b> Use 3M's National Monotonic Relative Weights data to adjust relative weights so they monotonically increase by SOI; the weights are then normalized to the statewide CMI to 1.00.	This step ensures that the charges increase along with severity. The national file is also used to adjust weights for small case counts (<30), which can be statistically unstable.
4. <b>Set each hospital's APR-DRG SOI high trim threshold:</b> Adjust each hospital's CPC by the hospital base CMI, multiply by the statewide APR-DRG SOI weight, then multiply by 3.5155.	Trim points are set specifically for each hospital. In 2006, it was determined that the outlier threshold was 3.5155 times the approved charges. The multiplier of 3.5155 was adopted in the final July 2006 outlier methodology.
5. <b>Adjust each APR-DRG SOI high trim cell for the dead-zone:</b> A minimum \$10,000 loss and a maximum of \$100,000.	Each trim point must be at least \$10,000 above the approved CPC, but not more than \$100,000 above.
6. <b>Charges above the high outlier threshold are trimmed:</b> Charges in excess of the threshold (based on unit rates) are excluded for CPC/CPE target setting (step 7).	The outlier cases are still included in the calculations with their charges reduced to the trim point.
7. <b>Hospital CPC/CPE(s) are revised:</b> To reflect high outlier trimmed charges and are revenue neutral at the base.	Trim points are set prospectively based on the prior year and are rebased at the beginning of each rate year. At this point, they are revenue neutral, and will remain this way if the number and case-mix remain constant.

Tables 2 and 3 show outlier calculation examples from real HSCRC data. Hospital A is a higher charge hospital, while hospital B is a lower charge hospital.

**Table 2. Hospital A's High Trim Limits for APR-DRG 4 (TRACHEOSTOMY W MV 96+ HOURS W EXTENSIVE PROCEDURE OR ECMO) by Severity Levels**

Severity Code	CPC Target	CMI	High Limit Multiplier	Trim Weight	Approved Charges	Initial Trim point	Diff. between Approved Charges & Initial Trim Point	Maximum Trim Point	Determine if using Initial Trim Point or Maximum	Final High Trim Limit
B	C	D	E	F	$G=(C/D)*F$	$H=(C/D)*E*F$	$I=H-G$	$K=G+100,000$	$L=IF((I \geq 100,000),K, ELSE ,H,))$	$M=MAX(L,J)$
1	\$24,543	1.346957	3.5155	7.167022	\$130,591	\$459,092	\$328,501	\$230,591	\$230,591	\$230,591
2				9.690092	\$176,564	\$620,710	\$444,146	\$276,564	\$276,564	\$276,564
3				11.003101	\$200,488	\$704,817	\$504,328	\$300,488	\$300,488	\$300,488
4				18.136112	\$330,459	\$1,161,730	\$831,271	\$430,459	\$430,459	\$430,459

**Table 3. Hospital B's High Trim Limits for APR-DRG 4 (TRACHEOSTOMY W MV 96+ HOURS W EXTENSIVE PROCEDURE OR ECMO) by Severity Levels**

Severity Code	CPC Target	CMI	High Limit Multiplier	Trim Weight	Approved Charges	Initial Trim point	Diff. between Approved Charges & Initial Trim Point	Maximum Trim Point	Determine if using Initial Trim Point or Maximum	Final High Trim Limit
B	C	D	E	F	$G=(C/D)*F$	$H=(C/D)*E*F$	$I=H-G$	$K=G+100,000$	$L=IF((I \geq 100,000),K, ELSE ,H,))$	$M=MAX(L,J)$
1	\$10,306	0.818111	3.5155	7.167022	\$90,285	\$317,398	\$227,112	\$190,285	\$190,285	\$190,285
2				9.690092	\$122,069	\$429,134	\$307,065	\$222,069	\$222,069	\$222,069
3				11.003101	\$138,610	\$487,282	\$348,672	\$238,610	\$238,610	\$238,610
4				18.136112	\$228,466	\$803,173	\$574,707	\$328,466	\$328,466	\$328,466

## Appendix VII: EAPG Service Line Map (EAPG version 3.8)

The following table summarizes the codes used to map EAPGs outpatient service lines.

EAPG	EAPG Description	Service Line
1	PHOTOCHEMOTHERAPY	Minor Surgery
2	SUPERFICIAL NEEDLE BIOPSY AND ASPIRATION	Other
3	LEVEL I SKIN INCISION AND DRAINAGE	Minor Surgery
4	LEVEL II SKIN INCISION AND DRAINAGE	Major Surgery
5	NAIL PROCEDURES	Minor Surgery
6	LEVEL I SKIN DEBRIDEMENT AND DESTRUCTION	Minor Surgery
7	LEVEL II SKIN DEBRIDEMENT AND DESTRUCTION	Major Surgery
8	LEVEL III SKIN DEBRIDEMENT AND DESTRUCTION	Major Surgery
9	LEVEL I EXCISION AND BIOPSY OF SKIN AND SOFT TISSUE	Minor Surgery
10	LEVEL II EXCISION AND BIOPSY OF SKIN AND SOFT TISSUE	Major Surgery
11	LEVEL III EXCISION AND BIOPSY OF SKIN AND SOFT TISSUE	Major Surgery
12	LEVEL I SKIN REPAIR	Minor Surgery
13	LEVEL II SKIN REPAIR	Major Surgery
14	LEVEL III SKIN REPAIR	Major Surgery
15	LEVEL IV SKIN REPAIR	Major Surgery
20	LEVEL I BREAST PROCEDURES	Minor Surgery
21	LEVEL II BREAST PROCEDURES	Major Surgery
22	LEVEL III BREAST PROCEDURES	Major Surgery
30	LEVEL I MUSCULOSKELETAL PROCEDURES EXCLUDING HAND AND FOOT	Minor Surgery
31	LEVEL II MUSCULOSKELETAL PROCEDURES EXCLUDING HAND AND FOOT	Major Surgery
32	LEVEL III MUSCULOSKELETAL PROCEDURES EXCLUDING HAND AND FOOT	Major Surgery
33	LEVEL I HAND PROCEDURES	Minor Surgery
34	LEVEL II HAND PROCEDURES	Major Surgery
35	LEVEL I FOOT PROCEDURES	Major Surgery
36	LEVEL II FOOT PROCEDURES	Major Surgery
37	LEVEL I ARTHROSCOPY	Major Surgery
38	LEVEL II ARTHROSCOPY	Major Surgery
39	REPLACEMENT OF CAST	Other
40	SPLINT, STRAPPING AND CAST REMOVAL	Other
41	CLOSED TREATMENT FX & DISLOCATION OF FINGER, TOE & TRUNK	Major Surgery
42	CLOSED TREATMENT FX & DISLOCATION EXC FINGER, TOE & TRUNK	Major Surgery
43	OPEN OR PERCUTANEOUS TREATMENT OF FRACTURES	Major Surgery
44	BONE OR JOINT MANIPULATION UNDER ANESTHESIA	Major Surgery
45	BUNION PROCEDURES	Major Surgery
46	LEVEL I ARTHROPLASTY	Major Surgery
47	LEVEL II ARTHROPLASTY	Major Surgery

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EAPG	EAPG Description	Service Line
48	HAND AND FOOT TENOTOMY	Major Surgery
49	ARTHROCENTESIS AND LIGAMENT OR TENDON INJECTION	Minor Surgery
60	PULMONARY TESTS	Other
61	NEEDLE AND CATHETER BIOPSY, ASPIRATION, LAVAGE AND INTUBATION	Minor Surgery
62	LEVEL I ENDOSCOPY OF THE UPPER AIRWAY	Minor Surgery
63	LEVEL II ENDOSCOPY OF THE UPPER AIRWAY	Major Surgery
64	ENDOSCOPY OF THE LOWER AIRWAY	Major Surgery
65	RESPIRATORY THERAPY	Other
66	PULMONARY REHABILITATION	Rehabilitation
67	VENTILATION ASSISTANCE AND MANAGEMENT	Other
80	EXERCISE TOLERANCE TESTS	Cardiovascular
81	ECHOCARDIOGRAPHY	Cardiovascular
82	CARDIAC ELECTROPHYSIOLOGIC TESTS AND MONITORING	Cardiovascular
83	PLACEMENT OF TRANSVENOUS CATHETERS	Cardiovascular
84	DIAGNOSTIC CARDIAC CATHETERIZATION	Cardiovascular
85	ANGIOPLASTY AND TRANSCATHETER PROCEDURES	Cardiovascular
86	PACEMAKER INSERTION AND REPLACEMENT	Cardiovascular
87	REMOVAL AND REVISION OF PACEMAKER AND VASCULAR DEVICE	Cardiovascular
88	LEVEL I CARDIOTHORACIC PROCEDURES W OR W/O VASCULAR DEVICE	Cardiovascular
89	LEVEL II CARDIOTHORACIC PROCEDURES W OR W/O VASCULAR DEVICE	Cardiovascular
90	SECONDARY VARICOSE VEINS AND VASCULAR INJECTION	Cardiovascular
91	VASCULAR LIGATION AND RECONSTRUCTION	Cardiovascular
92	RESUSCITATION	Cardiovascular
93	CARDIOVERSION	Cardiovascular
94	CARDIAC REHABILITATION	Cardiovascular
95	THROMBOLYSIS	Cardiovascular
96	ATRIAL AND VENTRICULAR RECORDING AND PACING	Cardiovascular
97	AICD IMPLANT	Cardiovascular
110	PHARMACOTHERAPY BY EXTENDED INFUSION	Minor Surgery
111	PHARMACOTHERAPY EXCEPT BY EXTENDED INFUSION	Minor Surgery
112	PHLEBOTOMY	Other
113	LEVEL I BLOOD AND BLOOD PRODUCT EXCHANGE	Other
114	LEVEL II BLOOD AND BLOOD PRODUCT EXCHANGE	Other
115	DEEP LYMPH STRUCTURE AND THYROID PROCEDURES	Minor Surgery
116	ALLERGY TESTS	Other
117	HOME INFUSION	Minor Surgery
118	NUTRITION THERAPY	Other
130	ALIMENTARY TESTS AND SIMPLE TUBE PLACEMENT	Major Surgery
131	ESOPHAGEAL DILATION WITHOUT ENDOSCOPY	Minor Surgery
132	ANOSCOPY WITH BIOPSY AND DIAGNOSTIC PROCTOSIGMOIDOSCOPY	Minor Surgery

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
133	PROCTOSIGMOIDOSCOPY WITH EXCISION OR BIOPSY	Minor Surgery
134	DIAGNOSTIC UPPER GI ENDOSCOPY OR INTUBATION	Radiology
135	THERAPEUTIC UPPER GI ENDOSCOPY OR INTUBATION	Minor Surgery
136	DIAGNOSTIC LOWER GASTROINTESTINAL ENDOSCOPY	Radiology
137	THERAPEUTIC COLONOSCOPY	Minor Surgery
138	ERCP AND MISCELLANEOUS GI ENDOSCOPY PROCEDURES	Minor Surgery
139	LEVEL I HERNIA REPAIR	Minor Surgery
140	LEVEL II HERNIA REPAIR	Major Surgery
141	LEVEL I ANAL AND RECTAL PROCEDURES	Minor Surgery
142	LEVEL II ANAL AND RECTAL PROCEDURES	Major Surgery
143	LEVEL I GASTROINTESTINAL PROCEDURES	Minor Surgery
144	LEVEL II GASTROINTESTINAL PROCEDURES	Major Surgery
145	LEVEL I LAPAROSCOPY	Minor Surgery
146	LEVEL II LAPAROSCOPY	Major Surgery
147	LEVEL III LAPAROSCOPY	Major Surgery
148	LEVEL IV LAPAROSCOPY	Major Surgery
149	SCREENING COLORECTAL SERVICES	Clinic
160	EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY	Minor Surgery
161	URINARY STUDIES AND PROCEDURES	Other
162	URINARY DILATATION	Minor Surgery
163	LEVEL I BLADDER AND KIDNEY PROCEDURES	Minor Surgery
164	LEVEL II BLADDER AND KIDNEY PROCEDURES	Major Surgery
165	LEVEL III BLADDER AND KIDNEY PROCEDURES	Major Surgery
166	LEVEL I URETHRA AND PROSTATE PROCEDURES	Minor Surgery
167	LEVEL II URETHRA AND PROSTATE PROCEDURES	Major Surgery
168	HEMODIALYSIS	Other
169	PERITONEAL DIALYSIS	Other
180	TESTICULAR AND EPIDIDYMAL PROCEDURES	Major Surgery
181	CIRCUMCISION	Minor Surgery
182	INSERTION OF PENILE PROSTHESIS	Major Surgery
183	OTHER PENILE PROCEDURES	Major Surgery
184	DESTRUCTION OR RESECTION OF PROSTATE	Major Surgery
185	PROSTATE NEEDLE AND PUNCH BIOPSY	Minor Surgery
190	ARTIFICIAL FERTILIZATION	Major Surgery
191	LEVEL I FETAL PROCEDURES	Other
192	LEVEL II FETAL PROCEDURES	Major Surgery
193	TREATMENT OF INCOMPLETE ABORTION	Major Surgery
194	THERAPEUTIC ABORTION	Major Surgery
195	VAGINAL DELIVERY	Major Surgery
196	LEVEL I FEMALE REPRODUCTIVE PROCEDURES	Minor Surgery



Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
197	LEVEL II FEMALE REPRODUCTIVE PROCEDURES	Major Surgery
198	LEVEL III FEMALE REPRODUCTIVE PROCEDURES	Major Surgery
199	DILATION AND CURETTAGE	Minor Surgery
200	HYSTEROSCOPY	Major Surgery
201	COLPOSCOPY	Other
210	EXTENDED EEG STUDIES	Other
211	ELECTROENCEPHALOGRAM	Other
212	ELECTROCONVULSIVE THERAPY	Other
213	NERVE AND MUSCLE TESTS	Other
214	NERVOUS SYSTEM INJECTIONS, STIMULATIONS OR CRANIAL TAP	Radiology
215	LEVEL I REVISION OR REMOVAL OF NEUROLOGICAL DEVICE	Minor Surgery
216	LEVEL II REVISION OR REMOVAL OF NEUROLOGICAL DEVICE	Major Surgery
217	LEVEL I NERVE PROCEDURES	Major Surgery
218	LEVEL II NERVE PROCEDURES	Major Surgery
219	SPINAL TAP	Major Surgery
220	INJECTION OF ANESTHETIC AND NEUROLYTIC AGENTS	Major Surgery
221	LAMINOTOMY AND LAMINECTOMY	Major Surgery
222	SLEEP STUDIES	Other
223	LEVEL III NERVE PROCEDURES	Major Surgery
224	LEVEL IV NERVE PROCEDURES	Major Surgery
230	MINOR OPHTHALMOLOGICAL TESTS AND PROCEDURES	Minor Surgery
231	FITTING OF CONTACT LENSES	Other
232	LASER EYE PROCEDURES	Major Surgery
233	CATARACT PROCEDURES	Major Surgery
234	LEVEL I ANTERIOR SEGMENT EYE PROCEDURES	Major Surgery
235	LEVEL II ANTERIOR SEGMENT EYE PROCEDURES	Major Surgery
236	LEVEL III ANTERIOR SEGMENT EYE PROCEDURES	Major Surgery
237	LEVEL I POSTERIOR SEGMENT EYE PROCEDURES	Major Surgery
238	LEVEL II POSTERIOR SEGMENT EYE PROCEDURES	Major Surgery
239	STRABISMUS AND MUSCLE EYE PROCEDURES	Major Surgery
240	LEVEL I REPAIR AND PLASTIC PROCEDURES OF EYE	Major Surgery
241	LEVEL II REPAIR AND PLASTIC PROCEDURES OF EYE	Major Surgery
250	COCHLEAR DEVICE IMPLANTATION	Major Surgery
251	OTORHINOLARYNGOLOGIC FUNCTION TESTS	Other
252	LEVEL I FACIAL AND ENT PROCEDURES	Minor Surgery
253	LEVEL II FACIAL AND ENT PROCEDURES	Major Surgery
254	LEVEL III FACIAL AND ENT PROCEDURES	Major Surgery
255	LEVEL IV FACIAL AND ENT PROCEDURES	Major Surgery
256	TONSIL AND ADENOID PROCEDURES	Minor Surgery
257	AUDIOMETRY	Other

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
270	OCCUPATIONAL THERAPY	Rehabilitation
271	PHYSICAL THERAPY	Physical Therapy
272	SPEECH THERAPY AND EVALUATION	Rehabilitation
273	MANIPULATION THERAPY	Rehabilitation
274	OCCUPATIONAL/PHYSICAL THERAPY, GROUP	Rehabilitation
275	SPEECH THERAPY & EVALUATION, GROUP	Rehabilitation
280	VASCULAR RADIOLOGY EXCEPT VENOGRAPHY OF EXTREMITY	Radiology
281	MAGNETIC RESONANCE ANGIOGRAPHY - HEAD AND/OR NECK	Radiology
282	MAGNETIC RESONANCE ANGIOGRAPHY - CHEST	Radiology
283	MAGNETIC RESONANCE ANGIOGRAPHY - OTHER SITES	Radiology
284	MYELOGRAPHY	Radiology
285	MISCELLANEOUS RADIOLOGICAL PROCEDURES WITH CONTRAST	Radiology
286	MAMMOGRAPHY	Radiology
287	DIGESTIVE RADIOLOGY	Radiology
288	DIAGNOSTIC ULTRASOUND EXCEPT OBSTETRICAL AND VASCULAR OF LOWER EXTREMITIES	Radiology
289	VASCULAR DIAGNOSTIC ULTRASOUND OF LOWER EXTREMITIES	Radiology
290	PET SCANS	CT/MRI/PET
291	BONE DENSITOMETRY	Radiology
292	MRI- ABDOMEN	CT/MRI/PET
293	MRI- JOINTS	CT/MRI/PET
294	MRI- BACK	CT/MRI/PET
295	MRI- CHEST	CT/MRI/PET
296	MRI- OTHER	CT/MRI/PET
297	MRI- BRAIN	CT/MRI/PET
298	CAT SCAN BACK	CT/MRI/PET
299	CAT SCAN - BRAIN	CT/MRI/PET
300	CAT SCAN - ABDOMEN	CT/MRI/PET
301	CAT SCAN - OTHER	CT/MRI/PET
302	ANGIOGRAPHY, OTHER	Radiology
303	ANGIOGRAPHY, CEREBRAL	Radiology
310	DEVELOPMENTAL & NEUROPSYCHOLOGICAL TESTING	Other
311	FULL DAY PARTIAL HOSPITALIZATION FOR SUBSTANCE ABUSE	Psychiatric
312	FULL DAY PARTIAL HOSPITALIZATION FOR MENTAL ILLNESS	Psychiatric
313	HALF DAY PARTIAL HOSPITALIZATION FOR SUBSTANCE ABUSE	Psychiatric
314	HALF DAY PARTIAL HOSPITALIZATION FOR MENTAL ILLNESS	Psychiatric
315	COUNSELLING OR INDIVIDUAL BRIEF PSYCHOTHERAPY	Psychiatric
316	INDIVIDUAL COMPREHENSIVE PSYCHOTHERAPY	Psychiatric
317	FAMILY PSYCHOTHERAPY	Psychiatric
318	GROUP PSYCHOTHERAPY	Psychiatric
319	ACTIVITY THERAPY	Psychiatric

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
320	CASE MANAGEMENT & TREATMENT PLAN DEVELOPMENT - MENTAL HEALTH OR SUBSTANCE ABUSE	Psychiatric
321	CRISIS INTERVENTION	Psychiatric
322	MEDICATION ADMINISTRATION & OBSERVATION	Psychiatric
323	MENTAL HYGIENE ASSESSMENT	Psychiatric
324	MENTAL HEALTH SCREENING & BRIEF ASSESSMENT	Psychiatric
327	INTENSIVE OUTPATIENT PSYCHIATRIC TREATMENT	Psychiatric
328	DAY REHABILITATION, HALF DAY	Rehabilitation
329	DAY REHABILITATION, FULL DAY	Rehabilitation
330	LEVEL I DIAGNOSTIC NUCLEAR MEDICINE	Radiology
331	LEVEL II DIAGNOSTIC NUCLEAR MEDICINE	Radiology
332	LEVEL III DIAGNOSTIC NUCLEAR MEDICINE	Radiology
340	THERAPEUTIC NUCLEAR MEDICINE	Minor Surgery
341	RADIATION THERAPY AND HYPERTHERMIA	Minor Surgery
342	LEVEL I AFTERLOADING BRACHYTHERAPY	Minor Surgery
343	RADIATION TREATMENT DELIVERY	Minor Surgery
344	INSTILLATION OF RADIOELEMENT SOLUTIONS	Minor Surgery
345	HYPERTHERMIC THERAPIES	Minor Surgery
346	RADIOSURGERY	Minor Surgery
347	HIGH ENERGY NEUTRON RADIATION TREATMENT DELIVERY	Minor Surgery
348	PROTON TREATMENT DELIVERY	Minor Surgery
349	LEVEL II AFTERLOADING BRACHYTHERAPY	Minor Surgery
350	LEVEL I ADJUNCTIVE GENERAL DENTAL SERVICES	Other
351	LEVEL II ADJUNCTIVE GENERAL DENTAL SERVICES	Other
352	PERIODONTICS	Other
353	LEVEL I PROSTHODONTICS, FIXED	Other
354	LEVEL II PROSTHODONTICS, FIXED	Other
355	LEVEL III PROSTHODONTICS, FIXED	Other
356	LEVEL I PROSTHODONTICS, REMOVABLE	Other
357	LEVEL II PROSTHODONTICS, REMOVABLE	Other
358	LEVEL III PROSTHODONTICS, REMOVABLE	Other
359	LEVEL I MAXILLOFACIAL PROSTHETICS	Other
360	LEVEL II MAXILLOFACIAL PROSTHETICS	Other
361	LEVEL I DENTAL RESTORATIONS	Other
362	LEVEL II DENTAL RESTORATIONS	Other
363	LEVEL III DENTAL RESTORATION	Other
364	LEVEL I ENDODONTICS	Other
365	LEVEL II ENDODONTICS	Other
366	LEVEL III ENDODONTICS	Other
367	LEVEL I ORAL AND MAXILLOFACIAL SURGERY	Minor Surgery
368	LEVEL II ORAL AND MAXILLOFACIAL SURGERY	Major Surgery

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
369	LEVEL III ORAL AND MAXILLOFACIAL SURGERY	Major Surgery
370	LEVEL IV ORAL AND MAXILLOFACIAL SURGERY	Major Surgery
371	ORTHODONTICS	Other
372	SEALANT	Other
373	LEVEL I DENTAL FILM	Other
374	LEVEL II DENTAL FILM	Other
375	DENTAL ANESTHESIA	Other
376	DIAGNOSTIC DENTAL PROCEDURES	Minor Surgery
377	PREVENTIVE DENTAL PROCEDURES	Clinic
380	ANESTHESIA	Other
390	LEVEL I PATHOLOGY	Pathology
391	LEVEL II PATHOLOGY	Pathology
392	PAP SMEARS	Pathology
393	BLOOD AND TISSUE TYPING	Lab
394	LEVEL I IMMUNOLOGY TESTS	Lab
395	LEVEL II IMMUNOLOGY TESTS	Lab
396	LEVEL I MICROBIOLOGY TESTS	Lab
397	LEVEL II MICROBIOLOGY TESTS	Lab
398	LEVEL I ENDOCRINOLOGY TESTS	Lab
399	LEVEL II ENDOCRINOLOGY TESTS	Lab
400	LEVEL I CHEMISTRY TESTS	Lab
401	LEVEL II CHEMISTRY TESTS	Lab
402	BASIC CHEMISTRY TESTS	Lab
403	ORGAN OR DISEASE ORIENTED PANELS	Lab
404	TOXICOLOGY TESTS	Lab
405	THERAPEUTIC DRUG MONITORING	Lab
406	LEVEL I CLOTTING TESTS	Lab
407	LEVEL II CLOTTING TESTS	Lab
408	LEVEL I HEMATOLOGY TESTS	Lab
409	LEVEL II HEMATOLOGY TESTS	Lab
410	URINALYSIS	Lab
411	BLOOD AND URINE DIPSTICK TESTS	Lab
412	SIMPLE PULMONARY FUNCTION TESTS	Other
413	CARDIOGRAM	Other
414	LEVEL I IMMUNIZATION	Other
415	LEVEL II IMMUNIZATION	Other
416	LEVEL III IMMUNIZATION	Other
417	MINOR REPRODUCTIVE PROCEDURES	Minor Surgery
418	MINOR CARDIAC AND VASCULAR TESTS	Other
419	MINOR OPHTHALMOLOGICAL INJECTION, SCRAPING AND TESTS	Other

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
420	PACEMAKER AND OTHER ELECTRONIC ANALYSIS	Other
421	TUBE CHANGE	Other
422	PROVISION OF VISION AIDS	Other
423	INTRODUCTION OF NEEDLE AND CATHETER	Other
424	DRESSINGS AND OTHER MINOR PROCEDURES	Minor Surgery
425	OTHER MISCELLANEOUS ANCILLARY PROCEDURES	Other
426	PSYCHOTROPIC MEDICATION MANAGEMENT	Other
427	BIOFEEDBACK AND OTHER TRAINING	Other
428	PATIENT EDUCATION, INDIVIDUAL	Other
429	PATIENT EDUCATION, GROUP	Other
430	CLASS I CHEMOTHERAPY DRUGS	Minor Surgery
431	CLASS II CHEMOTHERAPY DRUGS	Minor Surgery
432	CLASS III CHEMOTHERAPY DRUGS	Minor Surgery
433	CLASS IV CHEMOTHERAPY DRUGS	Minor Surgery
434	CLASS V CHEMOTHERAPY DRUGS	Minor Surgery
435	CLASS I PHARMACOTHERAPY	Drugs
436	CLASS II PHARMACOTHERAPY	Drugs
437	CLASS III PHARMACOTHERAPY	Drugs
438	CLASS IV PHARMACOTHERAPY	Drugs
439	CLASS V PHARMACOTHERAPY	Drugs
440	CLASS VI PHARMACOTHERAPY	Drugs
441	CLASS VI CHEMOTHERAPY DRUGS	Minor Surgery
443	CLASS VII CHEMOTHERAPY DRUGS	Minor Surgery
444	CLASS VII PHARMACOTHERAPY	Drugs
448	EXPANDED HOURS ACCESS	Other
449	ADDITIONAL UNDIFFERENTIATED MEDICAL VISITS/SERVICES	Other
450	OBSERVATION	Other
451	SMOKING CESSATION TREATMENT	Other
452	DIABETES SUPPLIES	Other
453	MOTORIZED WHEELCHAIR	Other
454	TPN FORMULAE	Other
455	IMPLANTED TISSUE OF ANY TYPE	Other
456	MOTORIZED WHEELCHAIR ACCESSORIES	Other
457	VENIPUNCTURE	Other
458	ALLERGY THERAPY	Other
459	VACCINE ADMINISTRATION	Other
460	CLASS VIII COMBINED CHEMOTHERAPY AND PHARMACOTHERAPY	Minor Surgery
461	CLASS IX COMBINED CHEMOTHERAPY AND PHARMACOTHERAPY	Minor Surgery
462	CLASS X COMBINED CHEMOTHERAPY AND PHARMACOTHERAPY	Minor Surgery
463	CLASS XI COMBINED CHEMOTHERAPY AND PHARMACOTHERAPY	Minor Surgery

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
464	CLASS XII COMBINED CHEMOTHERAPY AND PHARMACOTHERAPY	Minor Surgery
465	CLASS XIII COMBINED CHEMOTHERAPY AND PHARMACOTHERAPY	Minor Surgery
470	OBSTETRICAL ULTRASOUND	Radiology
471	PLAIN FILM	Radiology
472	ULTRASOUND GUIDANCE	Radiology
473	CT GUIDANCE	CT/MRI/PET
474	RADIOLOGICAL GUIDANCE FOR THERAPEUTIC OR DIAGNOSTIC PROCEDURES	Radiology
475	MRI GUIDANCE	CT/MRI/PET
476	LEVEL I THERAPEUTIC RADIATION TREATMENT PREPARATION	Minor Surgery
477	LEVEL II THERAPEUTIC RADIATION TREATMENT PREPARATION	Minor Surgery
478	MEDICAL RADIATION PHYSICS	Minor Surgery
479	TREATMENT DEVICE DESIGN AND CONSTRUCTION	Radiology
480	TELE THERAPY/BRACHYTHERAPY CALCULATION	Radiology
481	THERAPEUTIC RADIOLOGY SIMULATION FIELD SETTING	Radiology
482	RADIOELEMENT APPLICATION	Minor Surgery
483	RADIATION THERAPY MANAGEMENT	Minor Surgery
484	THERAPEUTIC RADIOLOGY TREATMENT PLANNING	Minor Surgery
485	CORNEAL TISSUE PROCESSING	Other
490	INCIDENTAL TO MEDICAL, SIGNIFICANT PROCEDURE OR THERAPY VISIT	Other
491	MEDICAL VISIT INDICATOR	Other
492	ENCOUNTER/REFERRAL FOR OBSERVATION INDICATOR	Other
495	MINOR CHEMOTHERAPY DRUGS	Minor Surgery
496	MINOR PHARMACOTHERAPY	Drugs
500	ENCOUNTER/REFERRAL FOR OBSERVATION - OBSTETRICAL	Other
501	ENCOUNTER/REFERRAL FOR OBSERVATION - OTHER DIAGNOSES	Other
502	ENCOUNTER/REFERRAL FOR OBSERVATION - BEHAVIORAL HEALTH	Other
510	MAJOR SIGNS, SYMPTOMS AND FINDINGS	Other
520	SPINAL DISORDERS & INJURIES	Other
521	NERVOUS SYSTEM MALIGNANCY	Clinic
522	DEGENERATIVE NERVOUS SYSTEM DISORDERS EXC MULT SCLEROSIS	Other
523	MULTIPLE SCLEROSIS & OTHER DEMYELINATING DISEASES	Other
524	LEVEL I CNS DISORDERS	Other
525	LEVEL II CNS DISORDERS	Other
526	TRANSIENT ISCHEMIA	Other
527	PERIPHERAL NERVE DISORDERS	Other
528	NONTRAUMATIC STUPOR & COMA	Other
529	SEIZURE	Other
530	HEADACHES OTHER THAN MIGRAINE	Other
531	MIGRAINE	Other
532	HEAD TRAUMA	Other

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
533	AFTEREFFECTS OF CEREBROVASCULAR ACCIDENT	Other
534	NONSPECIFIC CVA & PRECEREBRAL OCCLUSION W/O INFARC	Other
535	CVA & PRECEREBRAL OCCLUSION W INFARCT	Other
536	CEREBRAL PALSY	Other
550	ACUTE MAJOR EYE INFECTIONS	Other
551	CATARACTS	Other
552	GLAUCOMA	Other
553	LEVEL I OTHER OPHTHALMIC DIAGNOSES	Other
554	LEVEL II OTHER OPHTHALMIC DIAGNOSES	Other
555	CONJUNCTIVITIS	Other
560	EAR, NOSE, MOUTH, THROAT, CRANIAL/FACIAL MALIGNANCIES	Clinic
561	VERTIGINOUS DISORDERS EXCEPT FOR BENIGN VERTIGO	Other
562	INFECTIONS OF UPPER RESPIRATORY TRACT & OTITIS MEDIA	Other
563	DENTAL & ORAL DISEASES & INJURIES	Other
564	LEVEL I OTHER EAR, NOSE, MOUTH,THROAT & CRANIAL/FACIAL DIAGNOSES	Other
565	LEVEL II OTHER EAR, NOSE, MOUTH,THROAT & CRANIAL/FACIAL DIAGNOSES	Other
570	CYSTIC FIBROSIS - PULMONARY DISEASE	Other
571	RESPIRATORY MALIGNANCY	Clinic
572	BRONCHIOLITIS & RSV PNEUMONIA	Other
573	COMMUNITY ACQUIRED PNEUMONIA	Other
574	CHRONIC OBSTRUCTIVE PULMONARY DISEASE	Other
575	ASTHMA	Other
576	LEVEL I OTHER RESPIRATORY DIAGNOSES	Other
577	LEVEL II OTHER RESPIRATORY DIAGNOSES	Other
578	PNEUMONIA EXCEPT FOR COMMUNITY ACQUIRED PNEUMONIA	Other
579	STATUS ASTHMATICUS	Other
591	ACUTE MYOCARDIAL INFARCTION	Other
592	LEVEL I CARDIOVASCULAR DIAGNOSES	Other
593	LEVEL II CARDIOVASCULAR DIAGNOSES	Other
594	HEART FAILURE	Other
595	CARDIAC ARREST	Other
596	PERIPHERAL & OTHER VASCULAR DISORDERS	Other
597	PHLEBITIS	Other
598	ANGINA PECTORIS & CORONARY ATHEROSCLEROSIS	Other
599	HYPERTENSION	Other
600	CARDIAC STRUCTURAL & VALVULAR DISORDERS	Other
601	LEVEL I CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS	Other
602	ATRIAL FIBRILLATION	Other
603	LEVEL II CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS	Other
604	CHEST PAIN	Other

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
605	SYNCOPE & COLLAPSE	Other
620	DIGESTIVE MALIGNANCY	Clinic
621	PEPTIC ULCER & GASTRITIS	Other
623	ESOPHAGITIS	Other
624	LEVEL I GASTROINTESTINAL DIAGNOSES	Other
625	LEVEL II GASTROINTESTINAL DIAGNOSES	Other
626	INFLAMMATORY BOWEL DISEASE	Other
627	NON-BACTERIAL GASTROENTERITIS, NAUSEA & VOMITING	Other
628	ABDOMINAL PAIN	Other
629	MALFUNCTION, REACTION & COMPLICATION OF GI DEVICE OR PROCEDURE	Other
630	CONSTIPATION	Other
631	HERNIA	Other
632	IRRITABLE BOWEL SYNDROME	Other
633	ALCOHOLIC LIVER DISEASE	Other
634	MALIGNANCY OF HEPATOBILIARY SYSTEM & PANCREAS	Clinic
635	DISORDERS OF PANCREAS EXCEPT MALIGNANCY	Other
636	HEPATITIS WITHOUT COMA	Other
637	DISORDERS OF GALLBLADDER & BILIARY TRACT	Other
638	CHOLECYSTITIS	Other
639	LEVEL I HEPATOBILIARY DIAGNOSES	Other
640	LEVEL II HEPATOBILIARY DIAGNOSES	Other
650	FRACTURE OF FEMUR	Other
651	FRACTURE OF PELVIS OR DISLOCATION OF HIP	Other
652	FRACTURES & DISLOCATIONS EXCEPT FEMUR, PELVIS & BACK	Other
653	MUSCULOSKELETAL MALIGNANCY & PATHOLOGICAL FRACTURES	Clinic
654	OSTEOMYELITIS, SEPTIC ARTHRITIS & OTHER MUSCULOSKELETAL INFECTIONS	Other
655	CONNECTIVE TISSUE DISORDERS	Other
656	BACK & NECK DISORDERS EXCEPT LUMBAR DISC DISEASE	Other
657	LUMBAR DISC DISEASE	Other
658	LUMBAR DISC DISEASE WITH SCIATICA	Other
659	MALFUNCTION, REACTION, COMPLIC OF ORTHOPEDIC DEVICE OR PROCEDURE	Other
660	LEVEL I OTHER MUSCULOSKELETAL SYSTEM & CONNECTIVE TISSUE DIAGNOSES	Other
661	LEVEL II OTHER MUSCULOSKELETAL SYSTEM & CONNECTIVE TISSUE DIAGNOSES	Other
662	OSTEOPOROSIS	Other
663	PAIN	Other
670	SKIN ULCERS	Other
671	MAJOR SKIN DISORDERS	Other
672	MALIGNANT BREAST DISORDERS	Clinic
673	CELLULITIS & OTHER BACTERIAL SKIN INFECTIONS	Other
674	CONTUSION, OPEN WOUND & OTHER TRAUMA TO SKIN & SUBCUTANEOUS TISSUE	Other



Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
675	OTHER SKIN, SUBCUTANEOUS TISSUE & BREAST DISORDERS	Other
676	DECUBITUS ULCER	Other
690	MALNUTRITION, FAILURE TO THRIVE & OTHER NUTRITIONAL DISORDERS	Other
691	INBORN ERRORS OF METABOLISM	Other
692	LEVEL I ENDOCRINE DISORDERS	Other
693	LEVEL II ENDOCRINE DISORDERS	Other
694	ELECTROLYTE DISORDERS	Other
695	OBESITY	Other
710	DIABETES WITH OPHTHALMIC MANIFESTATIONS	Other
711	DIABETES WITH OTHER MANIFESTATIONS & COMPLICATIONS	Other
712	DIABETES WITH NEUROLOGIC MANIFESTATIONS	Other
713	DIABETES WITHOUT COMPLICATIONS	Other
714	DIABETES WITH RENAL MANIFESTATIONS	Other
720	RENAL FAILURE	Other
721	KIDNEY & URINARY TRACT MALIGNANCY	Clinic
722	NEPHRITIS & NEPHROSIS	Other
723	KIDNEY AND CHRONIC URINARY TRACT INFECTIONS	Other
724	URINARY STONES & ACQUIRED UPPER URINARY TRACT OBSTRUCTION	Other
725	MALFUNCTION, REACTION, COMPLIC OF GENITOURINARY DEVICE OR PROC	Other
726	OTHER KIDNEY & URINARY TRACT DIAGNOSES, SIGNS & SYMPTOMS	Other
727	ACUTE LOWER URINARY TRACT INFECTIONS	Other
740	MALIGNANCY, MALE REPRODUCTIVE SYSTEM	Clinic
741	MALE REPRODUCTIVE SYSTEM DIAGNOSES EXCEPT MALIGNANCY	Other
742	NEOPLASMS OF THE MALE REPRODUCTIVE SYSTEM	Other
743	PROSTATITIS	Other
744	MALE REPRODUCTIVE INFECTIONS	Other
750	FEMALE REPRODUCTIVE SYSTEM MALIGNANCY	Clinic
751	FEMALE REPRODUCTIVE SYSTEM INFECTIONS	Other
752	LEVEL I MENSTRUAL AND OTHER FEMALE DIAGNOSES	Other
753	LEVEL II MENSTRUAL AND OTHER FEMALE DIAGNOSES	Other
760	VAGINAL DELIVERY	Other
761	POSTPARTUM & POST ABORTION DIAGNOSES W/O PROCEDURE	Other
762	THREATENED ABORTION	Other
763	ABORTION W/O D&C, ASPIRATION CURETTAGE OR HYSTEROTOMY	Other
764	FALSE LABOR	Other
765	OTHER ANTEPARTUM DIAGNOSES	Other
766	ROUTINE PRENATAL CARE	Other
770	NORMAL NEONATE	Other
771	LEVEL I NEONATAL DIAGNOSES	Other
772	LEVEL II NEONATAL DIAGNOSES	Other

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
780	OTHER HEMATOLOGICAL DISORDERS	Other
781	COAGULATION & PLATELET DISORDERS	Other
782	CONGENITAL FACTOR DEFICIENCIES	Other
783	SICKLE CELL ANEMIA CRISIS	Other
784	SICKLE CELL ANEMIA	Other
785	ANEMIA EXCEPT FOR IRON DEFICIENCY ANEMIA AND SICKLE CELL ANEMIA	Other
786	IRON DEFICIENCY ANEMIA	Other
800	ACUTE LEUKEMIA	Clinic
801	LYMPHOMA, MYELOMA & NON-ACUTE LEUKEMIA	Clinic
802	RADIOTHERAPY	Minor Surgery
803	CHEMOTHERAPY	Minor Surgery
804	LYMPHATIC & OTHER MALIGNANCIES & NEOPLASMS OF UNCERTAIN BEHAVIOR	Clinic
805	SEPTICEMIA & DISSEMINATED INFECTIONS	Other
806	POST-OPERATIVE, POST-TRAUMATIC, OTHER DEVICE INFECTIONS	Other
807	FEVER	Other
808	VIRAL ILLNESS	Other
809	OTHER INFECTIOUS & PARASITIC DISEASES	Other
810	H. PYLORI INFECTION	Other
820	SCHIZOPHRENIA	Psychiatric
821	MAJOR DEPRESSIVE DISORDERS & OTHER/UNSPECIFIED PSYCHOSES	Psychiatric
822	DISORDERS OF PERSONALITY & IMPULSE CONTROL	Psychiatric
823	BIPOLAR DISORDERS	Psychiatric
824	DEPRESSION EXCEPT MAJOR DEPRESSIVE DISORDER	Psychiatric
825	ADJUSTMENT DISORDERS & NEUROSES EXCEPT DEPRESSIVE DIAGNOSES	Psychiatric
826	ACUTE ANXIETY & DELIRIUM STATES	Psychiatric
827	ORGANIC MENTAL HEALTH DISTURBANCES	Psychiatric
828	MENTAL RETARDATION	Psychiatric
829	CHILDHOOD BEHAVIORAL DISORDERS	Psychiatric
830	EATING DISORDERS	Psychiatric
831	OTHER MENTAL HEALTH DISORDERS	Psychiatric
840	OPIOID ABUSE & DEPENDENCE	Other
841	COCAINE ABUSE & DEPENDENCE	Other
842	ALCOHOL ABUSE & DEPENDENCE	Other
843	OTHER DRUG ABUSE & DEPENDENCE	Other
850	ALLERGIC REACTIONS	Other
851	POISONING OF MEDICINAL AGENTS	Other
852	OTHER COMPLICATIONS OF TREATMENT	Other
853	OTHER INJURY, POISONING & TOXIC EFFECT DIAGNOSES	Other
854	TOXIC EFFECTS OF NON-MEDICINAL SUBSTANCES	Other
860	EXTENSIVE 3RD DEGREE OR FULL THICKNESS BURNS W/O SKIN GRAFT	Other

Market Shift Adjustments under Global Revenue and Total Patient Revenue Models

EAPG	EAPG Description	Service Line
861	PARTIAL THICKNESS BURNS W OR W/O SKIN GRAFT	Other
870	REHABILITATION	Rehabilitation
871	SIGNS, SYMPTOMS & OTHER FACTORS INFLUENCING HEALTH STATUS	Other
872	OTHER AFTERCARE & CONVALESCENCE	Other
873	NEONATAL AFTERCARE	Other
874	JOINT REPLACEMENT	Other
875	CONTRACEPTIVE MANAGEMENT	Other
876	ADULT PREVENTIVE MEDICINE	Clinic
877	CHILD PREVENTIVE MEDICINE	Clinic
878	GYNECOLOGIC PREVENTIVE MEDICINE	Clinic
879	PREVENTIVE OR SCREENING ENCOUNTER	Clinic
880	HIV INFECTION	Other
881	AIDS	Other
993	INPATIENT ONLY PROCEDURES	Major Surgery
994	USER CUSTOMIZABLE INPATIENT PROCEDURES	Other
999	UNASSIGNED	Unassigned
1001	DURABLE MEDICAL EQUIPMENT - LEVEL 1	Other
1002	DURABLE MEDICAL EQUIPMENT - LEVEL 2	Other
1003	DURABLE MEDICAL EQUIPMENT - LEVEL 3	Other
1004	DURABLE MEDICAL EQUIPMENT - LEVEL 4	Other
1005	DURABLE MEDICAL EQUIPMENT - LEVEL 5	Other
1006	DURABLE MEDICAL EQUIPMENT - LEVEL 6	Other
1007	DURABLE MEDICAL EQUIPMENT - LEVEL 7	Other
1008	DURABLE MEDICAL EQUIPMENT - LEVEL 8	Other
1009	DURABLE MEDICAL EQUIPMENT - LEVEL 9	Other
1010	DURABLE MEDICAL EQUIPMENT - LEVEL 10	Other
1011	DURABLE MEDICAL EQUIPMENT - LEVEL 11	Other
1012	DURABLE MEDICAL EQUIPMENT - LEVEL 12	Other
1013	DURABLE MEDICAL EQUIPMENT - LEVEL 13	Other
1014	DURABLE MEDICAL EQUIPMENT - LEVEL 14	Other
1015	DURABLE MEDICAL EQUIPMENT - LEVEL 15	Other
1016	DURABLE MEDICAL EQUIPMENT - LEVEL 16	Other
1017	DURABLE MEDICAL EQUIPMENT - LEVEL 17	Other
1018	DURABLE MEDICAL EQUIPMENT - LEVEL 18	Other
1019	DURABLE MEDICAL EQUIPMENT - LEVEL 19	Other
1020	DURABLE MEDICAL EQUIPMENT - LEVEL 20	Other
1090	USER DEFINED 340B DRUGS	Drugs

## Appendix VIII: Steps in Calculating Outpatient Weights

### OVERVIEW

HSCRC uses ECMADs as a method for quantifying inpatient and outpatient hospital volume into a single measure. This appendix outlines the methodology for (1) calculating the weight of an outpatient visit within the context of a hospital's ECMAD count, and (2) assigning outpatient service lines.

### BACKGROUND

HSCRC uses ECMADs in several calculations, including the reasonableness of charge (ROC) methodology, the global budget demographic adjustment, and MSAs. A hospital's ECMAD count includes case-mix adjusted inpatient discharges, as well as equivalent outpatient case-mix adjusted discharges, which are values imputed from a hospital's outpatient total and unit charges.

Inpatient cases can be attributed to a single diagnosis-related group (DRG), which groups up to 30 diagnosis and procedures codes into a single category. Inpatient weights reflecting relative complexity and resource demands have been used for many years. Creating a similar measure in the outpatient setting, on the other hand, is more complex. A single outpatient visit can contain up to 45 Current Procedural Terminology (CPT) codes, and therefore 45 EAPGs, which require a more complex weighting methodology in the outpatient setting.

### OUTPATIENT ECMAD WEIGHT CALCULATION

Outpatient weights for ECMADs are calculated by first classifying outpatient visit records by principal EAPG Type into groups and then creating weights within those groups based on the normalized distribution of expected charges for each outpatient visit record about the group average. Within certain groups, specific EAPGs are excluded, and trim points<sup>3</sup> are applied to the resulting distributions before creating weights. These details are outlined in greater detail in the section below.

#### A. Group and Assign Outpatient Records a Principal EAPG Type

##### *Step 1: Group Data*

The outpatient data are grouped using the EAPG grouper version 3.8. An EAPG is identified for every CPT code in the record. Each record can contain up to 45 EAPGs.

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<sup>3</sup> A trim point is the value at which a certain percentage of the largest and smallest values around that value for any given variable is removed before calculating the mean of that variable.

**Step 2: Exclude Observation Cases**

If the Observation Rate Center units in any outpatient visit record are greater than 23, the entire record is excluded from the outpatient weight assignment calculation as they are included in the inpatient ECMAD calculations.

**Step 3: Assign Principal Record Type**

A principal EAPG Type is assigned to records that have more than one EAPG. In order to do this, HSCRC applies a hierarchy based on EAPG Type. This is appropriate because each CPT code (up to 45 per record) is linked to an EAPG, and each EAPG is linked to an EAPG Type. The hierarchy for assigning a principal EAPG Type is as follows:

- Type 1: Mental Health/Substance Abuse
- Type 2: Significant Procedures
- Type 3: Medical Visit
- Type 4: Ancillary
- Type 5: Incidental
- Type 6: Drug
- Type 7: Durable Medical Equipment
- Type 8: Unassigned

For example, if a single record contained both an EAPG classified as Type 1 (Mental Health/substance Abuse) and an EAPG classified as Type 4 (Ancillary), then the entire record would be assigned the principal EAPG Type 1 because Type 1 is superior in the hierarchy. Table 1 presents additional examples of how the EAPG Type is assigned.

**Table 1. Assignment of Overall EAPG Type**

	EAPG 1	EAPG 2	EAPG 3	EAPG 4	EAPG TYPE 1	EAPG TYPE 2	EAPG TYPE 3	EAPG TYPE 4	Principal EAPG Type
<b>Record A</b>	6	6	9	390	2	2	2	4	2
<b>Record B</b>	295	408			9	4			4
<b>Record C</b>	491	401	408	628	5	4	4	3	3
<b>Record D</b>	403	403	410	400	4	4	4	4	4

Note: An EAPG Type of '0' is assigned to any record that contains only zeros or blanks.

## **B. Assign Weights to Radiation, Chemotherapy, and Non-Minor Infusion Records**

Steps 4 through 8 only apply to radiation, chemotherapy, and non-minor infusion records (defined below).

### ***Step 4: Select Radiation Therapy, Chemotherapy, and Non-Minor Infusion Records***

The selection of the records for this service line is based on three criteria:

1. Includes at least one EAPG from the list below
2. Related rate center charges are greater than operating room rate center charges
3. There are no charges for Emergency Services, Free Standing Emergency Services, and Trauma Resuscitation

Below is the list of EAPGs and related rate centers used to compare with operating room charges.

- Radiation Therapy EAPGs: 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 476, 477, 478, 482, 483, 484, 802, and radiology (diagnostic and therapeutic) rate centers
- Chemotherapy EAPGs: 1, 431, 432, 433, 434, 441, 443, 460, 461, 462, 463, 464, 465, 803, and drug rate centers
- Infusion EAPGs: 110, 111, and drug rate centers

### ***Step 5: Aggregate all Records and Associated EAPG Charges to a Patient-Level Record by Hospital and CRISP EID or Medical Record Number***

All records with the same CRISP EID and hospital are aggregated into a single record to create a patient-level record for the service line. If the CRISP EID is missing, medical record numbers are used for this aggregation. The earliest “From” date found is kept as the patient’s service start date, and the latest “Thru” date is kept as the service end date. EAPGs are unduplicated, and associated EAPG charges are summarized for each patient record.

### ***Step 6: Identify a High-Weight EAPG within a Bundled Record***

The following hierarchy is used for selecting and classifying patients within the oncology bundle to ensure the unique assignment of relevant EAPGs to the service line, avoid overlap, and ensure that categories are mutual exclusive:

1. First, cases with infusion EAPGs (110 and 111) in any of the 45 or more EAPG fields are selected. If a case has both EAPGs 110 and 111, the case is assigned a “High-Weight EAPG” of 110.

2. Cases with chemotherapy EAPGs (1, 430, 431, 432, 433, 434, 441, 443, 460, 461, 462, 463, 464, 465, 495, and 803) in any of the 45 or more EAPG fields are then selected. The case is then classified to an EAPG that has the highest weight among these listed EAPGs.
3. Finally, cases with radiation therapy EAPGs (340, 341, 342, 343, 344, 345, 346, 347, 348, and 349,476,477,478,482,483,484, and 802) in any of the 45 or more EAPG fields are selected. The case is then classified to an EAPG that has the highest weight among these listed EAPGs.

### **Step 7: Calculate a High-Weight EAPG Per Diem Charge and Per Diem ECMAD**

To adjust for the differences in duration of services, length of stay is calculated using the number of days between the service start date and the service end date (inclusive of the service start date). A per diem charge is calculated for each record as the total charge divided by the length of stay. An average per diem charge based on the per diem charge for each record is then calculated for each High-Weight EAPG. A per diem weight for each High-Weight EAPG is then calculated as the average per diem charge divided by the statewide average charge per outpatient record. A per diem ECMAD is also similarly calculated.

### **Step 8: Apply Weight and ECMAD**

For each radiation, chemotherapy, and non-minor infusion bundled record, a weight is calculated as the per diem weight for the associated High-Weight EAPG multiplied by the length of stay. Similarly, the ECMAD for the record is the per diem ECMAD for the associated High-Weight EAPG multiplied by the length of stay.

## **C. Assign Weights to Records with Principal EAPG Type 2 (Significant Procedure)**

Steps 9 through 11 only apply to outpatient records with a principal EAPG Type of 2 (significant procedures).

### **Step 9: Exclude EAPGs with Consolidation, Packaging, and Termination Indicators**

The 3M EAPG Grouper is applied to the first 45 EAPG fields of each outpatient record with a principal EAPG Type of 2 to identify EAPGs with consolidation, packaging, and termination indicators. If any one of the following four fields is flagged (= "1"), then the corresponding EAPG (not the whole record) is excluded:

- Patient-Terminated Procedure Discount Flag
- Packaging Flag
- Same Significant Procedure Consolidation Flag
- Clinical Significant Procedure Consolidation Flag

### **Step 10: Exclude Some Non-Significant Procedure EAPGs**

Non-significant procedure EAPGs—not whole records—are excluded (EAPGs of 0, 999, and greater than 373).

### **Step 11: Create and Apply Singleton Weights to Remaining Records**

A table of “singleton expected charges” is created from the average charge per EAPG of records containing only one Type 2 EAPG. This table is used to determine the statewide expected charge for each EAPG. These expected charges per EAPG are then used to determine an expected charge per outpatient record. The distribution of expected charge per outpatient record is then pseudo-normalized (three iterations only) about the actual mean statewide charge per outpatient record to yield an adjusted charge per outpatient record.

A charge adjustment factor is then calculated for each hospital. The charge adjustment factor is calculated from each hospital’s ratio of overall mean-adjusted outpatient charges/overall mean-expected outpatient charges. The adjusted charge for each record of a given hospital is divided by this factor, and the distribution of these values are then pseudo-normalized (three iterations only) about the actual mean hospital charge per outpatient record to yield the weight for the outpatient record.

### **D. Assign Weights to Records with a Principal EAPG Type 3 (Medical Visits)**

Step 12 is only applied to outpatient records with a principal EAPG Type of 3 (medical visits).

### **Step 12: Find Medical Visit EAPG sand Calculate Weights**

Records with a principal EAPG Type of 3 only have one medical visit EAPG. Non-medical EAPGs (EAPG = 999 or < 500) are excluded from the record. The remaining EAPG is a medical visit EAPG. Only medical visit EAPGs are used to calculate the expected charge of the outpatient record. The distribution of the expected charge per outpatient record is then pseudo-normalized about the actual mean statewide per outpatient record in order to arrive at the adjusted charge per outpatient record.

A charge adjustment factor is then calculated for each hospital. The charge adjustment factor is calculated from each hospital’s ratio of overall mean-adjusted outpatient charges/overall mean-expected outpatient charges. The adjusted charges are divided by this factor, and the distribution of these values are then pseudo-normalized (three iterations only) about the actual mean hospital charge per outpatient record to yield the weight for the outpatient record. If the total charge for case is greater than the trim point for the medical EAPG, the included charge will be based on the trim point. (Trim point = the greater of: (weight \*2) or (weight + \$10,000)).



## **E. Assign Weights to Records with Other Principal EAPG Types**

### ***Step 13: Find Other Visit EAPGs (Types 0, 1, 4-8) and Calculate Their Relative Weights***

Records with EAPG Types 0, 1, 4, 5, 6, 7, and 8 are treated as if they have only one EAPG in the record (regardless of the number of EAPGs found in the record). The first recorded EAPG is treated as the only EAPG in the record. For visits assigned an EAPG Type of 0, the EAPG for the record is set at 0.

An expected charge is calculated for the identified EAPG in the record. The distribution of expected charge per outpatient record is then pseudo-normalized about the actual mean statewide per outpatient record in order to arrive at the adjusted charge per outpatient record.

A charge adjustment factor is then calculated for each hospital. The charge adjustment factor is calculated from each hospital's ratio of overall mean-adjusted outpatient charges/overall mean-expected outpatient charges. The adjusted charges are divided by this factor, and the distribution of these values are then pseudo-normalized (three iterations only) about the actual mean hospital charge per outpatient record to yield the weight for the outpatient record. If the total charge for the case is greater than the trim point for the EAPG, then the included charge will be based on the trim point. (Trim point = the greater of: (weight \*2) or (weight + \$10,000.))

## **F. Merge the Datasets with Weights and Normalize the Weights to an Overall Statewide Average Weight of 1.00**

### ***Step 14: Calculate the Statewide Normalized Weights for each High-Weight EAPG***

The overall average statewide expected charge for all records is calculated using the entire outpatient record dataset. Each high EAPG weight is calculated as the expected charge divided by the average statewide expected charge. Next, the statewide CMI is calculated for all records. The ratio of 1 to the statewide CMI is calculated as an Adjustment Factor. Each record's high EAPG weight is multiplied by the Adjustment Factor to normalize the statewide CMI to 1.00. The weight is then rounded to the nearest 0.000001.

## **G. Calculate the ECMAD as the High EAPG Weight Multiplied by a Factor (Calculated as the Average Outpatient Charge Divided by the Average Inpatient Charge)**

### ***Step 15: Calculate the Statewide Average Charge per Case from the Included Cases Used to Determine the Inpatient Weights from the Inpatient Dataset***

The statewide average charge per outpatient record is determined from the outpatient dataset in Step F above. The ECMAD Adjustment Factor is then calculated as the statewide average charge per outpatient record divided by the statewide average charge per inpatient case. The ECMAD is defined as the normalized weight from Step 10 multiplied by the ECMAD Adjustment Factor.

## **Appendix IX: Public Comments**

HSCRC provided opportunity for public comment on the MSA approach described in this report and received three sets of comments. The comment letters are included as an attachment to this report.

**1. Johns Hopkins Health System and University of Maryland Medical System**

**2. Lifebridge Health**

**3. TPR Hospital Collaborative**