

Overview of the Demographic Adjustment under Global Revenue Models

Introduction

Under the new All-Payer Model in Maryland, hospitals have chosen to have their revenues regulated under global models in a system that focuses on meeting the three part aim of promoting better care, better health, and lower cost. In contrast to the previous Medicare waiver that focused on controlling increases in Medicare inpatient payments per case, the new All-Payer Model seeks to control increases in total hospital revenue per capita.

Central to the All-Payer Model are global revenue models that encourage hospitals to focus on population health and care improvement by prospectively establishing an annual revenue budget for each hospital. There are currently two global models being used: The Total Patient Revenue (TPR) model was expanded in 2008 and now includes 10 hospitals in more rural areas of the State. In 2013, the Global Budget Revenue (GBR) model, which was based on the TPR methodology, was introduced to all other hospitals in the State, including those in urban and suburban areas.

Under GBR and TPR, each hospital's total annual revenue is known at the beginning of the fiscal year. Total annual revenue is determined from a historical base period that is adjusted to account for several factors. In order to tie the global models to population and patient centered metrics and to provide for other changes required to the revenue budgets, the HSCRC makes a number of annual adjustments to the hospitals' global revenue budgets. The HSCRC has developed a demographic adjustment to recognize expected changes in hospital service volume due to population change as well as population aging, without allowing for increases in hospital service volume due to potentially avoidable utilization (PAU). The approach also provides for marginal cost allowances that are lower than average cost to provide for expected per capita efficiencies under the new Model through application of an additional reduction to the demographic adjustment.

This report outlines the demographic adjustment methodology that the HSCRC will implement for the update of global budgets of GBR hospitals in Maryland fiscal year 2015, which is similar to the approach used in establishing the fiscal year 2014 approved budgets. The TPR hospitals are operating under a demographic adjustment that is calculated in a similar manner as the GBR method, using county level as opposed to zip code level estimates of population changes and aging along with adjustments reflecting expected efficiencies for reductions in avoidable utilization.

Overview of Demographic Adjustment Calculation

The GBR demographic adjustment calculation begins by determining a hospital's virtual patient service area (VPSA). A VPSA is determined by aggregating the hospital's service volume in each zip code for eight age groups in the state. The HSCRC uses this service area distribution to attribute population to each hospital based on the proportional amount of services it provides to patients in each zip code relative to services provided by all hospitals. The eight age cohorts within each zip code provide more specific cost trends than would otherwise result from an overall distribution since population growth trends are and health care use within these cohorts differ significantly. In contrast to GBR hospitals, the TPR hospitals have more defined service areas, which allow the HSCRC to use counties as a service area to calculate population growth for TPR hospitals.

The HSCRC then calculates the estimated population change for the attributed population using population projections (see data sources below). It also applies an age weight to each age/zip code cohort of the hospital's VPSA to adjust for the differences in cost per capita of each age cohort and to allow for changes resulting from aging of the population. However, a portion of the existing service volume is a result of potentially avoidable utilization (PAU). The HSCRC removes this portion of the base volume when projecting each hospital's expected volume growth by reducing the age-adjusted growth percentage by that hospital's specific proportion of revenue that is associated with PAU. After removing PAU from the each hospital's demographic adjustment, the result is multiplied by a pro-rata factor that accounts for the expected per capita efficiencies to accomplish the overall savings target in the per capita growth rate to be applied. The result is the population driven volume growth that will be recognized in each hospital's global budget for the upcoming fiscal year.

Summary:

1. Calculate base population estimates for each hospital based on its share of volume, as measured by equivalent case-mix adjusted discharges, in a given zip code age cohort
2. Calculate age adjusted population growth rates by multiplying statewide age cost weights with zip/age population growth rates.
3. Calculate hospital specific age adjusted population growth by multiplying hospital specific base population by age adjusted population growth rates for each zip/age cohort and calculating total projected age adjusted population growth
4. Calculate final demographic adjustment by applying efficiency adjustments
 - a. Reduce age adjusted population growth by hospital specific PAUs as a percent of total all-payer revenue
 - b. Reduce PAU/age adjusted population growth by pro-rata per capita efficiency adjustment reduction

Demographic Adjustment Calculation Steps

This section provides the data sources used and a more detailed explanation of each step of the calculation.

Data Sources:

Volume estimates and total charges by age cohorts are calculated using HSCRC patient level inpatient and outpatient abstract data submitted on a monthly basis. All calculations involving volume and charges include only Maryland residents, determined by the reported billing zip code of the patient.

Zip code and age specific population estimates and projections were provided by Claritas for current year and 5-year population projections , since zip code level data are not available from the Department of State Planning.

Below are the detailed calculation steps:

STEP 1. Calculate base population estimates for each hospital based on its share of volume, as measured by equivalent case-mix adjusted discharges, in a given zip code/age cohort.

Step 1a: Calculate the base year total service volume of the hospital (inpatient and outpatient) for each zip code by each of the eight age cohorts based on Equivalent Case Mix Adjusted Discharges.

- i. Measure the volume of inpatient services as total inpatient case mix adjusted discharges (CMADs) that occurred in the specified fiscal year.
- ii. Measure the volume of outpatient services as follows:
 - a. Calculate the Hospital Unit Charge as the average charge per CMAD for all of the hospital's inpatients that occurred in the specified fiscal year.
 - b. Calculate the outpatient equivalent case mix adjusted discharges (ECMADs) as:

$$\text{Outpatient ECMAD} = \frac{\text{Total Charges} - \text{Inpatient Charges}}{\text{Hospital Unit Charge}}$$

- iii. Sum inpatient CMADs and Outpatient ECMADs to determine total service volume of the hospital ECMADs for each zip code and age cohort.

Step 1b: Allocate the base population for each zip/age cohort.

Use the proportion of each hospitals ECMAD volumes in each zip/age cohort divided by the total ECMADs for all hospitals in that zip/age cohort to allocate a proportion of the population in each zip code to each hospital.

Example:

For Hospital A and Zip/Age Cohort J the base population would be calculated as:

$$\text{Base Population}_{AJ} = \text{Population}_J * (\text{ECMAD}_{AJ} / \text{ECMAD}_J)$$

STEP 2: Calculate age adjusted population growth rates.

Step 2a: Calculate the statewide age cost weight for each age cohort.

Relative age cost weights are applied to a hospital's allocated population and population estimates to arrive at cost weighted populations for the base year and the projection year to account for the age-weighted growth in the population. Age specific hospital cost weights are calculated at the state level as the ratio of average total hospital charges per capita for each statewide age cohort to the statewide average hospital charge per capita in the base year. The total hospital charges include charges for Maryland residents only. This calculation is illustrated below for the statewide [5-14] age cohort.

$$\begin{aligned} & \text{Age Cost Weight for [5 to 14] Age Cohort} \\ &= \frac{\text{Total [5 to 14] Hospitals' Charges/Population in Base Year}}{\text{Total [All cohorts] Hospitals' Charges /Population in Base Year}} \end{aligned}$$

Step 2b: Calculate age adjusted growth rates.

For each zip/age cohort, the estimated population growth rates are multiplied by the age cost weights to determine the cost weighted population growth rates.

For a Zip/Age Cohort J and Age Weight [5 to 14];

$$\text{Age Adjusted Population Growth Rate} = \text{Population Growth Rate}_J * \text{Age-Weight [5 to 14]}$$

STEP 3: Calculate hospital overall age adjusted growth.

The age adjusted projected population related volume growth is calculated by multiplying base population numbers by age adjusted growth rates from Step 2 for each zip/age cohort. The overall hospital specific age adjusted growth rate is the sum of the allocated age adjusted population for the projection period divided by the age adjusted allocated population for the base period. This is converted to a percentage after subtracting 1.

For Hospital A and Zip/Age Cohort J and Age-Weight [5 to 14];

$$\text{Projected Population Growth} = \text{Base Population}_{AJ} * \text{Population Growth Rate}_J * \text{Age-Weight [5 to 14]}$$

Then overall Projected Population for Hospital A for all Zip/Age Cohorts = i...z:

$$\text{Overall Projected Population Growth Rate} = \frac{\text{Sum of (Projected Population Growth } i \dots z)}{\text{Sum of (Base Population } i \dots z)}$$

STEP 4: Calculate the appropriate volume growth by applying efficiency adjustments.

Step 4a: Reduce age adjusted overall projected growth by hospital specific overall PAU percentage of revenue.

The overall growth rate calculated in Step 3 is reduced by the PAU percentage of revenue that is calculated on a hospital specific basis by multiplying the growth rate by the PAU percentage of revenue. The policy result is that the hospital will not receive a demographic adjustment on any of its PAU revenues, which includes revenue from avoidable admissions, 30-day readmissions, observation or emergency department visits, as well as revenue from complications (see below for additional information). PAU percentages of revenue are calculated at the hospital specific level by calculating the ratio of PAU revenue divided by total hospital revenue.

Step 4b: Reduce the PAU adjusted growth percentage for each hospital to achieve an allowance for demographic growth statewide that is lower than the overall growth allowed by the All-Payer Model.

The All-Payer Model provides for per capita growth, without any explicit adjustment for aging of the population. The preliminary result of Step 4a provides a demographic factor for each hospital that includes an age adjustment and that has been reduced by a measure of potentially avoidable utilization. Without further adjustment, the age and PAU adjusted demographic factor statewide would produce an allowance for growth that is above the statewide allowance for growth in population. Therefore, an additional efficiency adjustment reduction percentage is applied to each hospital's age and PAU adjusted growth percentage to bring the allowance statewide to a level within the overall population increase percentage provided by the Model. For example, if the age and PAU adjusted allowance were 1.2% but the target population allowance was .6%, then all hospitals would receive an additional efficiency adjustment of 50%. This adjustment recognizes the ability to provide incremental volumes at a lower marginal cost or to further reduce avoidable volume to achieve the needed efficiency level of the per capita model.

Final Demographic Percentage: At the conclusion of Step 4b, the final demographic adjustment percentage has been calculated for each hospital in the State. After adding 1 to the percentage, this demographic growth rate is multiplied by each hospital's approved revenue from the base year to arrive at the population adjusted revenue for the target year.

Example Calculation:

Below is an example calculation with just one zip code for a GBR hospital to arrive at the statewide per capita efficiency adjustment.

Zip Code	Age Cohort	Base Year ECMADs for Hospital	Total ECMADs for All Hospitals	Share of ECMADs	Base Population	Allocated Base Population	State Total Hospital Revenue per Capita	Age Cost Weights	Projected Population Growth Rate of Cohort	Age Adjusted Population Growth Rates	Hospital Age Adjusted Population Growth	Hospital Overall Age Adjusted Population Growth	Hospital PAU %	Hospital Specific PAU Adjusted Growth Rate	Statewide Per capita Efficiency Adjustment
STEP 1a				Step1b		Step2a		Step2b		Step 3		Step 4			
A	B	C	D	E = C/D	F	G=F * E	H	I=H/H(total)	J	K=J*I	L=G*K	M=sum(L)/sum(G)	N	O=M*(1-N)	P=O*50%
00000	0-4	30	60	50%	3,713	1,857	\$1,577	0.68	0.77%	0.52%	10				
00000	05-14	45	100	45%	23,471	10,562	\$119	0.05	-0.07%	0.00%	(0)				
00000	15-44	100	210	48%	8,902	4,239	\$3,798	1.63	-1.16%	-1.89%	(80)				
00000	45-55	20	35	57%	7,533	4,305	\$2,822	1.21	1.18%	1.43%	61				
00000	55-64	25	40	63%	7,450	4,657	\$3,413	1.46	0.16%	0.23%	11				
00000	65-74	25	30	83%	4,517	3,764	\$5,162	2.21	2.73%	6.04%	227				
00000	75-84	55	70	79%	2,282	1,793	\$7,337	3.14	2.42%	7.60%	136				
00000	85+	60	80	75%	1,044	783	\$8,009	3.43	1.32%	4.53%	35				
Total	Total	360	625	58%	58,913	31,959	\$2,335				401	1.3%	14%	1.08%	0.54%

Demographic Adjustment Considerations

The approach described above was arrived at after the HSCRC staff conducted additional analysis and received stakeholder input on various demographic variables. The stakeholder workgroup recommended an expanded number of age cohorts, which HSCRC staff has accepted and applied in the updated calculations. The eight age cohorts being used are: 0-4, 5-14, 15-44, 44-55, 55-64, 65-74, 75-84, 85+. The workgroup was also concerned about the initial calculation that used statewide PAU percentages in reducing age-adjusted weights. Staff responded by removing the PAU percentages from the weights and applying the overall PAU adjustment on a hospital specific basis. In the event that the demographic adjustment is not greater than 0%, the demographic adjustment is held at 0%, thereby providing no increase or decrease for the affected hospital. This policy result may be adjusted in the future.

Other policy concerns include the application of an adjustment that increases revenues in areas of the State or in hospitals with excess capacity where volumes are declining. This topic requires further consideration during the upcoming year.

Calculation of the PAU Percentage for Each Hospital

PAU is defined as hospital care that is unplanned and can be prevented through improved care, care coordination, or effective community based care. Also, it can reflect cost increases that resulted from a potentially preventable complication occurring in a hospital. The HSCRC intends to continue to create new tools to refine the measurement of PAU.

For the purposes of FY 2014 and 2015, PAU was measured through three inpatient measures and one outpatient measure: 30 day all cause any hospital inpatient readmissions, inpatient prevention quality indicators (PQIs) as defined by the Agency for Healthcare Research and Quality (AHRQ), and inpatient potentially preventable conditions (PPCs) calculated under the

Maryland Hospital Acquired Conditions policy. The measure also includes outpatient rehospitalizations in the emergency room and observation occurring within 30 days of an inpatient admission.

The total cost of PAU was calculated for each hospital by summing the total cost associated with the discharges and visits indicated above. The PAU percentage was then calculated as the ratio of total PAU charges to the total charges for each hospital in the fiscal year base period. As described above, this PAU percentage was utilized to remove growth in the expected changes in hospital service volume due to population change as well as population aging, by not providing for increases in hospital service volume for growth in PAU.