Target Price Specifications
Model Year 7

Centers for Medicare & Medicaid Services (CMS)
Center for Medicare & Medicaid Innovation
(Innovation Center)

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1 INPUTS

Table 1: Target Price and Setting-Specific Update Factor Datasets

#	Name	Source	Description
Target Price Datasets			
1	BPCI Advanced National Clinical Episodes	BPCI Advanced Clinical Episode Specifications Document	The national set of Clinical Episodes, constructed using the methodology described in the specifications document. Additional inputs to this file include: Common Working File (CWF), Medicare Enrollment Database (EDB), and Official CMS Standardized Allowed Amounts.
2	BPCI Advanced Participant Profile	CMS	The Participant Profile identifies the Convener and Non-Convener Participants, the Clinical Episode Service Line Groups, and the Quality Measures Set they have selected to participate in for the BPCI Advanced model.
3	Provider of Service (POS) Files	https://data.cms.gov/provider-characteristics/hospitals-and-other-facilities/provider-of-services-file-hospital-non-hospital-facilities	The Provider of Services (POS) Extract is created from the QIES (Quality Improvement Evaluation System) database as of second quarter 2011 and all future POS files. The file contains an individual record for each Medicare-approved provider and is updated quarterly. The file includes information for all institutional providers, Ambulatory Surgical Centers (ASCs), and Clinical Laboratories.
4	Provider Specific Files (PSF)	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ProspMedicareFeeSvcPmtGen/psf_SAS	The file contains information about the facts specific to the provider that affect computations for Prospective Payment Systems.
5	Major Teaching Hospital (MTH)	CMS	Major teaching hospitals are identified by restricting the hospitals in the PSF to those with an intern to bed ratio of greater than or equal to 0.25.
6	Common Medicare Environment (CME)	CMS	The CME contains comprehensive data on individuals in the Medicare program. It provides information on insurance coverage and Medicare health plan and demonstration programs in addition to information about Medicare Parts A, B, C and non-subsidy Part D beneficiaries.
7	Long Term Minimum Dataset (MDS)	CMS	This file includes information on beneficiaries that are institutionalized long term.

#	Name	Source	Description
Setting-Specific Price Update Datasets			
8	Inpatient Prospective Payment System (IPPS) Base Rates and MS-DRG Weights	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/IPPS-Regulations-and-Notices.html	These inputs are used to update historical prices for the IPPS setting. Updated base rates and MS-DRG weights are used as per the most recent IPPS Final Rule and Correction Notice available on this page.
9	Geographic Practice Cost Index (GPCI), Relative Value Units (RVU), County/Locality Crosswalk, and Physician and Anesthesia Conversion Factors (CF)	GPCI: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeeSched/PFS-Federal-Regulation-Notices.html See Final Rule Addenda RVU/Physician CF: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeeSched/PFS-Relative-Value-Files.html Anesthesia CF: https://www.cms.gov/Center/Provider-Type/Anesthesiologists-Center.html	These inputs are used to update historical prices for the Physician Fee Schedule (PFS) setting. See most recent Final Rule/Relative Value File available on these pages.
10	Inpatient Rehabilitation Facility (IRF) Conversion Factor (most recent only)	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/InpatientRehabFacPPS/IRF-Rules-and-Related-Files.html	These inputs are used to update historical prices for the IRF setting as per the most recent IRF Final Rule available on this page.
11	Medicare Economic Index (MEI) (most recent only)	https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareProgramRatesStats/MarketBasketData.html	Used to update historical prices for the "Other" setting, which includes non-initiating OPPS claims.
12	Skilled Nursing Facility (SNF) Resource Utilization Groups (RUG) and Patient-Driven Payment Model (PDPM) weights and rates	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/SNFPPS/List-of-SNF-Federal-Regulations.html	These inputs are used to update historical prices for the SNF setting from the previously used RUG-IV payment model to the new PDPM model as per the most recent SNF Final Rule available on this page.
13	Home Health Resource Group (HHRG) and Patient-Driven Groupings Model (PDGM) base rates and weights	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HomeHealthPPS/Home-Health-Prospective-Payment-System-Regulations-and-Notices.html HH PPS base rates: https://www.cms.gov/HH-WebPricer HHRG weights: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HomeHealthPPS/coding_billing	These inputs are used to update historical prices for the HHA setting from the previously used HHRG payment model to the new PDGM model as per the most recent HH Final Rule available on this page.
14	Addendum B and J from the Outpatient Prospective Payment System (OPPS) Final Rule	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalOutpatientPPS/Hospital-Outpatient-Regulations-and-Notices.html	These inputs are used to update historical trigger prices in the OPPS setting.

2 TARGET PRICE OVERVIEW

The following document describes the methodology used to calculate Target Prices for the BPCI Advanced model. The BPCI Advanced Target Prices are constructed to satisfy the following essential features:

- Encourage both high and low cost providers to participate;
- Reward Participants' improvement over time;
- Adjust for patient case mix that is not under the control of providers;
- Allow for levels of Clinical Episode spending that are distinct according to providers' regions and other relevant provider characteristics
- Allow for trends in Clinical Episode spending that are distinct according to providers' regions and other relevant provider characteristics; and
- Induce Medicare savings while maintaining high quality care.

To satisfy these essential features, spending is risk-adjusted for patient characteristics; providers are benchmarked against providers with similar hospital-level characteristics, henceforth referred to as *peer groups*;[1] and individual historical patterns of risk adjusted spending relative to the provider's peer group are taken into account. This methodology provides both those Participants who have been historically low-cost providers and those who have been historically high-cost providers with an incentive to lower costs over time and to benefit from the financial incentives of the BPCI Advanced model.[2] Additionally, in Model Year 7 (MY7), the methodology will adjust the final Target Price in the Performance Period to account for realized peer group trends during the Performance Period that are driven by unanticipated, systematic factors such as payment system reforms.

The methodology produces Benchmark Prices, represented in official CMS standardized allowed amounts, for participating acute care hospitals (ACHs) and for participating physician group practices (PGPs). Since PGPs may initiate Clinical Episodes at multiple ACHs, PGPs may receive multiple Benchmark Prices, each built upon an ACH Benchmark Price from a different ACH.

The Hospital Benchmark Price (henceforth, HBP) is comprised of the following components, each of which is described in detail later in this document:

[1] Peer groups are defined by the list of peer group characteristics within the regression models, as opposed to distinct groups delineated by a single characteristic. See **Section 4.1.2** for more information.
[2] Step 8 of **Section 4.3.1** refers to historically low-cost providers as those who have lower Clinical Episode spending, relative to other Episode Initiators, for Clinical Episodes with the same patient and peer group characteristics.

- *Standardized Baseline Spending (SBS)*: This component accounts for the historical spending adjustment of ACHs in the baseline period by calculating risk- and peer-standardized Clinical Episode spending in the baseline period.
- *Patient Case Mix Adjustment (PCMA)*: This component adjusts for varying levels of severity in ACHs' patient case mix that are outside the control of ACHs. This value is only representative of the spending conditional on an ACH's patient case mix.
- *Peer Group Historical Adjustment (PGHA) Factor*: This component adjusts for persistent differences in patient case mix adjusted spending across peer groups over the entire baseline period.
- *Peer Group Trend (PGT) Factor:* This component projects the average value of patient case mix adjusted spending from the baseline period to the middle of MY7 for each peer group. The PGT is the "prospective trend" in peer group spending, projected through the use of baseline period data.
- *Peer Group Trend (PGT) Factor Adjustment:*[3] This component, also referred to as the "retrospective adjustment," adjusts for realized peer group trends that are driven by unanticipated, systematic factors by re-centering the Benchmark Price around realized Performance Period Clinical Episode spending within each peer group nationally.

Similarly, each PGP-ACH Benchmark Price is comprised of the following components:

- *HBP:* This component, as described above, provides the basic dollar value of the PGP-ACH Benchmark Price which is adjusted to account for: (i) the ACH historical spending adjustment of the ACHs at which the PGP initiates Clinical Episodes, (ii) case mix of that ACH, (iii) peer group average case mix adjusted Clinical Episode spending, and (iv) peer group trends prospectively (during the baseline period) and realized (during the Performance Period) in case mix adjusted Clinical Episode spending at the ACHs at which the PGP initiates Clinical Episodes.
- *Relative Case Mix:* The relative case mix accounts for whether the case mix of a PGP's Clinical Episodes at an ACH is expected to be more or less costly than the overall case mix of Clinical Episodes at that ACH.

The result of this methodology is a set of Target Prices that blends Participants' historical performance with trends and levels in each Clinical Episode Category's spending for each peer group. The Target Prices reflect each Participant's level of Clinical Episode spending relative to expected Clinical Episode spending for Episode Initiators with similar patient case mix and similar peer group characteristics.

[3] This component is only applied to the final Target Price calculation during the Performance Period.

The following discussion describes the step-by-step implementation of the methodology used to construct a Target Price for a given BPCI Advanced Clinical Episode Category and Episode Initiator.

3 CLINICAL EPISODE CONSTRUCTION BACKGROUND

While the purpose of this document is to describe how BPCI Advanced Target Prices are calculated, this section provides some initial background on the preceding process of constructing Clinical Episodes. The Clinical Episode Construction Specifications describe how to construct Clinical Episode level spending, apply service-level exclusions, convert Clinical Episode level spending to Model Year dollars by applying setting-specific update factors, and cap outlier Clinical Episodes at the 1st and 99th percentiles within each MS-DRG or APC pooled for each fiscal year.

The twenty-nine inpatient, three outpatient, and two multi-setting BPCI Advanced Clinical Episode Categories are "triggered" by an admission to the inpatient setting with specific MS-DRGs or a procedure performed in an outpatient setting with specific HCPCS.[4] Clinical Episodes are constructed to include all services that overlap the Clinical Episode window, with some exceptions for services and supplies provided for certain readmissions, which are defined by MS-DRG, for some Part B drugs, which are defined by HCPCS, and for Cardiac Rehabilitation spending, which is identified by HCPCS and place of service.[5] Clinical Episode level payments are created by summing official CMS standardized payments for all non-excluded services.[6] These standardized payments reflect the cost of services after removing variation in spending arising from geographical adjustment of reimbursement in CMS payment systems (e.g., hospital wage index and GPCI) and from policy-driven adjustments (e.g., indirect medical education (IME) adjustments). This process produces spending for each Clinical Episode in the baseline period, and henceforth all references to spending are assumed to be in standardized dollars unless noted otherwise as *real* dollars.

Prior to estimating the model of Clinical Episode spending on data from the baseline period, standardized payments for each Clinical Episode are updated to Model Year dollars using MS-DRG or APC specific updates for trigger spending, and setting-specific (e.g., IPPS, SNF, IRF, PFS, or HHA) price update factors for non-trigger spending. This allows the model to update the standardized allowed amount that providers would receive based on how inputs have changed in the various Medicare payment systems while holding constant the mix of services in

[4] A complete list of the MS-DRGs and HCPCS that trigger a BPCI Advanced Clinical Episode can be found in the "Clinical Episode List – Model Year 7.xlsx" file on the CMS BPCI Advanced Participant Resources website.
[5] A complete list of Clinical Episode exclusions can be found in the "BPCI Advanced Exclusions List.xlsx" file the CMS BPCI Advanced Participant Resources website.
[6] "CMS Standardization Methodology for Allowed Amount, Version 13." Centers for Medicare & Medicaid Services (CMS), Acumen, LLC, December 2023. Available at the ResDAC CMS Payment Standardization website.

the baseline period. This approach adjusts for inflation and is similar to the method used to update Target Prices in the Comprehensive Care for Joint Replacement (CJR) model.

These inflation-adjusted historical Clinical Episode spending amounts are in the same standardized Model Year dollar terms as standardized Model Year Clinical Episodes and represent the basis for comparing Episode Initiator performance in subsequent sections.[7] Other changes in Clinical Episode spending, due to historical spending adjustment gains, peer group trends – both prospective and realized, or changes in patient case-mix, are discussed in subsequent steps of the model.

[7] The setting-specific prices update factors will be re-calculated to reflect the changes in Medicare payment systems as more recent fee schedules become available during the Model Year.

4 STEPS IN TARGET PRICE CONSTRUCTION

The following section presents the step-by-step methodology used to construct Target Prices for both ACH and PGP Participants. **Section 4.1** describes the risk adjusters used to estimate beneficiary- and peer-adjusted Clinical Episode level spending. **Section 4.2** discusses the risk adjustment model used to estimate Clinical Episode spending. Finally, **Section 4.3** outlines how to use model estimates to obtain HBPs and PGP-ACH Benchmark Prices, which are used to calculate Target Prices. For the Major Joint Replacement of the Lower Extremity (MJRLE) Clinical Episode Category, the risk adjustment will be modified to account for the removal of Total Hip Arthroplasty (THA) from the IP-only list at the beginning of CY2020. For the Major Joint Replacement of the Upper Extremity (MJRUE) Clinical Episode Category, the risk adjustment will be modified to account for the removal of Total Shoulder Arthroplasty (TSA) from the IP-only list at the beginning of CY2021. For more details, please refer to the Appendices.

4.1 Patient and Peer Group Risk Adjusters

For all Clinical Episodes that overlap the BPCI Advanced model time periods, build a relevant set of patient and peer group characteristics to merge into the Clinical Episode level file. Note that in Stage 1 of the risk adjustment model, if a binary covariate is zero for less than 21 Clinical Episodes in the baseline period, or one for less than 21 Clinical Episodes in the baseline period, then it is either removed from the risk adjustment model if there are no related covariates or combined with the binary covariate representing the most similar group if there is a set of related covariates (e.g., bed size). The covariates in Stage 2 of the risk adjustment model capture level differences between peer groups, time trends, and peer group differences in trends. The set of covariates in Stage 2 is modified for low volume peer groups and Clinical Episode Categories.

4.1.1 Patient Case Mix Adjusters

Build the following groups of patient characteristics to merge into the Clinical Episode level file, as shown in Table 2.[8] These characteristics were selected to align closely with the CMS v22 Part C HCC and Relative Resource Use HCC (RRU-HCC) models. Preliminary Target Price summary workbooks contain coefficients for each risk adjuster included in the model.

[8] Table 2 lists general categories for patient case mix characteristics and does not represent the comprehensive set of risk adjusters. CMS may need to add or remove certain elements of the risk adjustment model during construction of Target Prices.

Table 2: Patient Characteristics Categories used to Risk Adjust BPCI Advanced Target Prices

Risk Adjuster Category	Data Source/Input	Specifications
Hierarchical Condition Category (HCC)	Inpatient, Outpatient, and Part B Carrier Claims	HCC flags are constructed using Version 22 of the CMS Medicare Advantage Risk Adjustment software.[9]
HCC Interactions	Inpatient, Outpatient, and Part B Carrier Claims	HCC flags are interacted with each other and other demographic characteristics as used in the PAC-PRD, RRU and Part C Models.
HCC Severity	Inpatient, Outpatient, and Part B Carrier Claims	Count of HCCs for a given beneficiary, categorized into four groups: 0, 1-3, 4-6, 7+
Recent Resource Use	Inpatient, Outpatient, and Part B Carrier Claims	Flags to indicate whether there was an inpatient hospitalization (besides IRF or LTCH) or any Post-Acute Care (IP LTCH, SNF, HH, or IRF stay) in the 180-day period prior to the Clinical Episode.
Demographics	Enrollment Database (EDB) and Common Medicare Environment (CME)	Includes age, disability as the reason for Medicare entitlement, and dual eligibility for Medicare and Medicaid.
Long-Term Institutional	Long-Term Minimum Data Set (MDS)	Indicates whether the beneficiary was institutionalized in a long-term care facility in the 180 days prior to the Clinical Episode start date.
Dementia	Inpatient, Outpatient, and Part B Carrier Claims	Flags to indicate dementia are based on the Diagnosis Codes to Condition Categories (DGN-CC) mappings for CC51 and CC52 from the Version 24 CMS HCC risk adjustment model. The HCC hierarchy will be applied to these two CCs.
MS-DRG/APCs	Inpatient and Outpatient Claims	MS-DRGs are acquired from inpatient claims and mapped from the baseline period to the Model Year to ensure consistency across years. APCs are based on HCPCS and are mapped from the baseline period to the Model Year. [10]

[9] The following link will take you to the CMS website where the software is available.
[10] IPPS and OPPS Final Rules as well as OPPS addenda are used for MS-DRG and APC mapping. The following link will take you to the CMS website where the IPPS Final Rules can be found. OPPS final rules and addenda can be found at the following link on the CMS website.

Risk Adjuster Category	Data Source/Input	Specifications
Clinical Episode Category Specific Adjustments	Inpatient Claims	Clinical Episode Category specific risk adjusters such as indicators of hip arthroplasty and knee arthroplasty in the Major Joint Replacement of the Lower Extremity Clinical Episode, hemorrhagic stroke indicator in the Stroke Clinical Episode, and indicators for fistula and ulcerative colitis in the Inflammatory Bowel Disease Clinical Episode.[11]
COVID-19[12] Infection Rate	Inpatient, Outpatient, SNF and Part B Carrier Claims	The COVID-19 infection rate[13] will be measured for the week of the Clinical Episode start date and based on the hospital's location (i.e., census tract[14]) where the beneficiary initiated an episode. This infection rate will be interacted with five dummy variables which represent the five distinct time periods impacted by the pandemic during the baseline. The first four time periods will include Clinical Episodes with start dates on or between (1) March 1, 2020 to October 31, 2020; (2) November 1, 2020 and February 28, 2021; (3) March 1, 2021 and October 31,2021; (4) November 1, 2021 and February 28, 2022. The final time period will include Clinical Episodes on or after March 1, 2022. In the Performance Period, the PCMA term will be updated using the actual COVID-19 rate in the Performance Period and the coefficient estimate for the final time period impacted by the pandemic during the baseline (Clinical Episodes with start dates on or after March 1, 2022).

[11] As introduced in MY6, include a flag for traumas or fractures that occur for MY7 MJRUE Clinical Episodes. Interact this flag with the two new MJRUE Clinical Episode procedure groups – Total Shoulder and Partial Shoulder.

[12] In MY7, Clinical Episodes where a beneficiary has a COVID-19 diagnosis will be included in both the baseline period as well as the Performance Period.

[13] The COVID-19 infection rate is calculated among beneficiaries who are greater than or equal to 65 years old as the ratio of all COVID-19 positive beneficiaries to the total number of Medicare beneficiaries in the anchor provider's census tract and its neighboring tracts. Beneficiaries are considered COVID-19 positive in the week of, the week before and the week after the following diagnosis codes are found in either their IP, OP, SNF or Carrier Claims: i) B97.29 with either J12.89, J20.8, J22, J40, J80 or J98.8 (prior to April 1, 2020); or ii) U07.1 or B97.29 (on or after April 1, 2020).

[14] Census tracts are small and relatively permanent statistical subdivisions of a county (or the statistical equivalents of a county) that are uniquely numbered. Additional information on the 2020 census tracts can be found on the Census.gov website. The census tracts for eligible anchor providers in the MY7 baseline period were identified using the addresses and zip codes listed in the 2023Q1 POS file and a ZIP+4 database.

4.1.2 Peer Groups

For Stage 1 of the risk adjustment model, construct ACH peer group characteristics using the following methodology, as shown in Table 3. Merge peer group characteristics to the Clinical Episode level files based on the ACH of the Clinical Episode. Also, create a series of quarter-year flags. These are included and fully interacted with the peer group characteristics in Table 3 in Stage 1 of the risk adjustment to improve the precision of the estimated effects of the patient characteristics, except for the bed size categories and the Census Division Other indicator, which are not interacted with the quarter-year counter variables.[15]

Table 3: Peer Group Characteristics used to Construct BPCI Advanced Target Prices

Peer Group Characteristic Category	Data Source/Input	Construction Methodology
Major Teaching Hospital (MTH)	Provider Specific Files	MTHs are identified by restricting the hospitals in the Provider Specific Files to those with an intern to bed ratio (IBR) greater than or equal to 0.25.
Urban/Rural	CBSA Urban-Rural Indicator from the POS Current Files	If the indicator is "U" and hospital is not an MTH, the provider is flagged as an urban non-MTH; if the indicator is not "U" or the POS file does not contain information on a provider, and the hospital is not an MTH, the provider is flagged as a rural non-MTH.

[15] In Stage 1 of the risk adjustment, the bed size categories are not interacted with the quarter-year flags. Additionally, if any peer group characteristic has any quarter-year interaction that occurs in less than 21 Clinical Episodes, then the quarter-year interactions are dropped for all peer group characteristics within that peer group "dimension" and only the variables corresponding to the peer group characteristics are included in the model. For example, if there are only 5 Clinical Episodes at a rural, non-MTH hospital in 2019Q3, then all quarter-year interactions for both MTH and rural-non-MTH will be removed from Stage 1 of the risk-adjustment model, since both these covariates belong to the peer group "dimension" MTH-urban/rural, but MTH and rural-non-MTH will still be included in the model.

Peer Group Characteristic Category	Data Source/Input	Construction Methodology
Safety-Net Hospitals	CME dataset	For each Anchor Stay/Anchor Procedure hospital with anchor discharge dates in a specific fiscal year, first extract all inpatient stays for that anchor provider with a positive standardized allowed amount and discharge dates in the same fiscal year as the Clinical Episode. Calculate the proportion of total inpatient stays for beneficiaries that are identified as either "full" or "partially" dual eligible If this proportion exceeds 60%, flag the hospital as a safety-net hospital for the year selected in the first step.
Census Division	See 2779A1 – CCN for Medicare Providers; US Census Division and PSF	Determine census division based on the state of the hospital using the first two digits of the PROVIDER variable. • Map New England (CT, ME, MA, NH, RI, VT) to census division 1. • Map Mid-Atlantic (NJ, NY, PA) to census division 2. • Map East North Central (IL, IN, MI, OH, WI) to census division 3. • Map West North Central (IA, KS, MN, MO, NE, ND, SD) to census division 4. • Map South Atlantic (DE, FL, GA, MD, NC, SC, VA, DC, WV) to census division 5. • Map East South Central (AL, KY, MS, TN) to census division 6. • Map West South Central (AR, LA, OK, TX) to census division 7. • Map Mountain (AZ, CO, ID, MT, NV, NM, UT, WY) to census division 8 • Map Pacific (AK, CA, HI, OR, WA) to census division 9. • Map American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and US Virgin Islands to census division "Other."

Peer Group Characteristic Category	Data Source/Input	Construction Methodology
Bed Size	Provider Specific Files	Use the bed size to group the hospital into one of the following four categories: • Small: 0-250 beds • Medium: 251-500 beds • Large: 501-850 • Extra-Large: 850 + If the PSF file contains no bed size information for a provider, assign that provider's bed size as missing.

For Stage 2 of the risk adjustment model, construct ACH peer groups using the methodology listed below, sourcing the peer group characteristics as shown in Table 3. The grouping logic used to determine peer groups in Stage 2 is based on overall ACH count and safety net ACH count within each Clinical Episode Category, as shown in Table 4 below. [16]

Table 4: Peer Groups used in Stage 2 of Risk Adjustment

Overall ACH Count	Safety Net ACH Count	Peer Groups
>= 2,000	-	Safety Net; Non Safety Net * MTH; Non Safety Net * Rural Non-MTH; Non Safety Net * Urban Non-MTH * All Census Divisions
>=300 and <2,000	>=10	Safety Net; Non Safety Net * MTH; Non Safety Net * Rural Non-MTH; Non Safety Net * Urban Non-MTH * All Census Divisions
>=300 and <2,000	<10	MTH; Rural Non-MTH; Urban Non-MTH * All Census Divisions
<300	>=10	Safety Net; Non Safety Net * All Census Divisions
<300	<10	All Census Divisions

Also, calculate the natural logarithm of the quarter-year counter (the quarter-year counter takes a value of 1 in the first quarter-year of the baseline period). The time variable will be included along with each of the peer groups specified above as well as seasonal dummies in

[16] Peer groups from Stage 2 are merged with the next closest peer group, based on relevant characteristics, if they occur for less than 21 observations at the ACH-quarter-year level in a Clinical Episode Category.

Stage 2 of the risk adjustment. Additionally, each of the peer groups specified above are fully interacted with the time variable and included in Stage 2. Exceptions are made for low volume peer groups.[17,18]

4.2 Estimate Model of Clinical Episode level Spending

Once the Clinical Episode level files have been constructed and merged with the risk adjusters, estimate a model of Clinical Episode level spending using a two-stage risk adjustment model, as described in the following section. This process is run separately for each of the 34 Clinical Episode Categories. These estimates are used as inputs in the multiplicative terms that are used to construct HBPs and PGP-ACH Benchmark Prices. To illustrate how the risk adjustment model estimates are used to construct these components, the remainder of this document uses fabricated data from a single Clinical Episode Category to walk through each step of the Target Price construction process. The numerical example simplifies the methodology by considering 25 Clinical Episodes from a single Clinical Episode Category, each attributed to one of two ACHs and one of two PGPs.[19,20]

- **Step 1. Limit the population to eligible providers:** Participation in a specific Clinical Episode Category in the BPCI Advanced model is limited to ACHs that initiate at least 41 Clinical Episodes in the baseline period for the same Clinical Episode Category. This restriction reduces the uncertainty of estimating Clinical Episode prices for low-volume ACHs by excluding the lowest-volume providers. There is no such restriction on PGP participation; a PGP can participate in the BPCI Advanced model as long as the TIN was formed before the application due date and is a current Participant. Current PGP Episode Initiators will not be allowed to change their TIN (i.e., participate under a new TIN) and continue participating in MY7. As such, preliminary Target Prices are only built for ACHs with at least 41 Clinical Episodes in a given Clinical Episode Category in the initial baseline period. Because an ACH with 40 or fewer Clinical Episodes in the baseline period does not receive a HBP and PGP Target Prices are built from HBPs, PGP Participants do not receive preliminary Target Prices if they only initiated Clinical Episodes at ineligible ACHs. Table 5 below provides an example to illustrate how Clinical Episode count thresholds are applied to restrict the population to eligible ACHs.

[17] In Stage 2 of the risk adjustment, if any peer group characteristic occurs for less than 21 eligible ACHs (except Census Division Other) at the ACH-year-quarter level, then its interaction with the natural logarithm of the quarter-year counter is removed from the model. For example, if Census Division 1 contains less than 21 eligible ACHs for a Clinical Episode Category, then Census Division 1 will not be interacted with the natural logarithm of the quarter-year counter.
[18] If Census Division Other has an ACH count of less than 10, it will be combined with Census Division 9.
[19] In the baseline period, a Clinical Episode can be attributed to both an ACH and a PGP, since precedence rules are not applied.
[20] Values in the tables are rounded for simplicity. Actual Target Price construction will be exact.

Additionally, it shows whether preliminary Target Prices will be distributed or not for the PGPs depending on the Clinical Episode counts of the ACHs at which they initiate Clinical Episodes. Please note, the list of eligible ACHs for MY7 will be determined during the preliminary Target Price run and remain fixed for subsequent Target Price updates.[21]

Table 5: Clinical Episode Category Level Participant Eligibility Examples

BPID	PGP/ACH	CCN/TIN	ACH CCN Associated with Anchor Claim	Four-Year Baseline Period Clinical Episode Count for One Clinical Episode Category	Eligible for Participation	Preliminary Target Price Calculated
BPID1	ACH	CCN1		39	N	N
BPID2	ACH	CCN2		40	N	N
BPID3	ACH	CCN3		41	Y	Y
BPID4	ACH	CCN4		42	Y	Y
BPID5	PGP	TIN1	CCN1	20	Y	N
BPID5	PGP	TIN1	CCN2	21	Y	N
BPID6	PGP	TIN2	CCN3	20	Y	Y
BPID6	PGP	TIN2	CCN4	21	Y	Y
BPID7	PGP	TIN3	CCN4	20	Y	Y

Note: PGPs that initiate Clinical Episodes at ACHs not eligible for participation due to low volume will not receive preliminary Target Prices. However, these PGPs are still eligible to participate in the model. For example, BPID5 would not receive a preliminary Target Price because it only initiates at ineligible ACHs. However, if BPID5 began initiating at CCN4 while the model was active, BPID5 would receive the ACH price for CCN4 during Reconciliation.

- As shown in Table 5 above, the eligibility criteria for each ACH will depend on having at least 41 Clinical Episodes in the baseline period. BPID1 initiated 39 Clinical Episodes in the baseline period and is ineligible to receive Target Prices for this Clinical Episode Category. Likewise, BPID2 only initiated 40 Clinical Episodes and is also ineligible to receive Target Prices. However, BPID3 and BPID4 initiated 41 and 42 Clinical Episodes, respectively, and will receive Target Prices. Note that eligibility is determined independently for each Clinical Episode Category. An Episode Initiator can be eligible for some Clinical Episode Categories, yet ineligible for others.
- As indicated in Table 5, all PGP Participants are eligible to participate but they will only receive preliminary Target Prices for the ACHs at which they initiated Clinical Episodes that meet the Clinical Episode minimum, which includes every Clinical Episode during the baseline period regardless of PGP. The PGP, BPID5, initiated 41 Clinical Episodes in the baseline period, but these Clinical Episodes were initiated at two different ACHs, BPID1 and BPID2, neither of which

[21] The volume of episodes for ACHs may shift during Target Price updates due to changes to the composition of MS-DRGs or APCs in the annual IPPS or OPPS updates. Since participation decision is made based on the preliminary Target Price data, the list of eligible ACHs will not change after the preliminary Target Price run.

initiated sufficient Clinical Episodes in the baseline period. As a result, although BPID5 is eligible to participate in the model, it will not receive any preliminary Target Prices. In the Model Year, if this Participant initiates Clinical Episodes at an ACH that meets the Clinical Episode minimum, it will receive final Target Prices based upon that ACH's HBP. In addition, no Episode Initiator, including BPID5, will be attributed Model Year Clinical Episodes initiated at ineligible ACHs such as CCN1 and CCN2. Conversely, BPID6 initiated 41 Clinical Episodes and BPID7 initiated 20 Clinical Episodes at ACHs that meet the minimum Clinical Episode Count allowing them to receive preliminary Target Prices.

- **Step 2. Estimate a Clinical Episode level risk adjustment model:** Using the set of final Clinical Episodes at eligible ACHs, estimate a compound lognormal risk adjustment model for Clinical Episode spending conditional on patient characteristics, peer group characteristics, and quarter year dummies.[22]
- **Step 3. Calculate the Clinical Episode level patient case mix adjustment amount:** Calculate the Clinical Episode level patient case mix adjustment amount as the predicted Clinical Episode spending from the compound lognormal model conditional on the patient characteristics only.[23] Combined with **Step 7**, these will be the inputs to the ACH's preliminary PCMA component and the PGP's preliminary Relative Case Mix component. This step is demonstrated in the right column of Table 6 below.

[22] In the compound log-normal model, the predicted standardized allowed amount Y for Clinical Episode *i* initiated at ACH *h* during time period *t* is denoted by

$$Y_{i,h,t} = \exp(Z_{h,t}\,\gamma) * [P_1 * \exp(X_{i,t}\beta_1 + \sigma_1^2/2) + P_2 * \exp(x_{i,t}\,\beta_2 + \sigma_2^2/2)]$$

where Z is a vector of peer group characteristics, quarter-year dummies, and their interactions; X is a vector of patient characteristics; β_1 is the coefficient on patient characteristics in node 1; P_1 is the probability of the patient being in node 1; and σ_1 is the variation in node 1 that isn't explained by patient characteristics; and similarly for node 2.

[23] The peer group characteristics and time variables are omitted from this calculation and are reintroduced in the second stage, so the Clinical Episode level patient case mix adjustment amount formula is

$$P_1 * \exp\left(X_{i,t}B_1 + \frac{\sigma_1^2}{2}\right) + P_2 * exp\left(X_{i,t}B_2 + \frac{\sigma_2^2}{2}\right)$$

Table 6: Model Estimation - PCMA Input Calculation

Sample Data for a Single Clinical Episode Category					Model Estimation Steps
					Step 3
Clinical Episode ID	Quarter	ACH	PGP ID	Clinical Episode Spending (Observed Spending)	Clinical Episode Level Patient Case Mix Adjustment Amount
1	2019Q1	H1001	P001	$10,000	$4,000
2	2019Q1	H1001	P001	$12,000	$18,000
3	2019Q1	H1001	P001	$12,500	$8,000
4	2019Q1	H1001	P001	$60,000	$67,800
5	2019Q1	H1001	P001	$45,000	$30,000
6	2019Q1	H1001	P001	$55,000	$45,000
7	2019Q2	H1001	P001	$87,000	$70,000
8	2019Q2	H1001	P002	$70,000	$64,000
9	2019Q1	H1001	P002	$12,500	$8,600
10	2019Q1	H1001	P002	$27,000	$32,000
11	2019Q2	H1001	P002	$32,500	$37,000
12	2019Q2	H1001	P002	$15,000	$9,500
13	2019Q1	H1002	P001	$24,000	$20,000
14	2019Q1	H1002	P001	$25,000	$18,000
15	2019Q1	H1002	P001	$36,000	$35,000
16	2019Q1	H1002	P001	$24,000	$23,000
17	2019Q1	H1002	P001	$68,000	$52,000
18	2019Q2	H1002	P001	$45,000	$26,000
19	2019Q2	H1002	P001	$29,000	$24,000
20	2019Q2	H1002	P002	$63,000	$56,000
21	2019Q2	H1002	P002	$57,000	$34,000
22	2019Q3	H1002	P002	$38,000	$29,000
23	2019Q3	H1002	P002	$54,000	$49,000
24	2019Q1	H1002	P002	$31,000	$37,000
25	2019Q1	H1002	P002	$27,000	$19,000

Note: All spending is expressed in standardized dollars. All dollar values are rounded to the nearest dollar. Ratios are rounded to two decimal places.

- **Step 4. Capture coefficients for ACH peer group characteristics:** In the second stage of the risk adjustment model, obtain estimates for peer groups and peer group trends using an ordinary least squares (OLS) regression at the ACH-quarter level, weighted by the number of Clinical Episodes initiated at the ACH-quarter level, as shown in the two rightmost columns of Table 7 below.
    - **4a.** Calculate the ratio of observed Clinical Episode spending to the Clinical Episode level patient case mix adjustment amount (calculated in **Step 3**). This ratio is the portion of the observed Clinical Episode spending that is not explained by the patient case mix severity, and may be referred to as the Clinical Episode level patient case mix adjusted spending.

- **4b.** At the ACH-quarter level, calculate the average of the ratio of observed Clinical Episode spending to Clinical Episode level patient case mix adjustment amount and regress this average ratio on peer groups; the natural logarithm of the quarter-year counter;[24] the interactions of the time covariate with the peer groups; and seasonal dummies, using an OLS regression. Use this regression to formulate the expected value of the ratio for each ACH-quarter. The coefficients from this regression will also be used to construct the PGHA and PGT in later steps.

Table 7: Model Estimation - PGHA and PGT Input Calculations

Sample Data for a Single Clinical Episode Category					Model Estimation Steps		
					Step 3	Peer Group Characteristics	
						Step 4a	Step 4b
Clinical Episode ID	Quarter	ACH	PGP ID	Clinical Episode Spending (Observed Spending)	Clinical Episode Level Patient Case Mix Adjustment Amount	Observed Spending/ Clinical Episode Level Patient Case Mix Adjustment Amount	Predicted Ratio from Peer Group Factor OLS
1	2019Q1	H1001	P001	$10,000	$4,000	2.50	1.25
2	2019Q1	H1001	P001	$12,000	$18,000	0.67	1.25
3	2019Q1	H1001	P001	$12,500	$8,000	1.56	1.25
4	2019Q1	H1001	P001	$60,000	$67,800	0.88	1.25
5	2019Q1	H1001	P001	$45,000	$30,000	1.50	1.25
6	2019Q1	H1001	P001	$55,000	$45,000	1.22	1.25
7	2019Q2	H1001	P001	$87,000	$70,000	1.24	1.15
8	2019Q2	H1001	P002	$70,000	$64,000	1.09	1.15
9	2019Q1	H1001	P002	$12,500	$8,600	1.45	1.25
10	2019Q1	H1001	P002	$27,000	$32,000	0.84	1.25
11	2019Q2	H1001	P002	$32,500	$37,000	0.88	1.15
12	2019Q2	H1001	P002	$15,000	$9,500	1.58	1.15
13	2019Q1	H1002	P001	$24,000	$20,000	1.20	1.28
14	2019Q1	H1002	P001	$25,000	$18,000	1.39	1.28
15	2019Q1	H1002	P001	$36,000	$35,000	1.03	1.28
16	2019Q1	H1002	P001	$24,000	$23,000	1.04	1.28
17	2019Q1	H1002	P001	$68,000	$52,000	1.31	1.28
18	2019Q2	H1002	P001	$45,000	$26,000	1.73	1.26
19	2019Q2	H1002	P001	$29,000	$24,000	1.21	1.26
20	2019Q2	H1002	P002	$63,000	$56,000	1.13	1.26
21	2019Q2	H1002	P002	$57,000	$34,000	1.68	1.26
22	2019Q3	H1002	P002	$38,000	$29,000	1.31	1.3
23	2019Q3	H1002	P002	$54,000	$49,000	1.10	1.3
24	2019Q1	H1002	P002	$31,000	$37,000	0.84	1.28
25	2019Q1	H1002	P002	$27,000	$19,000	1.42	1.28

[24] The quarter-year counter takes a value of 1 in the first quarter-year of the baseline period.

Note: All spending is expressed in standardized dollars. All dollar values are rounded to the nearest dollar. Ratios are rounded to two decimal places.

- **Step 5. Calculate predicted Clinical Episode spending:** As shown in Table 8, calculate the predicted Clinical Episode spending by multiplying the predicted ratio from **Step 4b** and the Clinical Episode level patient case mix adjustment amount **(Step 3)**.

Table 8: Model Estimation - SBS Input Calculations

Sample Data for a Single Clinical Episode Category					Model Estimation Steps			
					Step 3	Peer Group Characteristics		Step 5
						Step 4a	Step 4b	
Clinical Episode ID	Quarter	ACH	PGP ID	Clinical Episode Spending (Observed Spending)	Clinical Episode Level Patient Case Mix Adjustment Amount	Observed Spending/ Clinical Episode Level Patient Case Mix Adjustment Amount	Predicted Ratio from Peer Group Factor OLS	Predicted Clinical Episode Spending
1	2019Q1	H1001	P001	$10,000	$4,000	2.50	1.25	$5,000
2	2019Q1	H1001	P001	$12,000	$18,000	0.67	1.25	$22,500
3	2019Q1	H1001	P001	$12,500	$8,000	1.56	1.25	$10,000
4	2019Q1	H1001	P001	$60,000	$67,800	0.88	1.25	$84,750
5	2019Q1	H1001	P001	$45,000	$30,000	1.50	1.25	$37,500
6	2019Q1	H1001	P001	$55,000	$45,000	1.22	1.25	$56,250
7	2019Q2	H1001	P001	$87,000	$70,000	1.24	1.15	$80,500
8	2019Q2	H1001	P002	$70,000	$64,000	1.09	1.15	$73,600
9	2019Q1	H1001	P002	$12,500	$8,600	1.45	1.25	$10,750
10	2019Q1	H1001	P002	$27,000	$32,000	0.84	1.25	$40,000
11	2019Q2	H1001	P002	$32,500	$37,000	0.88	1.15	$42,550
12	2019Q2	H1001	P002	$15,000	$9,500	1.58	1.15	$10,925
13	2019Q1	H1002	P001	$24,000	$20,000	1.20	1.28	$25,600
14	2019Q1	H1002	P001	$25,000	$18,000	1.39	1.28	$23,040
15	2019Q1	H1002	P001	$36,000	$35,000	1.03	1.28	$44,800
16	2019Q1	H1002	P001	$24,000	$23,000	1.04	1.28	$29,440
17	2019Q1	H1002	P001	$68,000	$52,000	1.31	1.28	$66,560
18	2019Q2	H1002	P001	$45,000	$26,000	1.73	1.26	$32,760
19	2019Q2	H1002	P001	$29,000	$24,000	1.21	1.26	$30,240
20	2019Q2	H1002	P002	$63,000	$56,000	1.13	1.26	$70,560
21	2019Q2	H1002	P002	$57,000	$34,000	1.68	1.26	$42,840
22	2019Q3	H1002	P002	$38,000	$29,000	1.31	1.3	$37,700
23	2019Q3	H1002	P002	$54,000	$49,000	1.10	1.3	$63,700
24	2019Q1	H1002	P002	$31,000	$37,000	0.84	1.28	$47,360
25	2019Q1	H1002	P002	$27,000	$19,000	1.42	1.28	$24,320

Note: All spending is expressed in standardized dollars. All dollar values are rounded to the nearest dollar. Ratios are rounded to two decimal places.

- **Step 6. Using the episode level file, calculate the average observed and average predicted Clinical Episode spending for each ACH:** As shown in Table 9, calculate the average observed Clinical Episode spending and the average predicted Clinical Episode

spending **(Step 5)** for each ACH. This is an input for the ACH's Historical Adjustment component.

Table 9: ACH Historical Adjustment Calculation

Sample Data for a Single Clinical Episode Category		Model Estimation Steps			
		Step 5	Step 6a	Step 6b	Step 8
ACH	Clinical Episode Spending (Observed Spending)	Predicted Clinical Episode Spending	Average Observed Spending	Average Predicted Spending	ACH Historical Adjustment
H1001	$10,000	$5,000	$36,540	$37,300	0.98
H1001	$12,000	$22,500			
H1001	$12,500	$10,000			
H1001	$60,000	$84,750			
H1001	$45,000	$37,500			
H1001	$55,000	$56,250			
H1001	$87,000	$80,500			
H1001	$70,000	$64,000			
H1001	$12,500	$8,600			
H1001	$27,000	$32,000			
H1001	$32,500	$37,000			
H1001	$15,000	$9,500			
H1002	$24,000	$25,600	$40,100	$35,650	1.12
H1002	$25,000	$23,040			
H1002	$36,000	$44,800			
H1002	$24,000	$29,440			
H1002	$68,000	$66,560			
H1002	$45,000	$26,000			
H1002	$29,000	$24,000			
H1002	$63,000	$56,000			
H1002	$57,000	$34,000			
H1002	$38,000	$29,000			
H1002	$54,000	$49,000			
H1002	$31,000	$37,000			
H1002	$27,000	$19,000			

4.3 Obtain ACH and PGP Target Prices

This section describes the methodology used to construct Target Prices based on the estimates obtained in **Section 4.2**. **Section 4.3.1** discusses the methodology used to construct HBPs. **Section 4.3.2** discusses the methodology used to construct PGP-ACH Benchmark Prices. **Section 4.3.3** discusses the steps used to convert Benchmark Prices to preliminary Target Prices through the application of the CMS Discount Factors and conversion from standardized to real dollars. Finally, **Section 4.3.4** discusses the final steps used to convert preliminary Target Prices to final Target Prices.

4.3.1 Formulation of the Preliminary Hospital Benchmark Price

The preliminary HBP takes the following form:

$$HBP_h^i = SBS_h * PCMA_h^i * PGHA_h * PGT_h$$

where *i* denotes that the item is preliminary. The Benchmark Price for ACH *h* for the Model Year accounts for all Clinical Episodes triggered at ACH *h* and is decomposed into the Standardized Baseline Spending of ACH *h* (SBS_h) which factors in the ACH's historical spending patterns; the expenditure riskiness of the ACH *h's* patients in the baseline period ($PCMA_h^i$) for the preliminary HBP (updated in the Performance Period ($PCMA_h^u$) for the updated HBP); the historical costliness of the peer group's Clinical Episodes, relative to similar Clinical Episodes at other peer groups ($PGHA_h$); and a Peer Group Trend Factor (PGT_h) to account for the fact that the baseline period is composed of multiple years and is prospectively projected forward to the middle of the Model Year.

The remainder of this section describes the steps used to derive each of these four components of the HBP using the risk adjustment model estimates described in **Section 4.2**. These steps are further illustrated in Table 10, using the numerical example from above.

- **Step 7. Calculate the Average Observed Clinical Episode Spending:** Take the average of the observed Clinical Episode spending for the national set of Clinical Episodes in the Clinical Episode Category. Average Observed Clinical Episode Spending is an input to the SBS and is the denominator for the preliminary PCMA.
- **Step 8. Calculate the ACH Historical Adjustment:** Calculate the ACH Historical Adjustment as the ratio of average observed to average predicted Clinical Episode spending **(Step 6)** for each ACH, as shown in Table 9. A value less than one (exceeding one) indicates an ACH's baseline period Clinical Episode spending was lower (higher) than the average ACH, controlling for patient and peer group influences on spending. In other words, ACHs with lower historical adjustment values have historically treated the same Clinical Episode with lower spending than ACHs from the same peer group with higher historical adjustment values. This is an input for the ACH's SBS component.
- **Step 9. Calculate SBS:** For each ACH, calculate SBS by multiplying the Average Observed Clinical Episode Spending **(Step 7)** by the ACH Historical Adjustment **(Step 8)**.
- **Step 10. Calculate Preliminary PCMA:** Calculate the preliminary PCMA by taking the average Clinical Episode level case mix adjustment amount **(Step 3)** for each ACH and dividing by the Average Observed Clinical Episode Spending **(Step 7)**.
    - **Note:** The preliminary PCMA is calculated using all of an Episode Initiator's baseline period Clinical Episodes. The Final PCMA is constructed using realized case mix

from an Episode Initiator's attributed Clinical Episodes in the applicable Performance Period.

- **Step 11. Calculate the PGHA:** To calculate the PGHA, use the coefficients from the regression in Step 4b and the ACH's peer group characteristics, to predict the ACH's patient case mix adjusted spending in each of the 16 quarter-years of the baseline. Then, take the average of these 16 predictions (calculation not shown in table).
- **Step 12. Calculate the PGT:** To calculate the PGT, use the coefficients from the regression in Step 4b and the ACH's peer group characteristics, to predict the ACH's patient case mix adjusted spending in the middle quarter (rounded to the nearest whole quarter) of the Model Year (calculation not shown in table), and divide this by the PGHA.
- **Step 13: Calculate the Preliminary HBP:** Calculate the preliminary HBP by multiplying the SBS **(Step 9)**, the preliminary PCMA **(Step 10)**, the PGHA **(Step 11)**, and the PGT **(Step 12)** for each ACH.

Table 10: Preliminary HBP Calculation

ACH	Step 7	Step 8	HBP Construction Steps				
			Step 9	Step 10	Step 11	Step 12	Step 13
	Average Observed Clinical Episode Spending	Historical Adjustment	Standardized Baseline Spending (SBS)	Preliminary Patient Case Mix Adjustment (PCMA)	Peer Group Historical Adjustment (PGHA)	Peer Group Trend (PGT)	Preliminary HBP
H1001	$40,530	1.06	$42,962	0.81	1.51	0.90	$47,292
H1002	$40,530	0.99	$40,125	0.80	1.21	0.95	$36,899

Note: All spending is expressed in standardized dollars. All dollar values are rounded to the nearest dollar. Ratios are rounded to two decimal places.

The four components that comprise the preliminary HBP are summarized in Table 11.

Table 11: Components of the Preliminary HBP

Component	Standardized Baseline Spending (SBS)	Patient Case Mix Adjustment (PCMA)	Peer Group Historical Adjustment (PGHA)	Peer Group Trend (PGT)
Purpose	Standardizes ACH *h's* spending across the baseline period to account for historical spending.	Adjusts the HBP for the expenditure riskiness of ACH *h's* patients.	Adjusts the HBP for differences in the baseline patient case mix adjusted spending of ACH *h*'s peer group relative to other peer groups *($PGHA_h$)*.	Trends the HBP for ACH *h* forward to the middle of the Model Year.
Derivation	The SBS is constructed by multiplying the Average Observed Clinical Episode Spending for the national set of Clinical Episodes by a historical adjustment measure for ACH *h*. The historical adjustment is ACH *h's* ratio of average observed to average predicted Clinical Episode spending where predicted spending is constructed by multiplying the predicted spending from the compound lognormal model using only the patient case mix parameters and the predicted ratio from the Peer Group Factor regression.	The PCMA numerator is constructed from the predicted spending from the first stage of the risk adjustment model, omitting the peer group and quarter-year dummies. This numerator is divided by the Average Observed Clinical Episode Spending.	The PGHA is constructed by taking the per-ACH-quarter average of the ratio of realized spending to predicted spending omitting the peer group characteristics and quarter-year dummy estimates from the first stage of the risk adjustment model. This ratio is then regressed on peer group characteristics, transformations of a quarter counter, interactions, and seasonal dummies. The predicted ratio from the regression is calculated for each quarter of the baseline period, and then the average of these quarterly predictions is calculated.	The patient case mix adjusted spending is predicted at the middle of the Model Year and divided by the PGHA.

4.3.2 Formulation of the Preliminary PGP-ACH Benchmark Price

The preliminary PGP-ACH Benchmark Price takes the following form:

$$PGP - ACH\ Benchmark\ Price_{p,h}^{i} = HBP_{h}^{i} * Relative\ Case\ Mix_{p,h}^{i}$$

PGPs receive Benchmark Prices for each of the eligible ACHs at which they initiate Clinical Episodes. Each PGP-ACH Benchmark Price accounts for (i) the preliminary HBP of the ACH at which the PGP initiated episodes and (ii) differences in the case mix of the PGP's Clinical Episodes initiated at the ACH relative to the case mix of all Clinical Episodes initiated at the ACH (their Relative Case Mix). The preliminary Relative Case Mix compares the case mix of the baseline Clinical Episodes initiated by the PGP at the ACH, relative to the case mix of all baseline Clinical Episodes initiated at the ACH. The updated Relative Case Mix compares the case mix of the Performance Period Clinical Episodes initiated by the PGP at the ACH, relative to the case mix of all baseline Clinical Episodes initiated at the ACH.

The remainder of this section describes the steps used to derive each component of the PGP-ACH Benchmark Price using the estimated parameters from the risk adjustment model described in **Section 4.2** and the preliminary HBP described in **Section 4.3.1**. These steps are further illustrated in the numerical example shown in Table 12.

- **Step 14: Calculate the Preliminary PGP Relative Case Mix:** Calculate the preliminary PGP Relative Case Mix to determine whether the overall case mix of PGP *p*'s Clinical Episodes at ACH *h* during the baseline period is more or less costly than the overall case mix of all Clinical Episodes initiated at ACH *h* during the baseline period.
    - **Step 14a:** Calculate average preliminary PCMA at the PGP-ACH level by taking the average of the Clinical Episode level patient case mix adjustment amounts over all Clinical Episodes for the PGP-ACH combination, and dividing by the Average Observed Clinical Episode Spending **(Step 7)**.
        - **Note:** Construct the updated PCMA at the PGP-ACH level using realized case mix of Performance Period Clinical Episodes.
    - **Step 14b:** Calculate preliminary Relative Case Mix as the ratio of PGP-ACH preliminary PCMA over the ACH preliminary PCMA **(Step 10)**.
        - **Note:** Construct the updated PGP Relative Case Mix as the ratio of the updated PCMA for the PGP-ACH to the preliminary PCMA for the ACH.
- **Step 15: Calculate Preliminary PGP-ACH Benchmark Price:** Calculate preliminary PGP-ACH Benchmark Price as the product of the preliminary HBP **(Step 13)**, and the preliminary Relative Case Mix **(Step 14)**.

Table 12: Preliminary PGP-ACH Benchmark Price Calculation

PGP ID	ACH	Step 14a	Step 14b	Step 13	Step 15
		PGP-ACH Preliminary PCMA	Preliminary Relative Case Mix	Preliminary HBP	Preliminary PGP-ACH Benchmark Price
P001	H1001	0.86	1.06	$47,327	$50,167
P001	H1002	0.70	0.88	$36,915	$32,485
P002	H1001	0.75	0.93	$47,327	$44,014
P002	H1002	0.92	1.15	$36,915	$42,452

Note: All spending is expressed in standardized dollars. All dollar values are rounded to the nearest dollar. Ratios are rounded to two decimal places.

The two components that comprise the PGP-ACH Benchmark Price are summarized in Table 13.

Table 13: Components of the PGP-ACH Benchmark Price

Component	Preliminary HBP	Relative Case Mix
Purpose	Provides the baseline dollar value of PGP *p*'s Benchmark Price for Clinical Episodes initiated at ACH *h* during the baseline period	Measures whether the overall case mix of PGP *p*'s Clinical Episodes at ACH *h* is more or less costly than the overall case mix of all Clinical Episodes at ACH *h*
Derivation	For a complete description of the construction of the HBP, see Table 11.	The relative case mix is the ratio of PGP *p*'s case mix at ACH *h* ($PCMA_{p,h}$) to the case mix of all Clinical Episodes initiated at ACH *h* ($PCMA_h$).

4.3.3 Create Preliminary Target Prices

The following section describes the steps to convert HBPs and PGP-ACH Benchmark Prices into the preliminary Target Prices that are disseminated to Participants. These steps are further illustrated in Table 14 (for ACH Target Prices) and Table 15 (for PGP-ACH Target Prices).

- **Step 16. Apply CMS Discount Factor:** Apply a 2% discount factor to HBPs and PGP-ACH Benchmark Prices for medical Clinical Episode Categories to calculate the Target Prices for ACHs and PGPs, respectively.[25] Apply a 3% discount factor to HBPs and

[25] The MY7 Clinical Episode List containing the medical and surgical classifications for each Clinical Episode Category can be found on the CMS BPCI Advanced Participant Resources website.

PGP-ACH Benchmark Prices for surgical Clinical Episode Categories to calculate the Target Prices for ACHs and PGPs, respectively.

- **Step 17. Convert Preliminary Target Prices into real dollars**: Because all calculations are conducted using official CMS standardized allowed amounts, convert standardized allowed amounts into real dollars by creating a ratio (from baseline period Clinical Episodes) of the sum of real Clinical Episode spending to standardized allowed amount spending at the Episode Initiator-Clinical Episode Category level. Multiply the Target Price by this ratio.
    - **Note**: The Final Target Prices are constructed from a ratio of real Clinical Episode payments to standardized payments, using realized Performance Period episodes.

Table 14: Preliminary ACH Target Price Calculation

ACH	Step 13	Step 16	Step 17	
	Preliminary HBP	Preliminary ACH Target Price	Preliminary Ratio of Real Dollars to Payment Standardized Dollars	Preliminary Target Price in Real Dollars
H1001	$47,327	$45,907	1.01	$46,366
H1002	$36,915	$35,808	1.01	$36,166

Note: All spending is expressed in standardized dollars. All dollar values are rounded to the nearest dollar. Ratios are rounded to two decimal places.

Table 15: Preliminary PGP-ACH Target Price Calculation

PGP ID	ACH	Step 15	Step 16	Step 17	
		Preliminary PGP-ACH Benchmark Price	Preliminary Target Price	Preliminary Ratio of Real Dollars to Payment Standardized Dollars	Preliminary Target Price in Real Dollars
P001	H1001	$50,167	$48,662	1.02	$49,635
P001	H1002	$32,485	$31,510	1.02	$32,140
P002	H1001	$44,014	$42,694	1.02	$43,548
P002	H1002	$42,452	$41,178	1.02	$42,002

Note: All spending is expressed in standardized dollars. All dollar values are rounded to the nearest dollar. Ratios are rounded to two decimal places.

- **Step 18. Adjust Preliminary Target Price:** During the Model Year, adjust the preliminary Target Prices to account for the most recently available Medicare payment rates released in the Federal Register.[26] This involves redoing the updates for updated

[26] The preliminary Target Prices will be updated twice. The first update in March 2024 will create preliminary Target Prices in CY2024/FY2024 dollars. The second update in December 2024 update will create preliminary Target Prices in CY2024/FY2025 dollars. Timing of Target Price updates are subject to change.

standardized Clinical Episode Spending and rerunning the risk adjustment and the rest of the Target Price construction.

4.3.4 Create Final Target Prices

The updated HBP takes the following form:

$$HBP_h^u = SBS_h * PCMA_h^u * PGHA_h * PGT_h * PGT\_Adj_h$$

where *u* denotes that the item is updated. The Standardized Baseline Spending of ACH *h* (SBS_h) is taken from the baseline; $PCMA_h{}^u$ captures the expenditure riskiness of the ACH *h's* patients in the Performance Period; $PGHA_h$ and PGT_h values at the peer group level are also taken from the baseline period; and the Peer Group Trend Factor Adjustment (PGT_Adj_h) re-centers the Benchmark Price around realized Performance Period Clinical Episode spending within each peer group nationally (including non-Participant BPCI Advanced eligible ACHs).

- **Step 19. Calculate the PGT Factor Adjustment:**

  The preliminary PGT Factor Adjustment is calculated at the Clinical Episode Category, Performance Period and Peer Group level and takes the following form:

$$PGT\_Adj_g^{pp} = \frac{\sum_{h \in g} Obs\_Spending_h^{pp}}{\sum_{h \in g,p} SBS_h^p \times PCMA_h^{pp,p} \times PGHA_h^p \times PGT_h^p \times n_h^{pp,p}}$$

  where,

  - $h \in g$ = All eligible ACHs *h* within a peer group *g*
  - $SBS_h^p, PGT_h^p, PGHA_h^p$ = SBS, PGT, PGHA for a given ACH *h*-Clinical Episode Category from the baseline Target Price run *p*. The baseline Target Price run *p* used in the PGT Factor Adjustment calculation is based on the FY/CY which the Performance Period falls under.[27]
  - $PCMA_h^{pp,p}$ = A modified version of the Updated PCMA that accounts for the patient case mix among all final Performance Period Clinical Episodes initiated at the ACH,[28] rather than among Performance Period Clinical Episodes attributed to the ACH.
  - $n_h^{pp,p}$ = Total Clinical Episode count using the national set of Performance Period episodes initiated at ACH *h*.[29]

[27] For example, when calculating the PGT Factor Adjustment for a Clinical Episode Category in MY7 Performance Period 11, use the SBS, PGT, and PGHA from the FY24/CY24 Target Price update.
[28] Final Performance Period Clinical Episodes initiated at the ACH refers to the Clinical Episodes remaining after all BPCI Advanced specific exclusions are applied (including overlap resolution).
[29] The total Clinical Episode count only includes Clinical Episodes initiated at eligible ACHs after all BPCI Advanced specific exclusions (including overlap resolution) are applied.

- $Obs\_Spending_h^{pp}$ = Total observed spending of all Clinical Episodes initiated at eligible ACH[30] *h* at the Performance Period *pp* level. This value is calculated at the ACH-Performance Period level.

- **Step 19a:** Multiply the modified updated PCMA with the ACH's PGHA, PGT, SBS, and count of Performance Period Clinical Episodes in the national set after overlap resolution, that were initiated at the ACH.[31] Take the sum of this product over all ACHs in the peer group. This will be the denominator. Then, divide the total Performance Period Clinical Episode spending summed across all Clinical Episodes initiated at eligible ACHs[32] within each peer group by the denominator calculated above. This ratio is the *PGT Factor Adjustment*.[33]
- **Step 19b:** Cap the PGT Factor Adjustment at 5% so that the maximum difference between the prospective peer group trend and realized peer group trend is 5%. In other words, the PGT Factor Adjustment can take a minimum value of 0.95 and a maximum value of 1.05. This is the *capped PGT Factor Adjustment*.

- **Step 20. Create Final Target Price:**

Convert preliminary Target Price into Final Target Price by:

- For ACH Target Prices, updating the Clinical Episode level patient case mix adjustment amount to account for realized case mix of Model Year Clinical Episodes at the ACH level and multiplying it with the capped PGT Factor Adjustment.
- For PGP-ACH Target Prices, updating the PGP-ACH level relative case mix so that it compares the Performance Period case mix of the PGP's episodes at the ACH to the baseline period case mix of the ACH's episodes. Note that the HBP in the PGP-ACH Benchmark Price formula is only updated with the capped PGT Factor Adjustment.

[30] All Clinical Episodes initiated at eligible ACHs refers to the Clinical Episodes remaining after all BPCI Advanced specific exclusions (including overlap resolution) are applied.
[31] See Footnote 30
[32] See Footnote 31
[33] In rare circumstances (e.g., when a peer group has very few episodes), CMS will use a modified approach to constructing the PGT Factor Adjustment in order to produce an appropriate retrospective trend (PGT x PGT Factor Adjustment).

APPENDIX A: MJRLE BENCHMARK PRICE CONSTRUCTION

Starting in Model Year 5, the MJRLE Clinical Episode Category includes outpatient Total Hip Arthroplasty (OP-THA) Clinical Episodes, in addition to the inpatient THA (IP-THA), and other inpatient MJRLE Clinical Episodes. THA was removed from the inpatient-only list at the start of CY2020, resulting in a sudden shift in the number of Medicare FFS THA procedures performed in the outpatient setting. To ensure that the Target Prices reflect the setting mix expected in the Performance Period, the standard procedure for constructing Target Prices was modified slightly. Specifically, IP-THA Clinical Episodes without Major Complications or Comorbidities (MCC) from 2019 and prior (i.e., 2018Q4 to 2019Q4) are selected for conversion to "pseudo-OP-THA" Clinical Episodes.

Episodes are first selected for conversion to pseudo-OP-THAs at the ACH-quarter-year level. The number of THA Clinical Episodes selected each quarter-year is based on the proportion of OP-THA Clinical Episodes initiated by the ACH in 2020Q1-2022Q3. Following the Clinical Episode cost editing, Stage 1 and Stage 2 regressions are run and all elements of Target Prices are constructed as per usual.

- **Step A1. Limit the population to eligible providers.** Run Step 1 as for the other Clinical Episode Categories.
- **Step A2. Determine the number of Clinical Episodes to be converted to pseudo-OP-THAs:** For each Episode Initiator and quarter-year combination from the beginning of the baseline period to 2019Q4 inclusive,[34] determine the number of Clinical Episodes that should be converted from IP-THA without MCC Clinical Episodes to pseudo-OP-THA Clinical Episodes based on the proportion of OP-THA Clinical Episodes among the THA without MCC Clinical Episodes at that Episode Initiator in 2020Q1-2022Q3, [35] where THA without MCC Clinical Episodes are assumed to include both IP-THA Clinical Episodes triggered by MS-DRG 470 and OP-THA Clinical Episodes.
- **Step A3. Run a Logit Regression to determine the relationship between comorbidities and age, and the probability of a THA occurring in the OP setting:** Using only the THA without MCC Clinical Episodes with Clinical Episode start dates in 2020, run a "Stage 0" logit regression where the dependent variable is an indicator for the

[34] Clinical Episodes are assigned to quarter-years based on anchor end dates.

[35] The number of pseudo-OP-THA Clinical Episodes is calculated using the following formula:
$\#(pseudoOP)_{h,q} = Prop\_OP_{h,2020Q1to2022Q3} * \#(THA)_{h,q} - \#(OP)_{h,q}$
where h indexes the Episode Initiator, *Prop* is short for proportion, *OP* stands for OP-THA, *THA* stand for all THA without MCC, including OP-THA, and q indexes the quarter-year

THA being performed in the outpatient setting, and the covariates are indicators for dementia/Alzheimer's, schizophrenia/bipolar, lung disease, cardiovascular conditions, kidney conditions, BMI >40 and other severe obesity, diabetes with complications, seizure disorder, leukemia/lymphoma, sickle cell anemia, coagulation defects and related conditions, adrenocortical insufficiency, intellectual disabilities, neurologic conditions, Crohn's disease, liver cirrhosis and other liver disease, underweight, presence of transplant, and ileostomy or colostomy based on the diagnoses on the trigger claims, and age in excess of 50 and its square.

- **Step A4.** Using the coefficients from the logit regression, and all of the THA without MCC Clinical Episodes from 2019 and prior, predict the probability of each Clinical Episode occurring in the OP setting. The predicted value is the *OP propensity score for THA episodes.*
- **Step A5. Convert some IP-THA without MCC Clinical Episodes to pseudo-OP-THA Clinical Episodes:** This involves selecting IP-THA Clinical Episodes and updating their observed Clinical Episode spending to mimic OP-THA spending.
    - **Step A5a:** Within each ACH-quarter-year, rank order the IP-THA without MCC Clinical Episodes based on their OP propensity score. Then, for each ACH-quarter-year, select the Clinical Episodes with highest OP propensity scores for conversion to pseudo-OP-THA Clinical Episodes. The number of Clinical Episodes to be converted will be taken from **Step A2.**
    - **Step A5b:** For the Clinical Episodes selected for conversion, edit the observed Clinical Episode spending for each Clinical Episode as follows:
        - Calculate the proportion of standardized spending due to SNF before update factors or Winsorization.
        - Reduce the observed Clinical Episode spending after update factors and Winsorization by this proportion.
        - Subtract the difference between the MS-DRG 470 Performance Period trigger cost and the OP-THA Performance Period trigger cost (assuming no complexity adjustment).

Appendix A Tables 1 and 2 display several examples of the cost-editing step being applied. In these examples, the standardized trigger cost for MS-DRG 470 in the Performance Period is $5,000 and the standardized trigger cost for OP-THA in the Performance Period is $3,000 so the difference is $2,000.

Appendix A Table 1: Example of how costs will be edited for selected THA Clinical Episodes

Episode ID	Standardized, Updated, Winsorized Episode Spending	Proportion of Standardized Spending Due to SNF	Standardized, Updated, Winsorized Episode Spending, less Estimated SNF Spending ($)	Pseudo-OP-THA Spending
00037	$8,000	0%	$8,000	$6,000
00041	$10,000	30%	$7,000	$5,000
00046	$12,000	15%	$10,200	$8,200

- **Step A6. Calculate HBPs:** Run **Steps 2-13** to create HBP, using all the MJRLE Clinical Episodes (the pseudo-OP-THAs) created in **Step A5**, the actual OP-THAs, and the IP-THAs without MCC that were not converted to pseudo-OP-THAs in **Step A5** (the IP-THAs with MCC, and the non-THAs).
- **Step A7.** Revert the pseudo-OP-THA Clinical Episodes to IP-THA Clinical Episodes by returning their Episode Spending to its original Standardized, updated, Winsorized amount.
- **Step A8.** Run **Steps 16-20** to calculate Target Prices from Benchmark Prices as per usual.

APPENDIX B: MJRUE BENCHMARK PRICE CONSTRUCTION

Starting in Model Year 6, the MJRUE Clinical Episode Category includes outpatient Total Shoulder Arthroplasty (OP-TSA) Clinical Episodes, in addition to the inpatient TSA (IP-TSA), and other inpatient MJRUE Clinical Episodes. TSA was removed from the inpatient-only list at the start of CY2021, resulting in a sudden shift in the number of Medicare FFS TSA procedures performed in the outpatient setting. To ensure that the Target Prices reflect the setting mix expected in the Performance Period, the standard procedure for constructing Target Prices was modified slightly. Specifically, IP-TSA Clinical Episodes from 2020 and prior (i.e., 2018Q4 to 2020Q4) are selected for conversion to "pseudo-OP-TSA" Clinical Episodes, which means their observed Clinical Episode spending is edited to mimic that of an OP-TSA Clinical Episode in the Performance Period.

Episodes are first selected for conversion to pseudo-OP-TSAs at the ACH-quarter-year level. The number of TSA Clinical Episodes selected each quarter-year is based on the proportion of OP-TSA Clinical Episodes initiated by the ACH in 2021Q1-2022Q3. Following the Clinical Episode cost editing, Stage 1 and Stage 2 regressions are run and all elements of Target Prices are constructed as per usual. For the PGP components of PGP-ACH Benchmark Prices, Clinical Episodes are re-selected for conversion to pseudo-OP-TSA Clinical Episodes, from within the PGP-quarter-year on the proportion of OP-TSA Clinical Episodes initiated by the PGP in 2021Q1-2022Q3.

- **Step A1. Limit the population to eligible providers.** Run Step 1 as for the other Clinical Episode Categories.
- **Step A2. Determine the number of Clinical Episodes to be converted to pseudo-OP-TSAs:** For each Episode Initiator and quarter-year combination from the beginning of the baseline period to 2020Q4 inclusive,[36] determine the number of Clinical Episodes that should be converted from IP-TSA Clinical Episodes to pseudo-OP-TSA Clinical Episodes based on the proportion of OP-TSA Clinical Episodes among the TSA Clinical Episodes at that Episode Initiator in 2021Q1-2022Q3,[37] where TSA Clinical Episodes are

[36] Clinical Episodes are assigned to quarter-years based on anchor end dates.

[37] The number of pseudo-OP-TSA Clinical Episodes is calculated using the following formula:
$\#(pseudoOP)_{h,q} = Prop\_OP_{h,2021Q1to2022Q3} * \#(TSA)_{h,q} - \#(OP)_{h,q}$
where *h* indexes the Episode Initiator, *Prop* is short for proportion, *OP* stands for OP-TSA, *TSA* stands for all TSA, including OP-TSA, and *q* indexes the quarter-year

assumed to include both IP-TSA Clinical Episodes triggered by MS-DRG 483 and OP-TSA Clinical Episodes.[38]

- **Step A3. Run a Logit Regression to determine the relationship between comorbidities and age, and the probability of a TSA occurring in the OP setting:** Using only the TSA Clinical Episodes with Clinical Episode start dates in 2021, run a "Stage 0" logit regression where the dependent variable is an indicator for the TSA being performed in the outpatient setting, and the covariates are indicators for dementia/Alzheimer's, schizophrenia/bipolar, lung disease, cardiovascular conditions, kidney conditions, BMI >40 and other severe obesity, diabetes with complications, seizure disorder, leukemia/lymphoma, sickle cell anemia, coagulation defects and related conditions, adrenocortical insufficiency, intellectual disabilities, neurologic conditions, Crohn's disease, liver cirrhosis and other liver disease, underweight, presence of transplant, and ileostomy or colostomy based on the diagnoses on the trigger claims, and age in excess of 50 and its square.
- **Step A4.** Using the coefficients from the logit regression, and all of the TSA Clinical Episodes from 2020 and prior, predict the probability of each Clinical Episode occurring in the OP setting. The predicted value is the *OP propensity score* for TSA episodes.
- **Step A5. Convert some IP-TSA Clinical Episodes to pseudo-OP-TSA Clinical Episodes:** This involves selecting IP-TSA Clinical Episodes and updating their observed Clinical Episode spending to mimic OP-TSA spending.
    - **Step A5a:** Within each ACH-quarter-year, rank order the IP-TSA Clinical Episodes based on their OP propensity score. Then for each ACH-quarter-year, select the Clinical Episodes with highest OP propensity scores for conversion to pseudo-OP-TSA Clinical Episodes. The number of Clinical Episodes to be converted will be taken from **Step A2.**
    - **Step A5b:** For the Clinical Episodes selected for conversion, edit the observed Clinical Episode spending for each Clinical Episode as follows:
        - Calculate the proportion of standardized spending due to SNF before update factors or Winsorization.
        - Reduce the observed Clinical Episode spending after update factors and Winsorization by this proportion.

[38] TSA Clinical Episodes are organized into two procedure groups: Total Shoulder and Partial Shoulder.

- Subtract the difference between the MS-DRG 483 Performance Period trigger cost and the OP-TSA Performance Period trigger cost (assuming no complexity adjustment).

Appendix B Table 3 display several examples of the cost-editing step being applied. In these examples, the standardized trigger cost for MS-DRG 483 in the Performance Period is $5,000 and the standardized trigger cost for OP-TSA in the Performance Period is $3,000 so the difference is $2,000.

Appendix B Table 2: Example of how costs will be edited for selected TSA Clinical Episodes

Episode ID	Standardized, Updated, Winsorized Episode Spending	Proportion of Standardized Spending Due to SNF	Standardized, Updated, Winsorized Episode Spending, less Estimated SNF Spending ($)	Pseudo-OP-TSA Spending
00017	$8,000	0%	$8,000	$6,000
00021	$12,000	40%	$7,200	$5,200
00026	$15,000	20%	$12,000	$10,000

- **Step A6. Calculate HBPs:** Run **Steps 2-13** to create HBP, using all the MJRUE Clinical Episodes (the pseudo-OP-TSAs) created in **Step A5**, the actual OP-TSAs, and the IP-TSAs that were not converted to pseudo-OP-TSAs in **Step A5** (the IP-TSAs and the non-TSAs).
- **Step A7.** Revert the pseudo-OP-TSA Clinical Episodes to IP-TSA Clinical Episodes by returning their Episode Spending to its original Standardized, updated, Winsorized amount.
- **Step A8.** Run **Steps 16-20** to calculate Target Prices from Benchmark Prices as per usual.