CENTER FOR HEALTH INFORMATION AND ANALYSIS

Relative Price and Provider Price Variation in the Massachusetts Commercial Market

July 2024

Methodology Report

CHIA.

Publication Number 24-213-CHIA-04

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METHODOLOGY REPORT

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Introduction

Relative price (RP) is a calculated, aggregate measure used to evaluate variation in health care provider prices. The Center for Health Information and Analysis (CHIA) is statutorily mandated to collect and report data on relative prices from private and public health care payers operating in the Massachusetts health care market.[1] RP reporting supports the Commonwealth's goals of promoting transparency, cost containment, and efficiency.

RP compares prices paid to different providers within a payer's network and where possible accounts for differences in the intensity, quantity and types of services delivered by providers, and for differences in the types of insurance products offered by payers.[2]

In addition, RP data forms the basis for the calculation of statewide relative price (S-RP), a directional measure of the prices paid to a provider across multiple payers. There are several limitations to this measure which are described in the limitation section.

[1] CHIA is required by Massachusetts General Law (M.G.L.) chapter 12C to promulgate regulations for the uniform calculation and reporting by payers of provider relative prices, and to publicly report that data. The Code of Massachusetts Regulations (CMR) 957 2.00 governs the methodology and filing requirements for health care payers to calculate and report these data to CHIA.

[2] Adjustments to control for differences in patient acuity or intensity of services occur only in the Inpatient Relative Price calculation, due to a lack of comparable base unit in outpatient services. Service mix adjustments, which adjust for differences in types of services delivered by providers occur in hospital outpatient, physician group, and other provider type Relative Price calculations only. Also, some insurers impute reported multipliers based on claims data and may not adjust for service line mix within the calculation of multiplier.

Data Collection

Timeline

RP data files are collected annually. Payers submit three files corresponding to different provider types—Hospitals, Physician Groups, and Other Providers.[3] Each year, data is submitted for the prior year. For example, CY2022 data is submitted in 2023.

Data Submitters

CHIA collects RP data from payers operating in the Massachusetts commercial health insurance market, commercial payers offering Medicare Advantage plans, and MassHealth Managed Care Organizations (MCOs)/Accountable Care Organizations (ACO-As).[4] Payers report data for all Massachusetts-based providers with whom they contract, including payments on behalf of non-Massachusetts residents who receive care from Massachusetts providers.

Data and Methodology

Payers submit three data files for different provider types: Hospitals including Inpatient and Outpatient datasets separately, Physician Groups, and Other Providers. Relative price is calculated for each of the payer's networks. A network is defined as a provider type-insurance type – product type combination, e.g., Acute Inpatient Hospital-Commercial-HMO or Physician Group-Medicare Advantage.[5] Within each network, RPs are calculated separately for each product type, as well as for all products combined.

Payers report data for the following insurance categories:

- Commercial (self and fully insured)
- Medicare Advantage
- Medicaid Managed Care Organization (MCO)/Accountable Care Organization (ACO-A)
- Medicare and Medicaid Dual-eligibles, aged 65 and over
- Medicare and Medicaid Dual-eligibles, aged 21-64[6]
- Other

[3] Other provider types include ambulatory surgery centers, community health centers, community mental health centers, freestanding clinical laboratories, freestanding diagnostic imaging centers, home health agencies, and skilled nursing facilities.

[4] A full list of payers required to submit RP data to CHIA can be found here: **http://www.chiamass.gov/list-of-payers-required-to-report-data**.

[5] For Other Providers, relative price is calculated by other provider type, insurance type combination. For example, Ambulatory Surgery Centers-Commercial or Community Health Centers—Medicaid Managed Care Organization (MCO)/Accountable Care Organization (ACO-A).

[6] Dually eligible members aged 21-64 are covered under Massachusetts One Care Program

Payers report the following product types:

- Health Maintenance Organization and Point of Service (HMO and POS)
- Preferred Provider Organization (PPO)
- Indemnity
- Other

RP calculations are performed at the network level. A network is defined by the following attributes:

- Insurance Payer
- Provider Type
    - Hospital Inpatient, Hospital Outpatient, Total Hospital
        - Hospital Type: Acute, Chronic (or long-term care), Rehabilitation, Psychiatric
    - Physician Group
    - Other Provider
        - Other Provider Type: Ambulatory surgery centers, Community health centers, Community mental health centers, Freestanding clinical laboratories, Freestanding diagnostic imaging centers, Home health agencies, Skilled nursing facilities
- Insurance Category {Commercial (self and fully insured), Medicare Advantage, Medicaid Managed Care Organization (MCO), Medicare and Medicaid Dual-eligibles aged 65 and over, Medicare and Medicaid Dual-eligibles, aged 21-64, Other}
- Product Type {HMO and POS, PPO, Indemnity, Other, All products combined}

The tables below illustrate the potential maximum number of networks an insurer could have within the RP calculation. If an insurer (such as Payer A) participates in all insurance categories and all product types, the number of hospital networks would be 360 (3 Provider Types, 4 hospital types, 6 Insurance Categories, 5 Product Types), the number of physician networks is 30 and the number of other provider networks is 210. Relative price is calculated within each network. For this hypothetical insurer there would be 600 RP calculations corresponding to the 600 networks.

Table A: Hospital Networks

Hospital				
Insurance Payer	**Provider Type**	**Hospital Type**	**Insurance Category**	**Product Type**
Payer A	Hospital Inpatient	Acute	Commercial (self and fully insured)	HMO and POS
Payer A	Hospital Outpatient	Chronic	Medicare Advantage	PPO
Payer A	Total Hospital	Rehab	Medicaid Managed Care (MCO)	Indemnity
Payer A		Psych	Medicare and Medicaid Dual-eligibles aged 65 and over	Other
Payer A			Medicare and Medicaid Dual- eligibles aged 21-64	All Products Combined
Payer A			Other	

Table B: Physician Group Networks

Physician			
Insurance Payer	**Provider Type**	**Insurance Category**	**Product Type**
Payer A	Physician	Commercial (self and fully insured)	HMO and POS
		Medicare Advantage	PPO
		Medicaid Managed Care (MCO)	Indemnity
		Medicare and Medicaid Dual-eligibles aged 65 and over	Other
		Medicare and Medicaid Dual- eligibles aged 21-64	All Products Combined
		Other	

Table C: Other Provider Networks

Other Provider				
Insurance Payer	**Provider Type**	**Other Provider Type**	**Insurance Category**	**Product Type**
Payer A	Other Provider	Ambulatory Surgery Centers	Commercial (self and fully insured)	HMO and POS
Payer A		Community Health Centers	Medicare Advantage	PPO
Payer A		Community Mentall Health Centers	Medicaid Managed Care (MCO)	Indemnity
Payer A		Freestanding Clinical Laboratories	Medicare and Medicaid Dual-eligibles aged 65 and over	Other
Payer A		Freestanding Diagnostic Imaging Centers	Medicare and Medicaid Dual- eligibles aged 21-64	All Products Combined
Payer A		Skilled Nursing Facilities	Other	

The basic steps for computing RP are the same across all file types:

1. Compute provider-specific aggregate price levels. (This calculation varies by provider type)
2. Take unweighted average of provider-specific price levels to obtain the network average price level.
3. For each provider, divide provider-specific price level by network average price level to obtain each provider's relative price (RP).

By construction, the network average RP equals 1.0 for each payer network. Providers with RP above 1.0 receive higher-than-average payments within a payer's network, and vice versa.

Each of the RP file types and corresponding RP calculations are described in more detail below.

Limitations

RP is an aggregate measure for assessing providers' overall price levels across all services. It is not designed to compare provider prices for particular services. And, because the measure is specific to each payer's network, RP values are not directly comparable across payers. An example of variation between networks is below:

*For two payers, Payer A and Payer B, relative price values are calculated for Provider X. The RP for Provider X in Payer A's network is 0.8 and the RP for Provider X in Payer B's network is 1.50. If the average payment across all providers by Payer A is $200 and the average payment to all providers for Payer B is $100, the payment to Provider X by Payer A is $160 (0.8*$200) and the payment by Payer B is $150 ($100*1.50.) While the calculated relative price value for Provider X is lower in Payer A's network the actual amount paid is higher than what was paid by Payer B. As the underlying average payments differ between the networks of the two payers, these two calculated RP values for Provider X are not directly comparable.*

S-RP blends relative price across payers using payer payment distributions. Since relative price is calculated within each payer network, a blending of relative prices will not account for absolute price differences across payers. For this reason, it is not advisable to use S-RP to understand absolute price differences between one provider and another. S-RP should only be used for directional purposes. An illustrated example of the limitations of S-RP is below.

Consider Hospital A with an outpatient RP of 1.05 for Insurer X and an outpatient RP of 1.10 for Insurer Y. The S-RP calculation would blend the outpatient RP using Insurer X and Y payments. However, the calculation does not consider whether Insurer X prices are higher or lower than Insurer Y prices. CHIA does not collect this information

and therefore cannot incorporate the RP differences among insurers into the S-RP calculation. Due to this limitation, the resulting S-RPs are not accurate and should not be used to understand absolute price differences among providers.

Hospital RP

Within the Hospital file, payers report data for four hospital types—Acute, Chronic (or long-term care), Rehabilitation, and Psychiatric.[7] Within these provider types, payers report inpatient and outpatient services separately.

Hospital Inpatient

For each hospital, payers submit number of discharges, total claims payments, total non-claims payments (such as bonuses for financial performance or for meeting certain quality targets), and case mix index (CMI), which captures the relative health of the population treated.[8]

Table D contains a simple illustration of the inpatient data elements submitted by payers that are used in the RP calculation. The payer in this example reported four hospitals and two product types (HMO, PPO) in its Acute Hospital-Commercial network.

Table D. Sample Hospital Inpatient Data

Hospital	Hospital Type	Insurance Category	Product Type	Discharges	Total Claims Payments	Total Non-Claims Payments	Case Mix Index
Hospital 1	Acute	Commercial	HMO and POS	251	$460,661	$105,491	1.5
	Acute	Commercial	PPO	237	$582,240	$81,406	1.6
Hospital 2	Acute	Commercial	HMO and POS	73	$453,685	$90,602	0.7
	Acute	Commercial	PPO	295	$56,882	$111,764	1.8
Hospital 3	Acute	Commercial	HMO and POS	49	$955,453	$76,962	0.7
	Acute	Commercial	PPO	228	$61,774	$125,589	0.7
Hospital 4	Acute	Commercial	HMO and POS	242	$838,973	$128,995	1.8
	Acute	Commercial	PPO	78	$965,899	$89,544	0.6

[7] RP Hospital designations follow those used by the Centers for Medicare and Medicaid Services (CMS) to delineate hospitals subject to or exempt from Medicare's inpatient prospective payment system, as defined in the Code of Federal Records (42 CFR 412.23).

[8] Hospital inpatient discharges are assigned to diagnosis-related groups (DRGs), based upon diagnosis and other factors. Each DRG is assigned a weight that reflects the relative amount of resources required to treat patients in the group, which determines provider reimbursement. A hospital's CMI equals the average DRG weight for their patients. A higher CMI represents a more clinically complex population. CMI values are generally not comparable across payers, as payers may use different DRG groupers.

Computing Hospital Inpatient Relative Price (by Product Type):

Step 1. Compute the Adjusted Base Rate (ABR). For inpatient data, this equals the cost per case mix-adjusted discharge. Discharges are weighted by case mix index to control for variation in patient acuity across providers. A higher CMI represents a more complex patient population (i.e., a patient population that requires more intensive resource use) and a lower CMI indicates a less complex set of patients. The formula for ABR is shown below and is also shown in Table E, Column E5.

$$Adjusted\ Base\ Rate\ (ABR) = \frac{(Total\ Claims + Total\ NonClaims)}{(Discharges) * (CMI)}$$

In calculating Hospital Inpatient RP, several adjustments are applied to the data. First, within a given insurance category, product-specific RP is only computed when the sum of Total Claims and Total Non-Claims to a hospital associated with that product equals at least $10,000. In addition, when the calculated ABR exceeds $100,000, the ABR is capped at $100,000 to prevent outlier payments from skewing the results.

Step 2. Calculate the network average price level by product type. Starting with product type HMO, calculate the arithmetic mean of all hospitals' ABR. This calculation is shown below and the results are included in Table E, Column E6. Perform the same calculation for all other product types (e.g., PPO, Indemnity).

$$Network\ Average\ ABR_{HMO} = \frac{\$1{,}503.72 + \$10{,}651.41 + \$30{,}099.56 + \$2{,}222.15}{4}$$

Step 3. Calculate RP ratios by product type for each provider. To do this, divide each hospital's ABR by the corresponding network average ABR for that product. (See Table E, Column E7.)

$$RP_{HMO}(Hosp\ 1) = \frac{ABR_{HMO}(Hosp\ 1)}{Network\ Average\ ABR_{HMO}} = \frac{\$1{,}503.72}{\$11{,}119.21} = 0.14$$

Table E. Computing Product-specific Hospital Inpatient RP

Hospital	Hospital Type	Insurance Category	Product Type	E1 Discharges	E2 Total Claims Payments	E3 Total Non-Claims Payments	E4 Case Mix Index	E5 Product Type Adjusted Base Rate = (C2+ C3) / (C1*C4)	E6 Network Average ABR	E7 Product-specific RP = C5/ C6 (HMO or PPO)
Hospital 1	Acute	Commercial	HMO	251	$460,661	$105,491	1.5	$1,503.72	**$11,119.21**	0.14
	Acute	Commercial	PPO	237	$582,240	$81,406	1.6	$1,750.12	**$6,448.47**	0.27
Hospital 2	Acute	Commercial	HMO	73	$453,685	$90,602	0.7	$10,651.41	**$11,119.21**	0.96
	Acute	Commercial	PPO	295	$56,882	$111,764	1.8	$317.60	**$6,448.47**	0.05
Hospital 3	Acute	Commercial	HMO	49	$955,453	$76,962	0.7	$30,099.56	**$11,119.21**	2.71
	Acute	Commercial	PPO	228	$61,774	$125,589	0.7	$1,173.95	**$6,448.47**	0.18
Hospital 4	Acute	Commercial	HMO	242	$838,973	$128,995	1.8	$2,222.15	**$11,119.21**	0.2
	Acute	Commercial	PPO	78	$965,899	$89,544	0.6	$22,552.20	**$6,448.47**	3.5

Computing Hospital Inpatient Relative Price (All Products Combined):

Step 1. To compute RPs for all product types combined, ABRs by product type are weighted by the network average product mix or product distribution. Network average product mix is calculated as the sum of payments corresponding to each product type divided by total network payments across all product types. The calculation for HMO is shown below. A similar calculation is performed for PPO. The results are shown in Table F, column F2.

$$Network\ Average\ Product\ Mix_{HMO} = \frac{Total\ Payments_{HMO}}{Total\ Network\ Payments} = \frac{\$3{,}110{,}822}{\$5{,}185{,}920} = 0.60$$

Step 2. The All Products Combined ABRs are computed for each hospital by calculating the weighted average of product specific ABRs using the network average product mix calculated in Step 1. (see Table F, column F3). For example, for Hospital 1:

$$All\ Product\ Combined\ ABR(Hospital\ 1) = HMO\ ABR\ (Hospital\ 1) * Network\ Average\ Product\ Mix_{HMO} + PPO\ ABR\ (Hospital\ 1) * Network\ Average\ Product\ Mix_{PPO}$$

$$= \$1{,}503.72 * 0.60 + \$1{,}750.12 * 0.40 = \$1{,}602.32$$

Step 3. Calculate the All Products Combined network average price level, or All Products Combined network average ABR. This equals the arithmetic mean of the All Products Combined ABRs (see Table F, Column F4).

$$All\ Product\ Combined\ Network\ Average\ ABR$$
$$= \frac{\begin{matrix}All\ Product\ Combined\ ABR\ (Hospital\ 1) + All\ Product\ Combined\ ABR(Hospital\ 2) \\ +All\ Product\ Combined\ ABR\ (Hospital\ 3) + All\ Product\ Combined\ ABR\ (Hospital\ 4)\end{matrix}}{Number\ of\ Hospitals}$$

$$All\ Product\ Combined\ Network\ Average\ ABR = \frac{(\$1602.32 + \$6516.43 + \$18,525.25 + \$10,357.03)}{4} = \$9,250.26$$

Step 4. Calculate the All Products Combined RP for each provider. The All Products Combined ABRs for each hospital are divided by the All Products Combined network average (column F4) to obtain RP values for all product types combined (see Table F, Column F5).

$$RP(Hospital\ 1) = \frac{All\ Products\ Combined\ ABR\ (Hospital\ 1)}{Network\ Average\ All\ Products\ Combined\ ABR} = \frac{\$1,602.32}{\$9,250.26} = 0.17$$

Table F. Computing Hospital Inpatient RP for all product types combined

Hospital	Hospital Type	Insurance Category	Product Type	F1 Adjusted Base Rate by Product Type From Table E, Column E5	F2 Network Average Product Mix	F3 All Products Combined Adjusted Base Rate (Step 1)	F4 Network Average Product-Adjusted Base Rate (Step 2)	F5 All Products Combined Inpatient Relative Price (Step 3)
						For each hospital, = Sum of (E1 series * E2 series)	= Mean of E3 series	= E3/E4
Hospital 1	Acute	Commercial	HMO	$1,503.72	0.60	$1,602.32	$9,250.26	**0.17**
	Acute	Commercial	PPO	$1,750.12	0.40			
Hospital 2	Acute	Commercial	HMO	$10,651.41	0.60	$6,516.43	$9250.26	**0.70**
	Acute	Commercial	PPO	$317.60	0.40			
Hospital 3	Acute	Commercial	HMO	$30,099.56	0.60	$18,525.25	$9,250.26	**2.00**
	Acute	Commercial	PPO	$1,173.95	0.40			
Hospital 4	Acute	Commercial	HMO	$2,222.15	0.60	$10,357.03	$9,250.26	**1.12**
	Acute	Commercial	PPO	$22,552.20	0.40			

Hospital Outpatient

Unlike payments for hospital inpatient services, payers employ a variety of payment methodologies to reimburse for outpatient services. As a result, the hospital outpatient RP calculation differs from the hospital inpatient calculation because hospital outpatient RP data does not contain volume information analogous to discharges. At a summary level, the hospital outpatient RP calculation aims to measure price variation across hospitals within a payer's network, after controlling for differences in service mix [9]and product mix. To build hospital outpatient RP, CHIA collects the following data elements for each hospital: claims and non-claims payments, multipliers, and service mix

[9] The relative price calculation utilizes a network service distribution to control for differences in service mix across providers. However, this methodology will not eliminate differences in service mix entirely. Payers may report multipliers that they have imputed and their calculations may not have accounted for service mix. Additionally, some providers may only provide a subset of services and using a network wide service distribution may not fully capture a representative price for these providers.

values – for each service type category.

A service field represents a grouping of outpatient hospital services that are similar in nature and within which the insurer often negotiates prices in a consistent manner. Common service fields for outpatient hospital services include ambulatory surgery, lab, radiology, and pharmacy. Each payer defines their own service fields, so service groupings are not consistent from one payer to another.

A service multiplier represents the negotiated mark-up (or mark-down) relative to the payer's standard fee schedule that a payer agrees to pay a given provider for a particular service field. For example, for laboratory services, a payer reports a multiplier of 1.15 for Hospital A and .90 for Hospital B. This indicates that the payer reimburses

Hospital A 15% above the payer's standard fee schedule rate for that service line, whereas Hospital B receives 10% below the standard rate. This also implies that Hospital A's price for this service type category is 28% higher than Hospital B's price (1.15/0.90-1).

Service mix represents the percent of total hospital outpatient claims dollars that are attributed to a particular service field. In other words, service mix is the distribution of hospital outpatient claims payments by service field.[10]

When providers are reimbursed based on a fee schedule it is CHIA's expectation that payers will provide actual negotiated multipliers in the relative data submission. However, CHIA recognizes that this may be difficult to do in certain instances and payers may have to impute multipliers using actual claims data. In addition, when providers are not paid on a fee-for-service basis, payers will have to impute multipliers. Below, CHIA has identified one approach to impute multipliers. If this approach is not applicable to a payer's method of reimbursement, the payer may develop their own approach.

Imputing Service Field Multipliers: One Approach

A service multiplier may be calculated as the ratio of actual spending for a given service unit to the network average payment for that service unit (see Table G). These service multipliers may be constructed based on unit costs for the underlying Current Procedural Terminology (CPT) codes within a service field. In Table G's example, two CPT codes comprise a single service field. To calculate for this, the spending per unit across the two codes is divided by cross-CPT code network average payment per unit.

[10] Service mix is calculated based on claims payments only. Service mix excludes non-claim payments.

Table G. Category Multiplier Calculation: Payment Example

This method relies on claims-based payments and the number of units for the services being analyzed. For example, for lab/radiology or emergency department services, the data could be grouped by CPT code. For ambulatory surgery services, when reimbursement is negotiated by ambulatory surgery categories using case rates, the data could be grouped by these case rate categories. The resulting multiplier is based on comparing a provider's "actual" average price to its "expected" average price. The expected average price is calculated using the network average prices for each case rate or CPT code. The example shown below is a hypothetical calculation of multipliers for lab services. In this example, there are only two providers in the network and two CPT codes that make up lab services, CPT X and CPT Y.

	(1)	(2)	(3)	(4)	(5) = (1)/(3)	(6) = (2)/(4)	(7)	(8)	(9) = (7)/(8)
Lab Services Multiplier	**CPT X Total Allowed Claims**	**CPT Y Total Allowed Claims**	**CPT X Units**	**CPT Y Units**	**CPT X Price**	**CPT Y Price**	**Actual Average Price**	**Expected Price**	**Multiplier = Actual/Expected**
Provider A	$250	$300	3	3	$83.33	$100.00	$91.67	$78.21	1.172
Provider B	$700	$700	10	9	$70.00	$77.78	$73.68	$77.94	0.945
Total/Network Average	$950	$1,000	13	12	$73.08	$83.33			

Columns (1) & (2): These represent total allowed claims paid out for CPT X and CPT Y for Providers A & B in a given year.

Columns (3) & (4): These represent total units for CPT X and CPT Y for Providers A & B for the same year as the reported allowed claims.

Column (5) & (6): These represent an imputed price for CPT X and CPT Y by provider and for the network.

Column (7): This is the actual price across both CPT codes. The formula for Provider A is: ($250+$300)/ (3+3) = $91.67. The formula for Provider B across both CPT codes is: ($700 + $700)/ (10+9) = $73.68

Column (8): This is the expected price for each provider using the network average prices. The formula for Provider A is {(3*73.08+(3*83.33)}/ (3+3) = 78.21. The formula for Provider B is {(10*73.08) + (9*83.33)}/ (10+9) = $77.94

Column (9): This is the imputed multiplier and takes the ratio of Actual Price to Expected Price.

If it is not possible to provide negotiated multipliers directly from the contracts, and data are not available to use the method shown above, then it is expected that payers use their best judgment and available data to calculate multipliers by provider group and service field that reasonably represent the relative difference in payments. Each year, a description of the methodology used to calculate multiplier values is submitted as part of the Relative Price data submission.

Hospital Outpatient RP Calculation Steps

Payers submit hospital outpatient payment data at the hospital-insurance category-product level, by service field. An outpatient relative price value is only calculated for hospitals with reported claims of more than $5,000 within a given network.

Table H: Sample Data for Acute Commercial Hospitals

		A	B	C	D	E	F
		Service Field Multiplier			Expenditures		
Hospital	Product Type	Emergency Room	Lab	Physician Services	Emergency Room	Lab	Physician Services
Hospital 1	HMO and POS	1	1.14	1.13	$579,683	$347,810	$1,391,240
Hospital 1	PPO	1.09	1.18	1.12	$193,497	$112,025	$712,884
Hospital 2	HMO and POS	1.015	1.04	1.03	$668,544	$465,955	$891,392
Hospital 2	PPO	1	0	1.11	$616,198	$0	$1,309,420
Total	**HMO and POS**				**$1,248,227**	**$813,765**	**$2,282,632**
Total	**PPO**				**$809,695**	**$112,025**	**$2,022,304**

The network average service field mix is calculated for each product type, as shown in Table I. In Table I's example, the results show that across all hospitals in this payer's network, 28.7% of HMO and POS claims were in Emergency Room.

Table I: Computing Network Wide Service Field Mix by Product Type

	A	B	C	D	A/D	B/D	C/D
Product Type	**Emergency Room**	**Lab**	**Physician Services**	**Total**	**Emergency Room Network Mix**	**Lab Network Mix**	**Physician Services Network Mix**
HMO and POS	$1,248,227	$813,765	$2,282,632	$4,344,624	28.7%	18.7%	52.5%
PPO	$809,695	$112,025	$2,022,304	$2,944,024	27.5%	3.8%	68.7%

The next step in the calculation is to calculate a weighted average multiplier (also known as base service-weighted

multiplier) using the network service field mix as weights (Table J). In the hospital outpatient calculation, the base service-weighted multiplier represents the weighted average provider-specific price level for claims payments across all service categories. Non-Claims are excluded from the base service-weighted multiplier. Table J shows the results of this calculation. In this table, the base service weighted multiplier for each hospital and product type is equal to the following:

$$\{(A * D) + (B * E) + (C * F)\} / G \quad \{(A*D)+(B*E)+(C*F)\}/G$$

Table J: Calculating Base Service Weighted Multiplier

		A	B	C	D	E	F	G = D+E+F	H
		Service Field Multiplier			Network Service Field Mix				
Hospital	Product Type	Emergency Room	Lab	Physician Services	Emergency Room	Lab	Physician Services	Total Network Mix	Base Service Weighted Multiplier
Hospital 1	HMO and POS	1.000	1.140	1.130	28.7%	18.7%	52.5%	100.0%	1.095
Hospital 1	PPO	1.090	1.180	1.120	27.5%	3.8%	68.7%	100.0%	1.114
Hospital 2	HMO and POS	1.015	1.040	1.030	28.7%	18.7%	52.5%	100.0%	1.028
Hospital 2	PPO	1.000	0.000	1.110	27.5%	0.0%	68.7%	96.2%	1.079

Note that Hospital 2 did not have a multiplier reported (highlighted in red) for lab services for their commercial PPO product. As a result, the network average service mix for this provider is set to 0 (highlighted in red).). The sum of the network average service mixes for Hospital 2-PPO is 96.2% instead of 100% (see Column G). The calculation in the above formula divides by column G to avoid artificially deflating the base service weighted multiplier for a multiplier that is reported as zero. This is known as the zero correction.

The next step is to calculate the non-claims multiplier which will be added to the base service weighted multiplier to account for non-claims based payments (Table K). The non-claims multiplier (column D) is the ratio of non-claims to claims, the result of which is then multiplied by the base service weighted multiplier (calculated in Table J, Column H). The non-claims multiplier is added to the base service weighted multiplier to calculate the adjusted rate (Table K, Column E).[11] Next, a network average adjusted rate is calculated by product type. Using the data in Table K as an example, the network average adjusted rate for HMO and POS would be calculated as:

$$(1.107 + 1.044) / 2 = 1.076$$

Finally, a relative price by product type is calculated by taking the ratio of the adjusted rate to the network average adjusted rate.

[11] The intent of the Non-Claims Multiplier is to distribute the Total Non-Claims Payments over units of service, where units of service are determined by the Total Claims Payments divided by the Base Service Weighted Multiplier charged per unit. Per Table K, Hospital 1 has $26,972 in Non-Claims Payments. These Non-Claims Payments are distributed over ($2,318,733/1.095) units of service.

Table K: Calculating Product-Specific Relative Price

		A	B	C	D = B/A*C	E=D+C	F= Avg of E	E/F
Hospital	Product Type	Total Hospital Claims	Total Hospital Non-Claims	Base Service Weighted Multiplier	Non Claims Multiplier	Adjusted Rate	Network Average Adjusted Rate	Relative Price
Hospital 1	HMO and POS	$2,318,733	$26,972	1.095	0.013	1.108	1.076	1.029
Hospital 1	PPO	$1,018,406	$11,826	1.114	0.013	1.127	1.106	1.019
Hospital 2	HMO and POS	$2,025,891	$32,659	1.028	0.017	1.045	1.076	0.971
Hospital 2	PPO	$1,925,618	$10,649	1.079	0.006	1.085	1.106	0.981

The final step in calculating hospital outpatient relative price is to calculate an all products combined outpatient hospital RP. First, a network average product mix (or product distribution) is calculated. The following Table L summarizes where Claims and Non-Claims Payments are used in the Relative Price calculation. Table M below sums total claims and total non-claims across product types for each hospital's payments by product type. In this illustration, total HMO and POS payments equal $4,404,256 or 59.8% ($4,404,256/$7,370,755) of total claims and PPO represents 40.2%.

Table L: Relative Price Hospital Calculation Components

RP Calculation Component	Are Claims Included?	Are Non-Claims Included?
Calculation Threshold	Yes	Yes
Network Average Service Mix	Yes	No
Base Service Weighted Multiplier	Yes	No
Product Mix	Yes	Yes

Table M: Summing Total Payments by Product to Calculate Network- wide Product Mix

Hospital	Product Type	Total Hospital Claims	Total Hospital Non Claims	Total Medical Expenditures
Hospital 1	HMO and POS	$2,318,733	$26,972	$2,345,706
Hospital 1	PPO	$1,018,406	$11,826	$1,030,232
Hospital 2	HMO and POS	$2,025,891	$32,659	$2,058,550
Hospital 2	PPO	$1,925,618	$10,649	$1,936,267

Total HMO and POS	$4,404,256
Total PPO	$2,966,499
Grand Total	$7,370,755

The final step in the RP calculation is to calculate the All Products Combined Outpatient Hospital Relative Price as shown in Table N below. For each hospital, a weighted average Adjusted Rate is calculated using the network average product type mix. The product mix is used to weight the product-specific adjusted rate to compute an all products combined adjusted rate. Column E is the All Products Combined Adjusted Rate. The all products relative price is equivalent to the ratio of the All Products Combined Adjusted Rate for each hospital to the average of the All Products Combined Adjusted Rate.

Table N: All Products Combined Relative Price

	A	B	C	D	E=A*C+B*D	F=E/1.088
	HMO and POS Adjusted Rate	PPO Adjusted Rate	HMO and POS Network Average Product Mix	PPO Network Average Product Mix	All Products Combined Adjusted Rate	All Products Combined Relative Price
Hospital 1	1.107	1.127	59.8%	40.2%	1.12	1.025
Hospital 2	1.044	1.085	59.8%	40.2%	1.06	0.975
Average					1.088	

Blended Hospital RP

In addition to separate Inpatient and Outpatient RP values, CHIA calculates and reports blended Hospital RP, which combines these results. Blended Hospital RP is only reported for hospitals with payments exceeding both the inpatient and outpatient reporting thresholds, as previously specified.

One approach to blending the inpatient RP and outpatient RP could include calculating a simple weighted average of the two RP's using network wide inpatient and outpatient payments as weights. However, this approach may double count prices as the payments already reflect the price of the hospitals. A second approach would be to blend the inpatient and outpatient RP using network wide volume of services. However, measures of volume are very diverse across inpatient and outpatient hospital services which makes this a very challenging calculation. A third approach would be to calculate a volume proxy which would be equal to payments divided by relative price. ("normalize payment for price"). Once the network wide volume proxies are calculated, a weighted average RP is calculated using the network wide volume proxy as weights. A fourth approach utilizes the third approach but makes further adjustments to account for providers that have high inpatient price and high inpatient payments in relation to outpatient. The fourth approach attempts to avoid overweighting of the inpatient RP. This is the approach that is currently used in CHIA's RP methodology.

Blended RP is calculated as follows:

1. Calculate Inpatient Payments for Blending. A hypothetical example is shown Table O below. Column A includes the calculated Inpatient RP which averages to 1.00. Column B includes the insurer reported payments for each of the four hospitals. Column C and D calculate a weighted average inpatient relative price using reported payments. Note the weighted average inpatient relative price is 1.108. Column E adjusts the inpatient RP to be used in the blending calculation. This adjustment normalizes the inpatient RP for the weighted average inpatient RP. Finally, column F adjusts the revenue (or "normalizes" the revenue) for the inpatient RP for blending. This is the revenue that will be used in the hospital blending RP calculation.

Table O: Calculation of Inpatient Payments for Blending

	A	B	C=A*B	D	E= A/D	F= B/E
	Inpatient RP	Inpatient Payments	Inpatient RP * Inpatient Payments	Weighted Average RP	Inpatient RP for Blending	Inpatient Payments for Blending
Hospital 1	0.6440	$982,170	$632,517		0.58	1,689,583
Hospital 2	1.6600	$1,978,945	$3,285,049		1.50	1,320,701
Hospital 3	1.0450	$969,452	$1,013,077		0.94	1,027,753
Hospital 4	0.6500	$1,258,477	$818,010		0.59	2,144,918
Average	1.00					
Total		$5,189,044	$5,748,654	1.108		6,182,955

2. Calculate Outpatient Payments for Blending. A hypothetical example is shown in Table P below. As shown, outpatient RP and outpatient payments are normalized or adjusted for outpatient RP.

Table P: Calculation of Outpatient Payments for Blending

	A	B	C=A*B	D	E= A/D	F= B/E
	Outpatient RP	**Outpatient Payments**	**Outpatient RP * Outpatient Payments**	**Weighted Average Outpatient RP**	**Inpatient RP for Blending**	**Inpatient Payments for Blending**
Hospital 1	0.55	$3,375,938	$1,856,766		0.49	6,934,880
Hospital 2	1.35	$6,280,404	$8,478,545		1.19	5,256,068
Hospital 3	1.28	$19,186,130	$24,558,246		1.13	16,934,975
Hospital 4	0.8	$6,994,578	$5,595,662		0.71	9,878,220
Average	1					
Total		$35,837,050	$40,489,220	11.13		39,004,143

3. Calculate network wide Inpatient and Outpatient mix or distribution to use in the blending calculation. In this example the calculation is as follows:

   Inpatient Hospital Mix: $6,182,955/($6,182,955+$39,004,143) = .137 or 13.7%

   Outpatient Hospital Mix: $39,004,143/($6,182,955 +$39,004,143) = .863 or 86.3%

4. The final step as shown in Table Q below blends the Inpatient RP and Outpatient RP using the network wide mix.

Table Q: Calculation of Blended Hospital RP

	A	B	C	D	E =A*C+B*D
	Inpatient RP	**Outpatient RP**	**Inpatient Mix**	**Outpatient Mix**	**Blended RP**
Hospital 1	0.6	0.6	13.7%	86.3%	0.6
Hospital 2	1.7	1.4	13.7%	86.3%	1.4
Hospital 3	1.0	1.3	13.7%	86.3%	1.2
Hospital 4	0.7	0.8	13.7%	86.3%	0.8

RP Composite Percentile Rank

When making comparisons of provider price levels across payers for all non-acute-hospital providers, CHIA converts RP values into percentile terms. Within a payer's network, each provider's relative price is converted into a percentile, ranging from 0 to 100. Higher RP values translate to higher percentile ranks. For example, an RP percentile of 90 indicates that a provider has a higher RP value than 90% of all other, same-type providers in that payer's network. An RP percentile of 10 means that a provider's RP was lower than 90% of all other providers in that payer's network. The 50th percentile represents a payer's median RP. Because the percentile method uses the same ordered rank scale for all payers, the relative position of the provider may be compared across payers.

Statewide Relative Price (S-RP)

There are several limitations to the statewide relative price calculation as described in the limitations section of this manual. To understand price differences across insurers one could analyze the inpatient S-RP to provide directional information on relative price. The outpatient statewide relative price numbers should not be analyzed to understand price differences between providers. CHIA calculates S-RP values using the methods described below:

Step 1: Calculate Inpatient Statewide Relative Price (S-RP)

a. This step builds upon results from the calculated hospital inpatient relative price. In the hospital inpatient RP calculation, an All Products Combined ABR (payments per case mix adjusted discharge) is calculated for each hospital by payer.
b. Combine the All Products Combined ABR across payers into a single All Product Combined ABR for each hospital using the share of total inpatient payments made by each payer to a given hospital to weight each payer-specific All Products Combined ABR. This will be known as the cross-payer inpatient All Products Combined ABR.
c. Compute statewide average All Products Combined ABR as the mean across all hospitals of the cross- payer ABRs calculated in step 1(b)
d. Calculate the cross-payer inpatient S-RP values for each hospital by dividing the hospital-specific cross- payer All Products Combined ABRs (step 1(b)) by the statewide average cross-payer All Products Combined ABR (step 1(c))

Step 2: Calculate Outpatient Statewide Relative Price (S-RP)

a. This step builds upon results from the calculated hospital outpatient relative price. In the hospital outpatient RP calculation, an All Products Combined relative price is calculated for each hospital by payer.
b. Combine the All Products Combined Hospital Outpatient RPs across payers into a single All Products Combined Hospital Outpatient RP for each hospital using the share of total outpatient payments made by each payer to a given hospital to weight each RP. This will be known as the cross-payer outpatient All Products Combined RP. Compute the statewide average outpatient cross-payer
c. All Products Combined RP as the mean of the hospital-specific cross-payer outpatient All Products Combined RP calculated in step 2(b)
d. Calculate the cross-payer outpatient S-RP for each hospital by dividing the hospital-specific cross-payer outpatient RP (step 2(b)) by the statewide average (step 2(c))

Step 3: Calculate Blended Cross-Payer RPs

a. Calculate the share of cross-payer total payments accounting for inpatient and outpatient services for each hospital
b. Using the hospital-specific inpatient and outpatient payment shares calculated in step 3(a) as weights, combine each hospital's all-payer inpatient and outpatient S-RP values (steps 1(d) and 2(d)) – these amounts will be known as the interim blended cross-payer S-RPs
c. Compute the statewide average of the interim blended cross-payer S-RPs as the mean of the hospital-specific interim blended cross-payer S-RP calculated in step 3(b)
d. Calculate the final blended cross-payer S-RP for each hospital by dividing the hospital-specific interim blended cross-payer S-RP (step 3(b)) by the statewide average (step 3(c))

Physician Group

CHIA requires payers to submit data for each physician group, according to the share of total physician group payments within each insurance category. In total, Physician Groups reported must represent at least 90% of total physician payments within each insurance category. Payers report in the aggregate any remaining physician groups not reported individually with the appropriate Organization ID as defined by the Data Specification Manual.[12]

Relative price is calculated only for physician groups with product-specific claims and non-claims payments exceeding $20,000. In addition, relative price is not calculated for the aggregate physician groups not reported individually. While relative price is not calculated for these physician groups, the reported claims payments for these groups are used in calculating network average service mix and the claims payments and the non-claims payment data for these groups are utilized in calculating network product mix.

Table R: Summary of Physician Group Relative Price Calculation Components

RP Calculation Component	Are Claims Included?	Are Non-Claims Included?
Calculation Threshold	Yes	Yes
Parent Provider Group Multiplier Adjustment	Yes	No
Network Average Service Mix	Yes	No

[12] For professional services and physician groups, payers are to report the top organizations based on share of total payments, according to their contractual relationships. These top organizations should be based upon payments to the parent provider, and should be reported until at least 90% of total payments to all physician groups are represented, or payments to a parent provider group are less than $20,000. Payers shall report all remaining physician group payments in aggregate under OrgID 999998 for aggregate physicians not paid on a fee schedule, or OrgID 999999 for aggregate physicians paid on a fee schedule.

Base Service Weighted Multiplier	Yes	No
Product Mix	Yes	Yes

Data elements reported by payers and the RP calculation methodology are generally analogous to those used for hospital outpatient services, with the following exceptions:

- Parent Provider Group Multiplier Adjustment:
  Some payers list multiple local provider groups under a single parent provider group, with corresponding specific claims amounts, non-claims amounts, and multipliers for each local provider group. The local provider group claims, non-claims, and multiplier data must be aggregated to the parent provider group level prior to performing the Relative Price calculation.

  - Local provider groups are determined by the count of unique pediatric and non-pediatric local provider group names listed for the same parent provider group.

  - Local provider group claims and non-claims amounts are summed to the parent provider group level.

  - The parent provider group multiplier is calculated as a weighted average of the local provider group multipliers, where the weights are the claims payments by local provider group. Non-Claims are excluded from calculation of the local provider group multiplier.

Table S: Calculate the Parent Provider Group Multiplier

				(A)	(B)
	Provider Group	**Local Practice Group**	**Service**	**Claims Payments**	**Local Practice Group Multiplier**
Row 1	Group A	Group A1	Surgery	$800,000	1.09
Row 2	Group A	Group A2	Surgery	$100,000	0.90
Row 3	Group B	Group B1	Surgery	$500,000	1.03
Row 4	Group B	Group B2	Surgery	$600,000	0.95

			(C)	(D)
	Provider Group	**Service**	**Parent Provider Group Claims Payments**	**Parent Provider Group Multiplier**
Row 5	Group A	Surgery	$900,000	$1.07
Row 6	Group B	Surgery	$1,100,000	$0.99

*D5 = ((A1 * B1) + (A2 * B2)) / (A1 + A2)*
*D6 = ((A3 * B3) + (A4 * B4)) / (A3 + A4)*

- Aggregated Physician Groups:

Data reported for aggregated physician groups identified by the OrgIDs 999998 or 999999 per the CHIA Data Specification is included in the Relative Price calculation as follows:

  - Claims payments are included in the network average service mix and the network product mix.
  - Non-Claims payments are included in the network product mix.
  - Relative price is not calculated for the aggregate physician groups not reported individually. The Base Service Weighted Multiplier is not calculated for these groups and therefore is not included in the Network Average Adjusted Rate.

- Calculation Threshold:
  The Physician Group threshold for calculating Relative Price is $20,000.

Other Provider

Payers submit data separately for the following other provider types:

- Ambulatory surgery centers
- Community health centers
- Community mental health centers
- Freestanding clinical laboratories
- Freestanding diagnostic imaging centers
- Home health agencies
- Skilled nursing facilities

Payers must report the top providers based on share of total payments, according to their contractual relationships, until at least 80% of total payments to all providers within each provider type and insurance type have been represented in the reported providers. Providers not meeting this threshold are combined and reported in aggregate with the corresponding OrgID 999901 – 999907 as defined by the CHIA Data Specifications Manual.[13]

The data elements and RP calculation method for Other Provider types are generally analogous to the Hospital Outpatient and Physician Group data and methods, with exceptions noted below.

- Other Provider Type:
  - Since RP is calculated by other provider type, the definition of network differs from hospital and physician relative price calculations. As shown in Table C, the number of potential networks in the other provider RP calculation can be up to 245.

[13] Payers are to report the top providers based on share of total payments, according to their contractual relationships, until at least 80% of total payments to all providers within each provider type have been represented in the reported providers. Payers must report aggregate data for other health care providers for that provider type. Payers must use the appropriate organization type OrgID as listed in the Data Specification Manual when reporting aggregate data for Other Providers and providers with payments less than $20,000.

- Parent Provider Group Multiplier Adjustment:
  Some payers list multiple local provider groups under a single parent provider group, with corresponding specific claims amounts, non-claims amounts, and multipliers for each local provider group. The local provider group claims, non-claims, and multiplier data must be aggregated to the parent provider group level prior to performing the Relative Price calculation.

    - Local provider groups are determined by the count of unique pediatric and non-pediatric local provider group names listed for the same parent provider group.

    - Local provider group claims and non-claims amounts are summed to the parent provider group level.

    - The parent provider group multiplier is calculated as a weighted average of the local provider group multipliers, where the weights are the claims payments by local provider group.

- Aggregated Other Provider Groups:
  Data reported for aggregated physician groups identified by the OrgIDs 999901 – 999907 per the CHIA Data Specification is included in the Relative Price calculation as follows:

    - Claims payments are included in the network average service mix and the network product mix.

    - Relative price is not calculated for the aggregate physician groups not reported individually. The Base Service Weighted Multiplier is not calculated for these grousp and therefore is not included in the Network Average Service Multiplier.

- Calculation Threshold:
  The Other Provider threshold for calculating Relative Price is $20,000.

Conclusion

CHIA's Relative Price data provides crucial information for monitoring the performance of health care providers in the Massachusetts health insurance market and bolsters the Commonwealth's goals of promoting price transparency.

CHIA will update this document to reflect any changes to RP data collection and methodology.

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