



Methodology for Health Costs for Consumers

NHID HealthCost Analysis Methodology

Overview

The [New Hampshire Insurance Department \(/new-hampshire-insurance-department\)](#) HealthCost website provides estimates of health care costs using a robust database of claims data local to New Hampshire, and includes cost information from all of the state's major health insurance companies.

The patient cost estimates are based on the median amounts paid (by both the insurance carrier and the patient) using claims data from the New Hampshire Comprehensive Health Information System (NHCHIS) database. The "cost" amount is based on the rate negotiated between health care providers and insurance companies, not the provider charges or "retail value" of the health care service. The negotiated amount is often referred to as the "allowed amount."

It has been documented in the published literature that there is substantial variation in the amounts paid for health care services, even when provided at the same hospital for similar patients. HealthCost provides further evidence of this variation among providers for the same service. There are many factors that contribute to this finding, including variation in clinical practice, billing systems, and the payment methodologies employed by health insurance companies. When the patient is insured, the patient receives the benefit of the lower payment rate negotiated between the provider and the insurance company, and any cost sharing ([deductible \(/glossary/deductible\)](#), [co-insurance \(/glossary/co-insurance\)](#), or [co-payment \(/glossary/co-payment\)](#)) is based on this allowed amount.

In this example, the patient would owe \$3,000 to the hospital:

- \$5,000 deductible
- \$4,000 hospital charge
- \$3,000 insurance company - hospital negotiated rate, or allowed amount.

When the patient is not insured, the HealthCost estimated cost for medical and dental procedures is based on charges minus any discount the provider may offer to uninsured patients. The NHID includes on HealthCost an estimated discount when the [health care provider \(/glossary/health-care-provider\)](/glossary/health-care-provider) has provided this information to the NHID. The NHID has not verified the discount amounts, and patients should expect their financial obligation to depend on individual circumstances and the specific health care provider's policies for uninsured patients.

The uninsured section of HealthCost for prescription drug pricing is based on the average allowed amount for all major insurance companies.

The methodology used in HealthCost is consistent across payers and providers by treatment type. So, the same aggregation method, rate calculations, and exclusion criteria for removing any health care service is based on an algorithm that is consistently applied from one provider to the next, and from one payer to another.

Included Costs

For many services on HealthCost, the estimate is for the total cost of a health care service and can be compared among providers who offer the same service. Outpatient tests and procedures are shown as "bundled data" with an open box symbol in front of the procedure name, and the price estimates may include multiple services or several independent providers. The estimated cost does not distinguish between what is paid to the hospital (or clinic, ambulatory surgery center, or any other facility), and physicians who treat the patient. The "lead provider" is a convenient way of aggregating cost data for what may be treatment received from several providers (billing separately).

Radiology services are shown as a modified bundle meaning that the cost estimate that is shown for these services includes the facility and the professional fees but not any other costs that the patient may have incurred on the same day. Radiology services costs are shown with the open box symbol in front of the procedure name to indicate the estimate is the total cost of that service.

When an infrequent and high cost procedure is performed in conjunction with a HealthCost procedure, then the patient's entire visit is excluded from the analysis. The entire patient experience is removed because the NHID cannot assume the more expensive procedure did not also impact the cost for performing the more routine services.

HealthCost also includes many services that are not bundled estimates. These services are distinct enough that a stand alone, unbundled cost estimate is appropriate. When an unbundled procedure is shown, there is no symbol before the procedure name, and the cost is just for the named procedure and a patient may have additional services provided at the same time.

Review of Claims Data

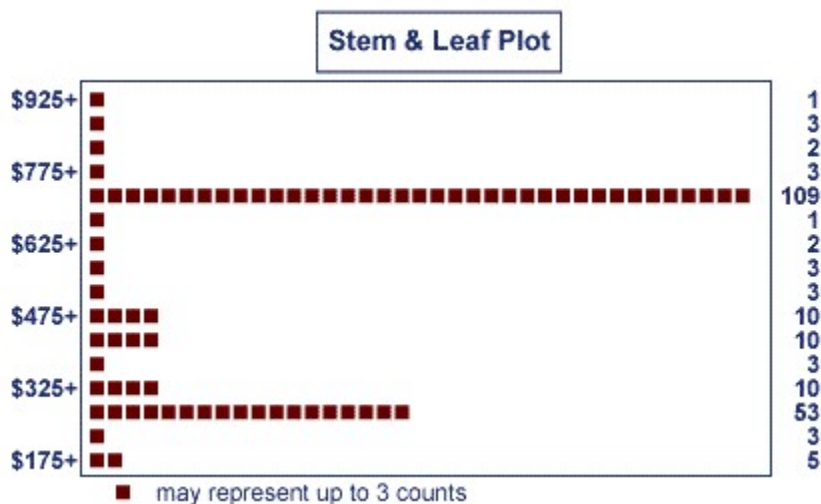
A statistical analysis of the data takes place prior to calculating separate rates by payer. The number of observations, mean, median, mode, coefficient of variation, skewness, kurtosis, extreme observation values, and graphical distributions (stem leaf plot, boxplot, and normal probability plot) of the data are evaluated to determine whether the median can be a useful estimate of cost for patients on a prospective basis. Although the median is used for the cost estimate, the evaluation of variability is around the mean. Findings that are not considered acceptable are usually one of the following: a bimodal distribution, are unusually skewed, have a high kurtosis value, the mean is substantially less than the median, or there is just a high degree of variation from one patient to another.

The following is an example of a diagnostic mammogram procedure that we did not feel met the criteria for inclusion on the HealthCost website (CPT 76091).

The summary statistics for one provider are:

N= 221
 mean= \$546
 median= \$703
 mode= \$703

A graphical representation of the data looks like:



The numbers on the left represent the various charge for the procedures, and the numbers on the right the frequency. The frequency is also represented by the number of boxes across from left to right. The first warning that there is a problem for HealthCost is that the mean is less than the median. When looking at health care cost data, the distribution is usually skewed to the right, or positive. That means there are high cost outliers that pull the average charge up, even when the charges for most of the procedures are much lower. When the median exceeds the mean, this is a sign the distribution is not typical of what we would expect when looking at health care cost data. If the distribution is not what we expect, than our assumptions in the model may not be supported.

The second major issue is that the distribution is bimodal. This distribution typically indicates that there are two different distributions, each with a single notable peak. However, it can be difficult to find the differentiating factor between the samples in one distribution and those in the other. It may patient age, prior medical history, or something influencing clinical judgment may be the cause. Summary statistics do not show the multiple charge distributions for this procedure code and would hide such a finding. We cannot make a reliable prediction whether a patient will be faced with a procedure that has a charge close to \$775, or less than \$325.

Major differences in charges for the same service among payers would be unexpected. We assume patients will not face different charges due to which insurance company they are covered by.

Calculation of Cost Estimate - Median Rate

The median treatment cost based on patient experience is reported instead of the average. For HealthCost, the median is a better measure of central tendency when predicting the cost to the patient and health plan. This is primarily because the median is influenced less than the average by outlier observations that may skew estimates.

In this example, both insurance carriers would have the same median cost reported in HealthCost:

Reimbursement Contract Rates

Proportion of Patients at Make Believe Hospital	Insurance Company A	Insurance Company B
40%	\$90	\$90
50%	\$100	\$100
10%	\$110	\$500
Median =	\$100	\$100
Average =	\$97	\$166
Total Annual Payments (1000 Visits) =	\$97,000	\$166,000

Based on the median, the range of reimbursement rates appears identical, whereas the average shows a value substantially above what most patients would experience.

Dealing with Variability

When medical cost estimates are provided on HealthCost, the NHID will include information on the variability of past patient experiences. If the historical data show low variability from one patient to the next, then this is indicated as Precision of the Cost Estimate = "HIGH." Likewise, if the historical data show extensive variation, the estimate will indicate the precision level is "LOW." When the precision level is LOW, individual patient experiences are more likely to differ from the rate estimate.

The variation in the rate is based on the coefficient of variation for charges, including all payers, and the difference between the median charge for the insurance company and the overall median for all insurance companies at the provider identified for the specific service under analysis. These values, both percentages, are summed together and translated into an ordinal scale. Like most ordinal scales, the distinction between the values at neighboring points on the scale is not necessarily the same. For instance, the range within VERY LOW and LOW might be much less than that in MEDIUM and HIGH. The scale is based on the variability among carriers for the health care service selected. The breakdown is based on percentiles, using 75th, 50th, and 25th break points.

When variability is high (Precision of the Cost Estimate="VERY LOW") and there are fewer than four patients, then the rate is not included on HealthCost.

Risk Adjustment - Some Patients are Sicker

Risk adjustment is used in HealthCost by including with estimates for bundled services a field called Patient Complexity. Risk adjustment is a relative measure for the difference in the "illness burden" of patients in the analysis, and the NHID uses the Chronic Illness and Disability Payment System from the University of California, San Diego. Risk adjustment may explain why the historical costs at one provider may exceed that of another provider. Risk adjustment includes all of the diagnoses over an extended period of time so that the effect of multiple comorbidities can be considered in evaluating patient populations. Examples of the conditions used in developing the risk score include: congestive heart failure, epilepsy, primary pulmonary hypertension, diabetes, and cancer. Patients that have multiple significant medical conditions are expected to need greater health care resources than a less complex patient population.

The application of risk adjustment is specific for the patients with the identified procedure. For example, Hospital A attracts an "average" population when all treatments are considered, but Hospital A attracts very complex patients for breast biopsies. When viewing the cost rates for breast biopsies, the Patient Complexity at Hospital A would be described as "HIGH." Please note

that the patient comorbidities considered in the risk adjustment are not necessarily related to the procedure with a cost estimate. So, Hospital A may attract a very complex set of patients with a history of mental illness and cardiovascular disease, but not cancer.

The risk adjustment value is relative, so 1.00 is the mid-point, and values above or below represent the difference in expected resource consumption. On HealthCost, the index measure is translated to an ordinal scale and the breakdown is based on percentiles, using the 90th, 75th, 25th, and 10th separation points. Like most ordinal scales, the distinction between the values at neighboring points on the scale is not necessarily the same.

The rates provided in HealthCost are not risk adjusted. They are the actual calculated rates based on the NHCHIS data and the HealthCost algorithms.

When the rates are reported as an unbundled cost, Patient Complexity is not provided. The estimated cost for unbundled services is not influenced by the number of supporting services and providers that might be included in a bundled rate for patients with a complex set of medical conditions.

Outliers

A process exists to remove outliers. Outliers are data values that do not represent the typical experience for a particular service at a particular provider location, and they can exist for several reasons. In some cases the historical claims are incomplete, such as when the providers have not billed for all the services performed during the encounter, or the insurance carrier has not processed all of the claims submitted for the visit. Alternatively, human error may result in a particular service that is coded incorrectly. An extreme example might be a service related to a kidney transplant that is coded as a kidney stone removal. In this example the cost for the kidney stone removal would appear to be excessive. Because the median is calculated instead of the average, outliers should have a small effect on the estimated costs reported in HealthCost, but they can have a substantial impact in the formula used to assess the variation in the rates.

Removal of the outliers takes place at two points. First, a ceiling for total charges in the analyses is established. The ceiling is where 95 percent of all charges fall below, across all providers. Observations above the ceiling are removed.

The second point where outliers are removed is after analyzing a specific provider's experience. Patients with total charges in the lowest one percentile or highest fifth percentile are removed from the analysis. The calculations of the percentiles are done using standard statistical conventions, so if the observation values do not vary much from each other, it is unlikely any will be removed.

Use of Procedures Codes:

The health care services on HealthCost are selected using the American Medical Association's Current Procedural Terminology (CPT) code or the American Dental Association Dental Procedure (CDT) codes. Since many of the codes are quite specific, a record count by CPT/CDT code is performed among codes that are for a similar service (e.g. all CPT codes for mammograms) and the frequency distribution is evaluated to see which codes are the most common. A review of the CPT/CDT code description takes place, to determine the simplest and most easily recognized procedure. A combination of frequency, simplicity, and consumer familiarity is used to determine which procedure code is used on HealthCost. When available, clinical insight is also considered.

In some cases, multiple CPT/CDT codes may be included under a single service. Sometimes this is due to changes in the CPT/CDT coding scheme, and other cases, changes in the technology available or the delivery of care. Codes will be combined as long as the cost is similar. A move from analog to digital mammograms is one example.

For unbundled services, the cost estimate is simply a calculation at the CPT/CDT code level for the service and the provider. While the algorithm for calculating unbundled services is the same as for bundled services, the variability among different patient experiences is much lower.

Prescription Drug Pricing *temporarily unavailable*

The algorithm for pharmacy estimates is similar to the medical costs, including a suitability review and the median cost, but does not remove outliers nor calculate a Precision of the Cost estimate. Prescription drug pricing for the same drug may differ for several reasons, but the basic concepts that apply to medical care costs carry over to the pharmacy world. For prescription drugs, there is a pharmacy charge for the drug, a negotiated payment level (allowed amount), and the cost sharing that determines what the patient must pay when picking up the prescription. The cost sharing is usually the copay amount, but some benefit designs include coinsurance or deductibles that also apply to prescription drugs.

HealthCost drug cost estimates are calculated using the negotiated amount, or allowed price for the drug. New Hampshire insurance law requires that patients be given the benefit of the negotiated prescription price, even when the copayment amount exceeds the charge of the drug. In the following example, the patient should only pay \$10:

- benefit prescription drug copay is \$25
- drug charge is \$20
- negotiated or allowed amount is \$10.

Drug names on HealthCost may be the generic or brand name. When looking up a medication, make sure you are familiar with both. In addition to the different prices negotiated by the carrier/PBM for each pharmacy, drug cost estimates may differ depending on how the

prescription is administered (e.g. aerosol vs. capsule), dosage, days supply, and quantity. These distinctions are provided on HealthCost for your benefit. Estimates are calculated separately for each of these differences.

****NH identified problems with the prescription drug cost information that was submitted to the state and is working with the submitters to receive correct data before posting drug estimates again****

Statewide Reports

HealthCost provides a Statewide Rates Report that can be downloaded from the home page. These rates are calculated at the CPT code level, separated by the provider type, and are intended for the provider and insurance company audiences to better understand competitive market rates. The mean, median, and interquartile rates are calculated for both provider charges and the allowed amounts, and they are specific by carrier (in separate sheets). These data are unfiltered rates with no outlier exclusion criteria or statistical review by the NHID.

Inflation

Since the rates on HealthCost are based on historical data, the NHID inflates the median values calculated from the data. The inflation rate added is five percent per year. The data in the Statewide Reports does not have the inflation factor applied.

Quality Indicators

HealthCost uses data from the Joint Commission, an organization with a long proven ability to identify, test, and specify standardized performance measures. The Joint Commission's National Quality Improvement Goals (NQIGs) data collection initiative obtains data on quality of care indicators in up to five treatment areas: heart attack, heart failure, community acquired pneumonia, pregnancy and related conditions, and surgical infection prevention. These conditions are the most common reasons that patients go to the hospital and they affect hundreds of thousands of patients each year. Patients who are treated according to the guidelines stated in the NQIGs are more likely to improve or and have good outcomes of care.

More information on the methodology used by the Joint Commission can be found here:

<http://www.healthcarequalitydata.org/Data.aspx#Professionals>
(<http://www.healthcarequalitydata.org/Data.aspx#Professionals>)

Quality information is collected using patient data from hospitals, and these data are recorded through the Centers for Medicare & Medicaid Services (CMS) Hospital Quality Initiative. [The Hospital Quality Initiative \(https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/downloads/HospitalOverview.pdf\)](https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/downloads/HospitalOverview.pdf)
(<https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/downloads/HospitalOverview.pdf>)

<https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/downloads/HospitalOverview.pdf>) uses a variety of tools to help stimulate and support improvements in the quality of care delivered by hospitals. The intent is to help improve hospitals' quality of care by distributing objective, easy to understand data on hospital performance, and quality information from consumer perspectives. Timeliness of care and other CMS measures methodology can be found here:

<https://www.medicare.gov/hospitalcompare/Data/About.html>

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Hospitals are shown as better than average, below average, and near average. These ratings indicate how a hospital compares to the national average. If a hospital is within 5% of the national average, it is given a yellow circle that indicates near the average. Greater than 5% in either direction results in a triangle which indicates either better or below average.

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This website was developed by the New Hampshire Insurance Department and the University of New Hampshire Mobile Development team and is maintained by the Department in cooperation with Human Services Research Institute.

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