HCCI HEALTH CARE COST INSTITUTE

2012 Health Care Cost and Utilization Report

Analytic Methodology

November 6, 2013

Note: This analytic methodology is appropriate for the *2012 Health Care Cost and Utilization Report*, as our methods are continually refined. Interested parties are encouraged to refer to the appropriate methodology and report.

HCCI HEALTH CARE COST INSTITUTE

Table of Contents

1. Introduction

For the *2012 Health Care Cost and Utilization Report*, the Health Care Cost Institute (HCCI) presented national and subnational benchmarked statistics of health care spending, utilization, prices, and service intensity for the population of individuals younger than 65 and covered by employer-sponsored private health insurance (ESI). The data behind these statistics came from a national, multipayer, commercial health care claims database created by HCCI containing information provided by three major insurers. As of July 2013, HCCI held approximately 1 billion commercial medical and pharmacy claims per year, representing the health care activity of more than 50 million individuals per year for the years 2007 through 2012. This document, the latest in a series of analytic methodologies from HCCI, describes in detail the methods used to transform raw claims into descriptive statistics.

For the annual *Health Care Cost and Utilization* reports, HCCI produced an analytic subset of its database, consisting of all non-Medicare claims on behalf of beneficiaries younger than age 65 covered by ESI and whose claims were filed with a contributing health plan between 2007 and 2012. Figure 1 shows the process HCCI used to clean the employer-sponsored health insurance claims data. It categorized claims, flagged chronically ill populations, calculated utilization, and determined resource intensity weights. HCCI made this data representative of the national population younger than 65 and having ESI using population weights based on U. S. Census Bureau data. For both the 2011 and 2012 reports, HCCI used a completion method to estimate the components of claims that were incomplete at the end of the reporting period. No adjustment was performed for inflation, so the estimated dollars in these reports are nominal.

FIGURE 1: PROCESS FLOW

A note on premiums

HCCI does not report on premiums or their determinants. For more information on health insurance premiums and the multiple factors that affect them (including health care expenditures;

insured, group, and market characteristics; benefit design; and the regulatory environment), see Congressional Research Service, *Private Health Insurance Premiums and Rate Reviews, 2011*;[1] American Academy of Actuaries, *Critical Issues in Health Reform: Premium Setting in the Individual Market, 2010*;[2] and Congressional Budget Office, *Key Issues in Analyzing Major Health Insurance Proposals, Chapter 3, Factors Affecting Insurance Premiums, 2008*.[3]

Changes in the methodology (August 2013)

Compared to earlier versions, HCCI's newest analytic methodology (v. 2.8) has a number of changes designed to respond to inquiries about methods and enhance reporting. Specifically, in the *2012 Health Care Cost and Utilization Report*, HCCI:

- changed the age groupings to correspond to the Affordable Care Act provision enabling children through age 25 to be covered on their parents' insurance for qualifying plans;
- updated age, gender, and geographical weights using the American Community Survey to reflect the years 2009–2011;
- excluded Puerto Rico along with other U.S. territories, thus limiting reporting to spending for individuals residing in the 50 U.S. states and the District of Columbia;
- performed a limited number of updates on the diagnosis related group (DRG), relative value unit (RVU), and ambulatory payment category (APC) weights used to account for intensity in its intensity-adjusted price calculation. The majority of codes reflect the 2010 indices, with only new or adjusted categories reflecting 2011 and 2012 values; and
- for the first time, tracked expenditures, utilization, prices, intensity, and intensity-adjusted weights for individuals with chronic conditions such as diabetes, mental health, and substance use.

HCCI HEALTH CARE COST INSTITUTE

2. Methods

2.1 Data collection

HCCI has access to health care claims data for approximately 50 million Americans in every year between 2007 and 2012. This dataset was developed from de-identified claims data that were compliant with the Health Insurance Portability and Accountability Act (HIPAA) and included the allowed cost (actual prices paid) to providers for services.

To produce the findings in the *2012 Health Care Cost and Utilization Report*, HCCI used an analytic subset of its data consisting of all eligible claims for insureds younger than age 65 and covered by either fully-insured or self-insured employer-sponsored health insurance (ESI). The final analytic subset consisted of about 40 billion covered lives, for the years 2007 through 2012 (Table 1). The claims used in the 2012 report, 5.4 billion claim lines, represent the health care activity of about 25 percent of all individuals younger than 65 and having ESI, making this one of the largest data collections on the privately insured ever assembled.

TABLE 1: ANALYTIC SUBSET FOR 2012 REPORT – TOTAL COVERED LIVES BY CALENDAR YEAR

	2010 Reports	**2011 Reports**	**2012 Reports**
Year	Covered Lives	Covered Lives	Covered Lives
2007	33,400,000	40,700,000	40,900,000
2008	34,000,000	41,200,000	41,300,000
2009	34,100,000	41,100,000	41,100,000
2010	33,100,000	40,000,000	40,000,000
2011	*	39,500,000	39,600,000
2012	*	*	40,000,000

Source: HCCI, 2013. Notes: Data refer only to HCCI holdings of claims for beneficiaries covered by employer-sponsored health insurance and younger than age 65. HCCI datasets include additional data on the individually insured, Medicare Advantage, and other covered beneficiaries not used in these reports. Data rounded to the nearest 100,000.

Between January 2012 and July 2013, each contributing insurer updated the 2007-2011 claims data they previously submitted to HCCI in addition to providing new data from 2012. HCCI's data manager confirmed the data integrity of each claims file (membership, medical, and pharmacy) in each year with the appropriate data contributor.

From these base datasets, a single analytical dataset was constructed for analysis using the process shown in Figure 1. Analysis of the analytic dataset is described in Section 3.

2.2 Claims categorization

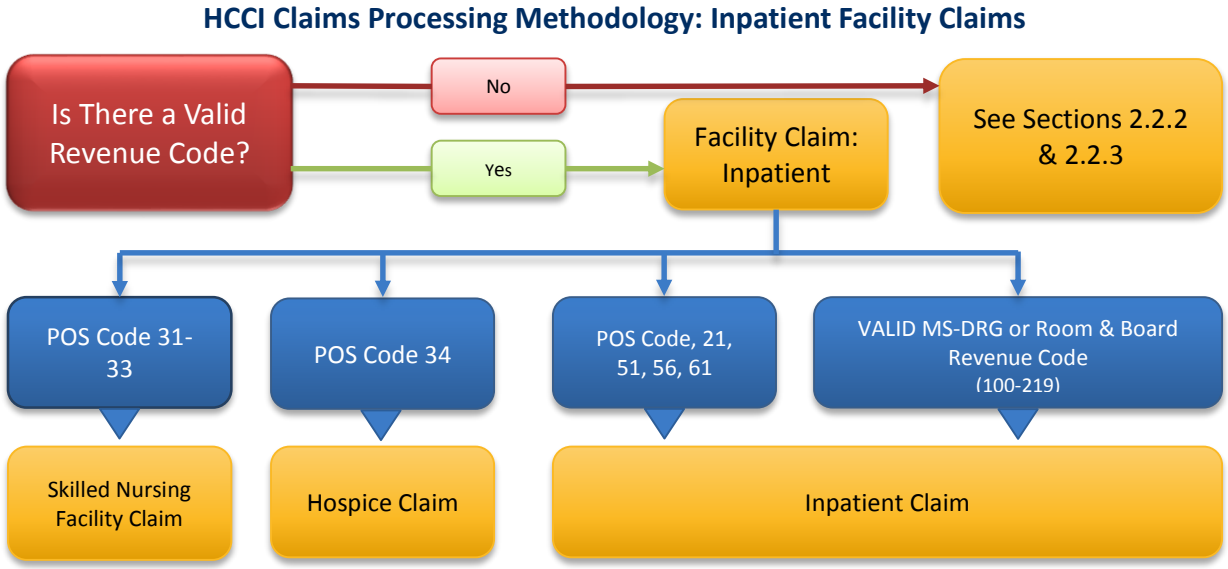
At the highest level, claims data were grouped into four service categories: inpatient facility, outpatient facility, professional procedure, and prescription drug. HCCI also divided claims into several subservice categories: inpatient facility subset excluding skilled nursing facilities, hospice, and ungroupable claims; outpatient facility visits; outpatient other claims; brand prescriptions; and generic prescriptions.

Inpatient facility claims were from hospitals, skilled nursing facilities (SNFs), and hospices, where there was evidence that the insured stayed overnight (Figure 2). The outpatient facility category contained claims that did not include an overnight stay but included observation and emergency room claims (Figure 3). Both outpatient and inpatient claims were for only the facility charges associated with such claims. HCCI classified professional procedural services provided by physicians and nonphysicians according to the industry's commonly used procedure codes (Figure 4), and the claims were grouped into primary care or specialist care. Prescription claims were coded into 30 therapeutic classes and grouped as either generic or brand name prescriptions (Figure 4).

2.2.1 Facility claims

HCCI categorized claims that were billed by places of services as "facility claims." Medical claims with a valid revenue code (i.e., a code assigned to a medical service or treatment for receiving proper payment) were assumed to be facility claims. Failing that, claims were assumed to be professional procedural claims. All lines within a claim were for services delivered by a single provider, so if at least one of the claim lines had a valid revenue code (denoting a facility provider type), all service lines of the claim were categorized as facility. Once processed, facility claims were grouped into two major service categories—inpatient and outpatient (Figure 2 and Figure 3).

FIGURE 2: FACILITY CLAIMS PROCESS, INPATIENT



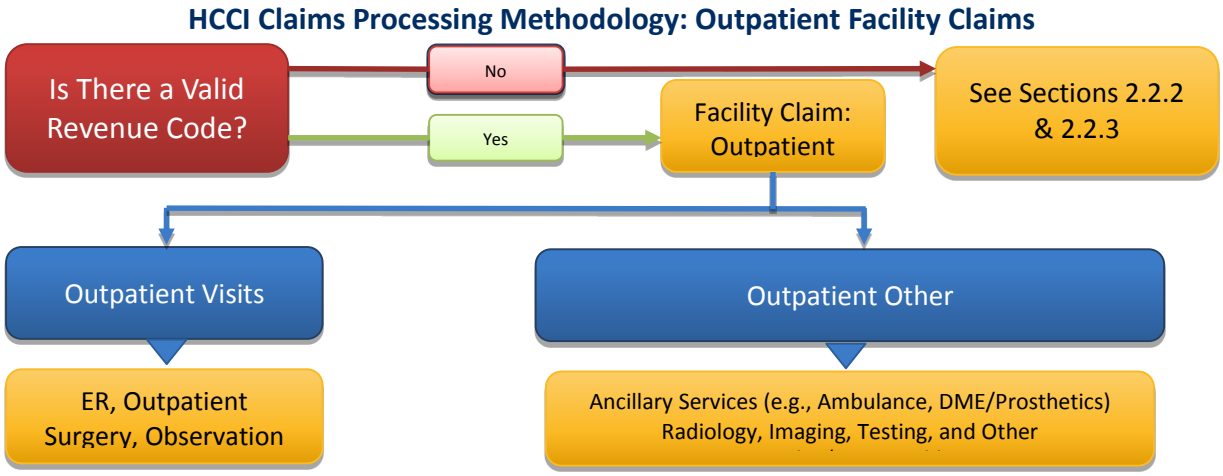
Source: HCCI, 2013.

2.2.1.1 Inpatient facility claims

Inpatient services are rendered when patients are kept overnight for treatment but not observation (Figure 2). The inpatient services category included claims with the following criteria: place of service (POS) codes 21, 51, 56, and 61; a valid Medicare Severity Diagnosis-Related Group (MS-DRG) code; or a room and board revenue code of 100-219. This category also included skilled nursing facility (SNF) and hospice claims.

- Inpatient claims were further classified into one of the following four detailed categories based on the MS-DRG code: *Medical, Surgical, Deliveries and Newborns, or Mental Health and Substance Use* (Appendix 4.1).
- Inpatient services were also grouped into mutually exclusive major diagnostic categories (MDCs), developed from ICD-9-CM diagnostic codes (Appendix 4.2).
- SNF and hospice: SNFs provide nursing and rehabilitation services but with less care intensity than would be received in a hospital. This category was used when the POS code was 31-33.[4] Hospice is special care provided by a program or facility for the terminally ill. This category was used when the POS code was 34.
- Some inpatient facility claims could not be categorized as described above; these claims were treated as ungroupable. Less than less than 0.1% of inpatient claims were ungroupable.

FIGURE 3: FACILITY CLAIMS PROCESS, OUTPATIENT



Source: HCCI, 2013.

2.2.1.2 Outpatient facility claims

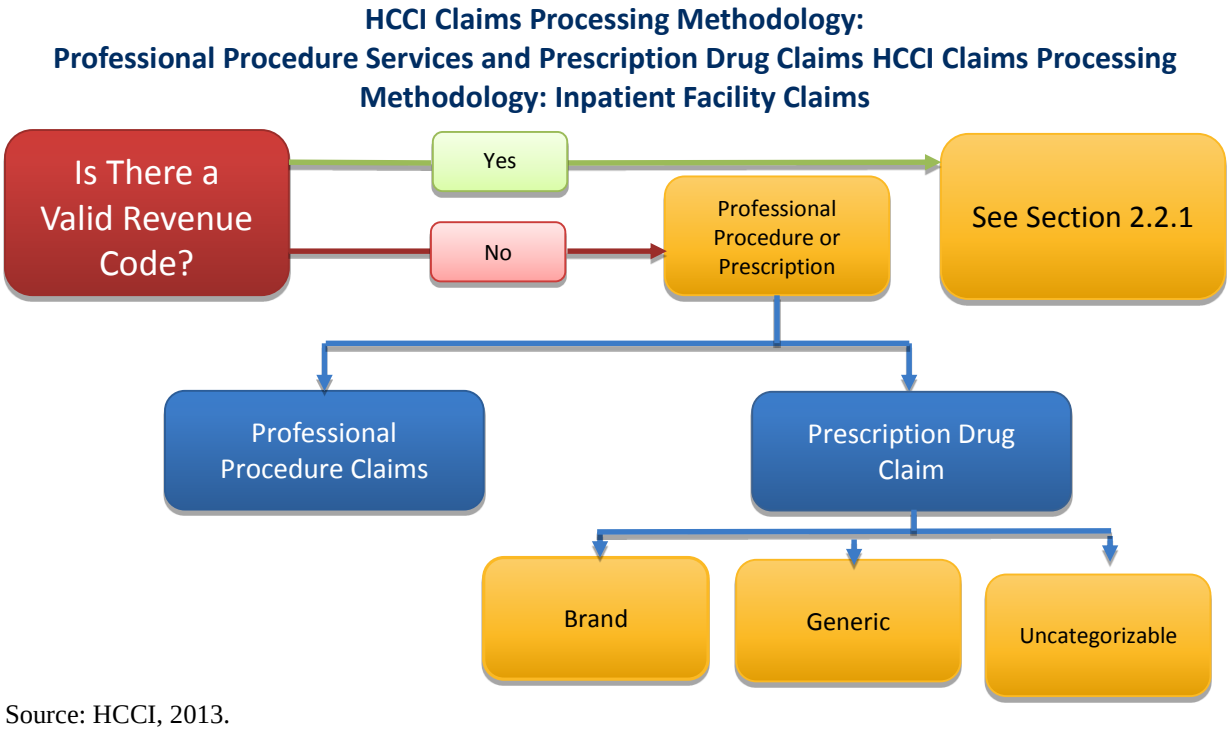
Outpatient services are rendered by a section of a hospital that provides medical services that do not require an overnight stay or hospitalization (e.g., emergency room [ER], outpatient surgery, observation room). These services can also be provided at freestanding outpatient facilities (e.g., radiology clinic). The outpatient category was used for all facility claims not characterized as inpatient (Figure 3).

- Outpatient claims were classified into subservice categories on the basis of both revenue code and the Current Procedural Terminology/Healthcare Common Procedure Coding System (CPT/HCPCS) code. Outpatient claims may have multiple services billed on the same claim, so a hierarchy system was used to determine which detail line to use for categorization (Appendix 4.3).
- The categories with the highest ranking values were ER, outpatient surgery, and observation. Claims with these services were categorized as visits, in which all the detailed records on the claim were grouped together in a single visit and assigned to the detailed category with the highest hierarchy value.
- Outpatient services not categorized as ER, outpatient surgery, or observation were counted as "outpatient other."[5] Therefore, each service on the claim was categorized and counted separately.

- Outpatient exceptions: Claims without the presence of a revenue code for services with CPT/HCPCS codes for ambulance, home health, and durable medical equipment/prosthetics/supplies were mapped to the outpatient ancillary services category. Hospice procedures given as outpatient services are categorized as outpatient other claims.

2.2.2 Professional procedure and prescription claims

FIGURE 4: PROFESSIONAL PROCEDURE AND PRESCRIPTION CLAIMS PROCESSES



Source: HCCI, 2013.

2.2.2.1 Professional procedure claims

Professional procedure claims are claims filed by a health care professional for medical services provided (Figure 4). Claims with no valid revenue code were assumed to be a professional procedure claim.

Claims were classified into HCCI's professional procedure detailed categories based on their CPT/HCPCS code (Appendix 4.4). Exceptions to the professional procedure codes were all facility-administered drugs, CPT/HCPCS codes J0000–J9999, and were mapped to the

administered drugs detailed service category within professional procedures, regardless of whether a revenue code was present on the claim.

If information was available, the claim was then also categorized by the provider's specialty (Appendix 4.4). Physicians and other professionals were categorized as primary care providers if they were coded as family practice, geriatric medicine, internal medicine, pediatrics, or preventive medicine.

2.2.2.2 Prescription drug claims

As seen in Figure 4, prescription drug or pharmacy claims were categorized as either brand or generic on the basis of their National Drug Code (NDC). Any drug unidentifiable as either brand or generic was grouped as "uncategorized". These uncategorizable drugs are included in the overall prescription drug trends, but not included as a subservice category of prescriptions. Administered drugs and any devices identified as professional procedures rather than scripts were categorized as professional procedures (Appendix 4.4). Prescription claims were grouped into one of the 30 American Hospital Formulary Service (AHFS) therapeutic classes based on the claim's NDC. AHFS therapeutic classes are developed and maintained by the American Society of Health-System Pharmacists.[6]

2.3 Chronic conditions categorization

In July 2013, HCCI retrospectively implemented a methodology to group claims according to major chronic condition categories. The first two sets of conditions to be grouped were diabetes and mental health/substance use (MHSU). By grouping claims according to these categories, HCCI, in effect, grouped individuals as being either diabetic, having an MHSU condition, having both, or having neither. The methodologies for these groupings follow.

2.3.1 Diabetes

HCCI identified diabetics using codes based on the 2004 Dictionary of Disease Management Terminology (DDMT).[7] On the advice of chronic condition experts, HCCI relied on the DDMT for categorization rather than the 2013 Healthcare Effectiveness Data and Information Set[8] specification for comprehensive diabetes care or the Clinical Classifications Software (CCS)[9] categories for diabetics (Appendix 4.5).

HCCI added a diabetes flag to the insured data on the basis of the DDMT methodology. For each year between 2007 and 2012, HCCI flagged insureds as diabetic. If the principal, secondary, or

tertiary diagnosis for (1) two office visits during the year, (2) one or more ER visits, or (3) one or more inpatient admissions was a DDMT diabetic category, the insured was flagged as diabetic for that year. Once an insured was flagged as a diabetic, he or she was flagged in all subsequent years. HCCI excluded radiology and laboratory claims from the diabetes methodology, as these can be used for screening purposes.

2.3.2 Mental health/substance use

HCCI identified individuals with MHSU conditions on the basis of CCS codes, after consultation with subject matter experts (see Appendix 4.6). In 2013, HCCI added an MHSU flag to the insured data. For each year between 2007 and 2012, HCCI reflagged insureds as MHSU. If the principal, secondary, or tertiary diagnosis for (1) two office visits during the year, (2) one or more ER visits, or (3) one or more inpatient admissions fell into a CCS MHSU category, the insured was flagged as having an MHSU condition in that year. An MHSU flag for a particular insured could change from year to year.[10]

2.4 Grouping and counting methodologies

2.4.1 Unit counting (utilization) methodology

To correctly calculate the utilization count, HCCI analyzed reimbursements for claims. In the following rules, *reimbursement* refers to any monetary payment to a provider, whether a professional procedure provider, facility, or pharmaceutical vendor.

- If the reimbursement dollars for an admission, visit, or professional procedure were equal to 0, the utilization count was set at 0.
- If the reimbursement dollars for an admission, visit, or professional procedure were less than 0, the utilization count was set at minus 1. Negative reimbursement amounts occur from claim reversals, making it important to reverse the utilization count as well.
- If the reimbursement dollars for an admission, visit, or professional procedure were greater than 0, the utilization count was set at 1.

Service category-specific rules are as follows:

- Inpatient, SNF, and hospice facility
    - If multiple claims had the same patient identification, facility categorization (inpatient, SNF, or hospice), and provider with overlapping or contiguous admission or discharge dates, they were grouped into one admission.
    - The length of stay was determined as the discharge date less the admission date. If multiple claims were combined into one admission, the discharge date used was the latest discharge date among all claims; the admission date used was the earliest admission date among all the claims.
- Outpatient facility
    - For ER, outpatient surgery, and observation claims (outpatient visits):
        - a visit was defined as all claims for the same patient, same provider, and same beginning service date;
        - if a claim had multiple beginning service dates among its various detail claim lines, the earliest date was used as the beginning service date for the entire claim.
    - For all other outpatient claims, utilization counts were record counts adjusted for the reimbursement dollars. These are referred to as outpatient other counts.[11]
- Professional procedures

For all professional procedure claims, utilization counts were record counts adjusted for the reimbursement dollars and are referred to as professional procedure counts.

- Prescriptions

Prescription drug claims were captured by scripts filled. Each prescription refill was considered a claim, as was every prescription; therefore, if a prescription was filled four times, four claims were counted. For the *2012 Health Care Cost and Utilization* Report HCCI calculated utilization through filled days, since scripts may be for different lengths of time and obscure changes in prescription utilization.

2.4.2 Intensity weights methodology

In general, intensity reflects the complexity of the service provided or the level of resources required for treatment. HCCI divided price per medical service into two components—intensity-adjusted price and intensity per service. The following section provides details on how intensity weights were assigned by service category. Our methodology bears some resemblance to that employed in Dunn, Liebman, and Shapiro.[12] For the *2012 Health Care Cost and Utilization Report*, HCCI did not implemented an intensity-weighting strategy for pharmacy claims.

2.4.2.1 Inpatient facility subset: excluding SNF, hospice, and ungroupable

To weight inpatient facility claims, HCCI excluded SNF, hospice, and ungroupable claims, as these do not have intensity weights. This limited inpatient categorization is referred to as the "inpatient subset". Each inpatient subset admission was assigned an MS-DRG or DRG code to which a weight was assigned. The Centers for Medicare & Medicaid Services (CMS) assigns every DRG a weight on the basis of the average costs to Medicare of patients classified in that DRG. The weight reflects the average level of resources expended for the average Medicare patient in that DRG relative to the average level of resources for all Medicare patients. DRGs that are more expensive to treat get a higher weight and vice versa. In this way, DRG weights reflect intensity of treatment. The weights used were generally for fiscal year 2010, with additional 2011 or 2012 weights when applicable, as published by CMS.

2.4.2.2 Outpatient facility

To weight outpatient facility claims, each claim line was mapped to a payment code in the Ambulatory Payment Classification (APC) system based on the CPT/HCPCS code on the claim line. The APC weights used were generally for calendar year 2010; additional 2011 or 2012 weights, as published by CMS, were used when applicable.

For claims that could not be mapped to an appropriate APC, weights were assigned on the basis of relative value units (RVUs) for facility procedure codes. RVUs, which are based on the resources required to complete each service, are determined by the American Medical Association and published by CMS. RVU weights were adjusted as were APC weights, based on the difference between calendar year 2010 RVU conversion factor and calendar year 2010 APC base rate.

2.4.2.3 Professional procedures

Each professional procedure was mapped to a CPT/HCPCS code (Appendix 4.4) and was assigned an RVU, either facility or non-facility, on the basis of the place of service. Professional

procedures are provided in various settings – hospitals, outpatient facilities, or physician offices. The RVUs used were generally for calendar year 2010; additional 2011 or 2012 weights, as published by the CMS, were used when applicable. Commercial adjustments were made to account for professional procedures not commonly seen in Medicare claims and for certain professional procedures such as anesthesia. The commercial modifiers are proprietary; therefore, HCCI cannot publish them.

2.4.3 Methodology for imputing missing weights

For outpatient and professional procedure claim lines that were not assigned weights using the methods described, an analysis was conducted to impute a weight. Weights were not imputed for inpatient admissions. The imputation analysis followed four key steps:

- Step 1: A detailed service category was determined for each of the professional procedure codes or revenue codes to be imputed (referred to as imputed codes; see Sections 2.2.1 and 2.2.2).
- Step 2: The average price paid and average APC/RVU weight for each detailed service category were calculated on the basis of the claims with *assigned* weights.
- Step 3. The price ratio between each imputed code and the average price of the corresponding detailed service category was calculated.
- Step 4. The weights for each imputed code were calculated.

2.5 Adjustment methodologies

2.5.1 Claims completion methodology

Claims data reflect health care services performed (i.e., claims incurred) in the year noted. Claims generally require time for submission to the payer, processing, and payments to the provider (sometimes called the claim payment lag time, or run-out period).

Completion is a standard actuarial practice designed to allow for the calculation of utilization, prices, expenditures, and intensity of health care services when a full set of claims is not available. Services that have outstanding claims may have a missing or incomplete record. Completion allows for the estimation of the cost impact of the outstanding claims to avoid undercounting or under-projecting trends.

Subsequent adjustments, or completion factors, varied by type of measure (i.e., dollars, unit counts, and intensity weights) and detailed service category (i.e., subgroups within the service categories, see Appendix Tables 4.3, 4.4, and 4.5). The factors were based on historical claims payment patterns specific to the HCCI dataset. They were developed using a standard actuarial model for incurred-but-not-paid analysis, as described by Bluhm (Appendix 4.7).[13]

For the *2012 Health Care Cost and Utilization Report*, the claims from 2011 were collected to reflect claims that were closed between data collection times (June 2012–June 2013). The 2012 claims were collected after 6 months of lag time, paid as of June 30, 2013. An adjustment was needed to account for the remaining 2011 and 2012 medical claims that would be paid after June 30, 2013. Prescriptions were considered complete and were not adjusted with completion factors. Claims from 2007 to 2010 were assumed to be fully adjudicated.

2.5.2 Population weighting methodology

A combination of U.S. Census Bureau surveys was used in HCCI's estimation process of the total ESI population (Appendix 4.8). Foremost, the American Community Survey (ACS) was used to establish a distribution of privately insured people across demographic and geographic characteristics.[14]

To develop demographic and geographic weights, the 3-year averages from the 2009 through 2011 ACS survey were used (single-year estimates were not used, as they can fluctuate in smaller counties). Estimates of the privately insured population were calculated as follows:

ACS privately insured[15] = ACS all insured – ACS publicly insured

Demographic and geographic divisions used were as follows:

- geographic divisions: Core-Based Statistical Area–Metropolitan Statistical Area (CBSA-MSA) and state. Counties that did not map to a CBSA-MSA code—namely, rural counties--were aggregated into a single area by state such that each state had a single "rural area" of counties. Individuals in the dataset may have had more than one state or CBSA listed. This could be due to and insured moving during the year or overlap of CBSAs (e.g., Virginia, Maryland, and the District of Columbia); this affected less than 1 percent of individuals in the dataset;
- age divisions: younger than 6 years of age, 6–18, 19–25, 26–44, 45–54, and 55–64 (Individuals older than age 64 were excluded); and

- gender divisions.

The distribution of the privately insured for these 4,992 distinct age, gender, and geographic categories was developed and used for all years (Appendix 4.6).

2009–2011 age-gender-geo weight = (ACS-estimated privately-insured population for the age-gender-geo category measured) / (2009-2011 ACS average national privately-insured population estimate)

The HCCI data were also aggregated by geographic division, age group, and gender. This enabled the development of weights using the survey-based targets discussed earlier. The weights were applied to insureds and claims, resulting in representative estimates of the national ESI population younger than age 65. For example, weights by age group and gender for 2012 were calculated as follows:

CBSA age-gender weight = (2009-2011 age-gender-geo weight at CBSA-MSA level) * (HCCI 2011 total insured count) / (HCCI 2012 insured count at CBSA-MSA level for individuals in the CBSA-MSA)

Non-CBSA age-gender weight = (2009-2011 age-gender-geo weight at state level for beneficiaries in non-CBSA counties) * (HCCI 2012 total insured count) / (HCCI 2012 insured count at state level for individuals without a CBSA-MSA code)

HCCI HEALTH CARE COST INSTITUTE

3. Analysis

The analytic dataset was composed of information on expenditures, prices paid, utilization, and intensity for insureds younger than 65 and covered by ESI. The statistics were weighted by geography-age-gender to be nationally representative. Analyses consisted of summary statistics on spending and the components of spending. Demographic flags were included for:

- four US census regions (West, Northeast, Midwest, and South);
    - nine US census divisions (New England, Mid-Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, Pacific);
- five age subgroupings (ages 0–18, 19–25, 26–44, 45–54, and 55–64);
    - four children age subgroupings (ages 0-3, 4-8, 9-13, 14-18); and
- gender.

HCCI divided claims into four service categories: inpatient facility, outpatient facility, professional procedures, and prescriptions. Within those categories were subservice and detailed services:

- five subservice categories (inpatient subset without skilled nursing facility, hospice, and ungroupable claims; outpatient visits; outpatient other; generic prescriptions; and brand name prescriptions); and
- multiple detailed service categories (e.g., major diagnostic categories).

In the *2012 Health Care Cost and Utilization Report*, HCCI produced five report tables for the service and subservice categories, consisting of: annual expenditures per capita, annual out-of-pocket expenditures per capita, annual payer expenditures per capita, utilization per 1,000 insureds, average prices, average intensity, and average intensity-adjusted prices. HCCI also produced an appendix (*2012 Health Care Cost and Utilization Report Appendix),* which included multiple detailed service category descriptive statistics for the foregoing list of benchmarks, and expanded this to include gender, regional, and age group–level statistics. Definitions of terms used in the report can be found in the glossary on the HCCI Website.

3.1 Annual expenditures per capita

HCCI captured per capita health care spending on people with ESI by summing in each year all the weighted dollars directly spent on health care services for filed claims and dividing that amount by the number of insured-years. By this method, the per capita health expenditures in the report estimates the cost per insured, even for insureds who did not use health care services.[16] This metric is a subset of overall national health care spending and may not be comparable to other metrics of national spending because it covers only persons having group ESI and younger than 65 years.

Similar methods were used to calculate expenditures per capita out-of-pocket and expenditures per capita by payers.

3.2 Utilization per 1,000 insured

In the annual *Health Care Cost and Utilization Report*s, HCCI calculated utilization rates per 1,000 insureds. The total service count was produced by summing for each service category the admissions, professional procedures, visits, scripts, or filled prescription days. The resulting amount was divided by the number of insured-years. This provided a per-individual utilization count by service category, which was then multiplied by 1,000.

3.3 Average price per service

In the annual *Health Care Cost and Utilization Report*s, HCCI calculated average price per service by dividing total expenditure by total utilization per service or subservice category. By this method, the derived calculation includes the "prices" paid by the payer and the insured out of pocket.

3.4 Decomposition of expenditures per capita

In the annual *Health Care Cost and Utilization Report*s, estimated health care expenditures were determined by the prices paid to providers for each service and the amount of service (utilization). HCCI decomposed spending trends into a price trend and a utilization trend to determine the major drivers of the health care cost curve.

3.5 Decomposition of average prices

HCCI also decomposed prices per service into a complexity of services (intensity) component and an intensity-adjusted price component to help isolate whether price per service increases were driven by intensity of care or rising unit prices. Intensity-adjusted price, or unit price, gives HCCI the average allowed cost per service, deflated by the sum of the weights across all the services in the category, or average price per service weight. Because weights are a measure of how much care is required to treat a patient in a given service category, the sum of the weights is a measure of the total amount, or intensity of care, delivered.

SNF, hospice, and ungroupable inpatient admissions have inconsistent DRG codes, creating difficulty in calculating intensity and intensity-adjusted price for these service categories. Therefore, inpatient facility intensity and intensity-adjusted price trends are reported for the inpatient subset without SNF, hospice, and ungroupable claims.

Outpatient and professional procedure claims were assigned weights using the relevant APC or RVU codes, as discussed above (see 2.4.2 and 2.4.3). After weights were assigned to outpatient services and professional procedures, HCCI calculated intensity per service.

Using the DRG weights allowed HCCI to measure differences in how much service a typical admission got on the basis of the DRGs in that admission category. Intensity-adjusted prices were calculated for the inpatient, outpatient, and professional procedure service categories. These were not calculated for prescriptions because they were not assigned intensity weights.

3.6 Population membership

Membership in the ESI population is calculated as the total number of months individuals are insured. From this member years are calculated by member months divided by 12, to estimate 12 months of coverage or the cost for a year of health care.

4. Appendix

4.1 Inpatient facility detailed service categories and corresponding MS-DRG codes [V26.0]

Medical	Surgical and Transplant	Deliveries & Newborns	Mental Health & Substance Use
52–103	1–13	765–768	876
121–125	20–42	774 & 775	880 – 887
146–159	113–117	789–793	894 – 897
175–208	129–139	794 & 795	
280–316	163–168		
368–395	215–265		
432–446	326–358		
533–566	405–425		
592–607	453–517		
637–645	573–585		
682–700	614–630		
722–730	652–675		
754–761	707–718		
776–782	734–750		
808–816	769 & 770		
834–849	799–804		
862–872	820–830		
913–923	853–858		
933–935	901–909		
945–951	927–929		
963–965	939–941		
974–977	955–959		
998	969 & 970		
	981–989		

4.2 Mapping to MS-DRG codes

MDC	Major Diagnostic Category Description	MS-DRG
1	Nervous system	020–103
2	Eye	113–125
3	Ear, Nose, Mouth, & Throat	129–159
4	Respiratory System	163–208
5	Circulatory System	215–316
6	Digestive System	326–395
7	Hepatobiliary System & Pancreas	405–446
8	Musculoskeletal System & Connective Tissue	453–566
9	Skin, Subcutaneous Tissue, & Breast	573–607
10	Endocrine, Nutritional, & Metabolic System	614–645
11	Kidney & Urinary Tract	652–700
12	Male Reproductive System	707–730
13	Female Reproductive System	734–761
14	Pregnancy; Childbirth	765–782; 998
15	Newborns & Neonates (Perinatal Period)	789–795
16	Blood, Blood-Forming Organs, & Immunological Disorders	799–816
17	Myeloproliferative Diseases & Disorders	820–849
18	Infectious & Parasitic Disease & Disorders	853–872
19	Mental Diseases & Disorders	876–887
20	Alcohol/Drug Use or Induced Mental Disorders	894–897
21	Injuries, Poison, & Toxic Effects of Drugs	901–923
22	Burns	927–935
23	Factors influencing Health Status	939–951
24	Multiple Significant Trauma	955–965
25	Human Immunodeficiency Virus Infections	969 – 977
PR	Transplants	001 – 017
AL	Extensive Procedures Unrelated to Principal Diagnosis	981-989, 999

HCCI HEALTH CARE COST INSTITUTE

4.3 Outpatient facility service categories mapping to CPT/HCPCS/revenue codes/hierarchies

HCCI Sub-service Category	HCCI Detailed Service Category	Revenue Codes Mapping (standard UB92 codes only)	2012 CPT/HCPCS Codes Mapping (standard 2012 codes)	Hierarchy Ranking
Visits	Emergency Room	450-452; 456; 459	99281-99292; 99466-99476	1
	Outpatient Surgery	360–362; 367; 369; 481; 490; 499; 790; 799	10021–36410; 36420-58999; 60000–69990; 93501–93581; 0016T–0261T	2
	Observation	760-762; 769	99217–99220	3
Ancillary	Ambulance		A0021–A0999	7
	DME/Prosthetics/Supplies		A4206–A9999; E0100–E8002; K0001–K0899; L0112–L9900	8
	Home Health		99500–99602	9
	Lab/Pathology	300–307; 309–312; 314; 319	36415; 36416; 80047–80440; 80500–80502; 81000–88399; 88720–89398; P2028–P9615	6
Other	Other Outpatient Services	420–424; 429–434; 439–444; 449; 480; 482–483; 489; 720–724; 729–732; 739; 800–804; 809; 820–825; 829–835; 839–845; 849–855; 859;	59000–59899; 90801–90899; 90935–90999; 92626–92633; 92950–93352; 93600–93799; 97001–98943; A4651–A4932; E1500–E1699; H0001–H2037	4

HCCI Sub-service Category	HCCI Detailed Service Category	Revenue Codes Mapping (standard UB92 codes only)	2012 CPT/HCPCS Codes Mapping (standard 2012 codes)	Hierarchy Ranking
		880–882; 889; 900–919; 944–945; 1000–1005		
Other	Radiology Services	320–324; 329–333; 335, 339, 340–344; 349–352; 359, 400–404; 409, 610–619	70010–70332; 70336; 70350–70390; 70450–70498; 70540–70559; 71010–71130; 72010–72120; 72170–72190; 71250–71275; 71550–71555; 72125–72133; 72141–72159; 72191–72198; 72200–73140; 73200–73206; 73218–73225; 73500–73660; 73700–73706; 73718–73725; 74000–74022; 74150–74178; 74181–74185; 74190–74775; 75557–75574; 75600–75630; 75635; 75650–76350; 76376–76380; 76390; 76496–76499; 76506–76999; 77001–77003; 77011–77014; 77021–77022; 77031–77059; 77071–77083; 77084; 77261–77799; 78000–79999; 96401–96571; R0070–R0076	5

HCCI HEALTH CARE COST INSTITUTE

4.4 Professional procedures detailed service categories mapping to CPT/HCPCS codes

HCCI Detailed Service Category	CPT/HCPCS Code Range
Administered Drugs, including Chemo Drugs	J0000–J9999
Allergy	95004–95075, 95115–95199
Anesthesia	00100–02020, 99100–99140
Cardiovascular	92950–93581, 93600–93799, 93875–93998
Consultations	99241–99255
Emergency Room/Critical Care	99281–99292, 99466–99476
Immunizations/Injections	90281–90749, 96360–96379, G0008–G0010
Inpatient Visits	99217–99239, 99304–99340, 99477, 99478–99480
Office Visits	99201–99215, 99341–99350
Ophthalmology	92002–92499, V2020–V2799
Pathology/Lab	80047–89398, P2028–P9615
Physical Medicine	97001–98943
Preventive Visits	99381–99387, 99391–99429, 99460–99464
Psychiatry & Biofeedback	90801–90911
Radiology	70010–79999, R0070–R0076
Surgery	10021–69990 excluding 36415–36416; 0016T–0261T
Other Professional Services	36415–36416, 90935–90999, 91000–91299, 92502–92700, 94002–94799, 95250–95251, 95800–96125, 96150–96155, 96401–96571, 96900–96999, 98960–99091, 99143–99199, 99354–99360, 99363–99380, 99441–99444, 99450–99456, 99465, 99499, 99605–99607, B4034–B9999, C1300–C9899, D0120–D9999, G0027–G9156, H0001–H2037, M0064–M0301, Q0035–Q9968, S0012–S9999, T1000–T5999, V5008–V5299, V5336–V5364, W0000–ZZZZZ

4.5 Diabetes codes

According to guidelines set down in the *Dictionary of Disease Management Terminology* (DDMT), HCCI used the following ICD–9–CM diagnosis codes to identify members with diabetes.

Service	ICD-9-CM Codes
Diabetes mellitus	250.xx
Polyneuropathy in diabetes	357.2
Diabetic retinopathy	362.0X
Diabetic cataract	366.41
Diabetes mellitus as complication of pregnancy/childbirth	648.0
Pre-diabetes diagnosis	790.21, 790.22, 790.29
Insulin pump status	V45.85
Fitting/adjustment of insulin pump, insulin pump titration	V53.91
Encounter for insulin pump training	V65.46
Mechanical complications, due to insulin pump	996.57
Service	**CPT/HCPCS Codes**
Diabetic outpatient self–management training services, individual or group insulin injection, per 5 units	G0108–G0109; J1815
Destruction of extensive or progressive retinopathy, one or more sessions, photocoagulation	67227–67228

4.6 Mental health and substance use (MHSU) codes

According to guidelines set down in the Clinical Classifications Software (CCS), HCCI used the following codes to identify members with mental health or substance use conditions.

Service Category	CPT/HCPCS/DRG Codes
Mental Health and Substance Use	290–319; 331; 333.92;357.5; 425.5; 535.3x;571.x; 64830; 64831; 64832; 64833; 64834; 64840; 64841; 64842; 64843; 64844; 65550; 65551; 65553; 76071; 76072; 76073; 76075; 7795; 7903; 797; 96500; 96501; 96502; 96509; 9800; E9500; E9501; E9502; E9503; E9504; E9505; E9506; E9507; E9508; E9509; E9510; E9511; E9518; E9520; E9521; E9528; E9529; E9530; E9531; E9538; E9539; E954; E9550; E9551; E9552; E9553; E9554; E9555; E9556; E9557; E9559; E956; E9570; E9571; E9572; E9579; E9580; E9581; E9582; E9583; E9584; E9585; E9586; E9587; E9588; E9589; E959; V110; V111; V112; V113; V114; V118; V119; V154; V1541; V1542; V1549; V1582; V400; V401; V402; V403; V4031; V4039; V409; V6284; V6285; V6542; V663; V673; V701; V702; V7101; V7102; V7109; V790; V791; V792; V793; V798; V799

4.7 Claims completion example

The following is an example of the estimation of incurred but not paid claims. Please note the numbers in this section are for illustration purposes only: They are *not* actual data.

Month	Paid $ to Date [1]	Completion Factor [2]	Estimated Incurred
Jan–12	$ 21,675,364	1.00	$ 21,727,186
Feb–12	17,339,406	1.00	17,402,178
Mar–12	18,271,837	1.00	18,289,514
Apr–12	20,286,106	1.00	20,339,892
May–12	19,356,580	1.00	19,426,260
Jun–12	17,751,856	0.99	17,945,588
Jul–12	18,256,838	0.99	18,355,884
Aug–12	17,732,384	0.98	18,083,643
Sep–12	17,489,161	0.95	18,481,283
Oct–12	16,893,933	0.93	18,120,909
Nov–12	15,981,513	0.86	18,681,099
Dec–12	11,217,486	0.62	18,028,238
Total	$ 212,252,463	0.94	$ 224,881,674

Notes: [1] $ incurred in the month, paid through 6/30/2013; [2] Completion factors will be developed using a lag triangle method

4.8 Population weighting example

The following is an example of how population adjustment weights were calculated. Please note the numbers in this section are for illustration purposes only: They are *not* actual data.

CBSA–MSA	State	Gender	Age Group	ACS Statistics [A] Any Insurance	ACS Statistics [B] Public Insurance	[C]=[A]–[B] Estimated Commercial Population	[D] Claims Population	[E]=[C]/[D] Population Adjustment Weight
Anniston-Oxford	AL	F	1	3,460	1,558	1,902	400	4.76
Anniston-Oxford	AL	F	2	9,443	4,687	4,756	1,400	3.40
Anniston-Oxford	AL	F	3	3,951	648	3,303	800	4.13
Anniston-Oxford	AL	F	4	10,363	1,915	8,448	2,000	4.22
Anniston-Oxford	AL	F	5	13,433	3,348	10,085	2,800	3.60
Anniston-Oxford	AL	M	1	3,398	1,771	1,627	500	3.25
Anniston-Oxford	AL	M	2	9,330	4,170	5,160	1,200	4.30
Anniston-Oxford	AL	M	3	4,459	1,030	3,429	800	4.29
Anniston-Oxford	AL	M	4	11,945	3,111	8,834	2,000	4.42
Anniston-Oxford	AL	M	5	14,102	3,698	10,404	3,000	3.47
Rural (Non-CBSA)	AL	F	1	31,153	18,439	12,714	2,500	5.09
Rural (Non-CBSA)	AL	F	2	92,918	43,828	49,090	8,750	5.61
Rural (Non-CBSA)	AL	F	3	31,473	6,104	25,369	4,500	5.64
Rural (Non-CBSA)	AL	F	4	93,547	16,024	77,523	14,000	5.54
Rural (Non-CBSA)	AL	F	5	127,888	35,008	92,880	17,000	5.46
Rural (Non–CBSA)	AL	M	1	32,662	18,632	14,030	2,375	5.91
Rural (Non–CBSA)	AL	M	2	86,851	39,502	47,349	7,500	6.31
Rural (Non-CBSA)	AL	M	3	34,490	10,205	24,285	4,250	5.71
Rural (Non-CBSA)	AL	M	4	100,960	21,463	79,497	16,000	4.97
Rural (Non-CBSA)	AL	M	5	136,492	36,834	99,658	15,000	6.64

5. Notes

[1] Congressional Research Service. Private Health Insurance Premiums and Rate Reviews [Internet]. Washington (DC): CRS; 2011 Jan [cited 2012 May 11]. Available from: http://assets.opencrs.com/rpts/R41588_20110111.pdf.

[2] American Academy of Actuaries. Critical Issues in Health Reform: Premium Setting in the Individual Market [Internet]. Washington (DC): AAA; 2010 March [cited 2012 May 11]. Available from: http://www.actuary.org/pdf/health/premiums_mar10.pdf.

[3] Congressional Budget Office. Key Issues in Analyzing Major Health Insurance Proposals, Chapter 3, Factors Affecting Insurance Premiums [Internet]. Washington (DC): CBO; 2008 December [cited 2012 May 11]. Available from: http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/99xx/doc9924/ 12-18-keyissues.pdf. For additional information on insurers' administrative costs and profits, see Centers for Medicare & Medicaid Services. National Health Expenditure Accounts: tables 2010 [Internet]. Baltimore (MD): CMS; 2012 Jan [cited 2012 May 11]. Available from: http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/tables.pdf.

[4] Centers for Medicare and Medicaid Services. Medicare Claims Processing Manual: Chapter 26: Completing and Processing Form CMS-1500 Data Set [Internet]. Baltimore (MD): CMS; 2011 Dec [cited 2012 May 18]. Available from: https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/clm104c26.pdf.

[5] In the *Children's Health Spending Report: 2007–2010* and *Health Care Cost and Utilization Report: 2011*, these were labeled "outpatient other" and as "outpatient procedures" in the *Health Care Cost and Utilization Report: 2010.*

[6] McEvoy, Gerald K., ed. *AHFS Drug Information 2010*. Bethesda, MD: American Society of Health-System Pharmacists, 2010. Print.

[7] Duncan, I.G., ed. *Dictionary of Disease Management Terminology*. Washington, DC: Disease Management Association of America, 2004.

[8] Health Plan Employer Data and Information Set (HEDIS), Washington, DC: National Committee for Quality Assurance, 2013.

[9] Clinical Classifications Software (ICD-9-CM) Summary and Download – Redirect. Agency for Healthcare Research and Quality, Rockville, MD: 2012 Dec. Available from: http://www.ahrq.gov/research/data/hcup/ccs.html.

[10] The chronic conditions categories are new to the HCCI benchmarking effort. The efficacy of our methodology is still being explored. HCCI welcomes feedback from area experts.

[11] These are referred to as "outpatient other" counts in *Health Care Cost and Utilization Report: 2012*, *Health Care Cost and Utilization Report: 2011* and as "outpatient procedure" counts in *Health Care Cost and Utilization Report: 2010*.

[12] Dunn, Abe, Eli Liebman, and Adam Hale Shapiro. "Developing a Framework for Decomposing Medical-Care Expenditure Growth: Exploring Issues of Representativeness." *Measuring Economic Sustainability and Progress*. 2012.

[13] Bluhm, W. F., ed. *Group Insurance*. 4th ed. Winsted: ACTEX Publications, Inc; 2003. P. 811-27. The specific methodology is proprietary and not owned by HCCI.

[14] U.S. Department of Commerce. U.S. Census Bureau. American Community Survey Office. Data and Documentation [Internet]. Washington (DC): Census; 2010 March [cited 2012 May 11]. Available from: http://www.census.gov/acs/www/data_documentation/data_main.

[15] If a member has both public and commercial insurance, she or he is categorized only as having public insurance.

[16] To calculate total prices paid for total expenditures per capita, the insured and payer expenditures per capita are summed. For facility and professional procedure claims, prices paid are calculated for all members who have medical insurance. For prescription claims, prices paid are calculated for all members with medical and prescription insurance.