

Cost-to-Charge Ratio Files:

2014 Central Distributor State Inpatient Database (CD-SID) User Guide

1. Purpose

The purpose of this data file is to provide Healthcare Cost and Utilization Project (HCUP) data users with ratios that will allow the conversion of charge data to cost estimates. The file is constructed using all-payer, inpatient cost and charge information from the detailed reports by hospitals to the Centers for Medicare & Medicaid Services (CMS). It provides an estimate of all-payer inpatient cost-to-charge ratios (CCR) for hospitals in states that participate in the 2014 Central Distributor SID. The participating states are: AZ, AR, CO, DC, FL, GA, HI, IA,¹ KY, MA, MD, ME, MI, MN,² NC, NE,³ NJ, NM, NV, NY, OR, RI, SD, UT, VT, WA, WI, and WV.⁴ Where permitted by HCUP State Partners, the dataset provides a hospital-specific CCR and a weighted group average.

The CD-SID CCR file can be linked to participating 2014 Central Distributor SID files by using the HOSPID variable. This is achieved by first linking the Cost-to-Charge file to the hospital linkage file (that comes with the Central Distributor SID) by HOSPID and then linking the resulting file to the Central Distributor SID file by DSHOSPID. Some states will include HOSPID directly on the CD-SID file (and do not have a separate AHA Linkage File). For these states, the Cost-to-Charge file can be merged directly onto the CD-SID file by HOSPID.

Note: HOSPID on the CCR CSV text file is enclosed in quotations, so it should be loaded as numeric or converted to numeric prior to merging with the CD-SID.

The cost of inpatient care for a discharge can then be estimated by multiplying TOTCHG (from the discharge record) by either the hospital-specific all-payer inpatient cost/charge ratio, APICC, or the group average all-payer inpatient cost/charge ratio, GAPICC.

¹ Iowa, Minnesota, and Nebraska's CCR data is provided in separate, state-specific files available by request from the HCUP Central Distributor to purchasers whose primary affiliation is with a college/university/government and whose intended use of the data does NOT involve product development, market research, or commercial applications.

² Refer to comment above.

³ Refer to comment above.

⁴ Mississippi did not provide data in time for inclusion in the 2014 CCR file; South Carolina does not release its CCRs for CD-SID.

2. File Format

The dataset contains one record each for 2,078 of 2,415 Central Distributor SID hospitals in 2014 (unduplicated HOSPIDs).⁵ All HCUP hospitals in the CCR file are in the American Hospital Association (AHA) 2014 survey.

Analysts might want to use the hospital-specific cost-to-charge when available (1,409 cases approximating 68%) and the weighted group average otherwise (669 cases). Alternatively, one might use the group average in all cases.

3. Internal Validation Studies

A regression analysis of the all-payer inpatient CCR was performed in earlier years. This analysis used all clean HCUP and non-HCUP records with both AHA and CMS data. This was a weighted OLS regression using acute medical-surgical beds as the weighting variable, with separate state constant terms. Factors leading to significant differences in the CCR were: investor-ownership, rural location, large size (more than 300 beds), and a high ratio of interns and residents per bed (top 5%). Several of the state constant terms were also significant. The results tended to validate the “peer-grouping” method used here to create weighted group averages for each HCUP record.

In 2001 a study was performed for two states where different methods of calculating cost by DRG were compared. Hospital-wide CCRs as provided here, although not as accurate as department-based CCRs, are more accurate than gross charges in estimating relative cost by DRG. In more recent years, studies involving a dozen states with detailed charges have been done. These studies produced more accurate CCRs because they use departmental CCRs as opposed to hospital-wide CCRs. Users interested in quantifying potential biases due to use of the hospital-wide CCRs should contact HCUP user support (hcup@ahrq.gov).

Two HCUP Methods Series Reports provide correction factors by department. An initial report with correction factors by CCS and APR-DRG for 2006 data can be found at: http://hcup-us.ahrq.gov/reports/2008_04.pdf. An updated report that used a more extensive methodology to develop correction factors for 2009 data by MS-DRG and CCS is available at http://www.hcup-us.ahrq.gov/reports/methods/2011_04.pdf.

⁵ The record count in the 2014 CCR for CD-SID file excludes hospitals for the three states that release separate, state-specific files available by request from the HCUP Central Distributor.

4. Hospital-Specific CCR (APICC)

The all-payer inpatient cost-to-charge ratio (APICC) is created by dividing the inpatient costs by the inpatient charges. Both of these values are found on the CMS Healthcare Cost Reporting Information System (HCRIS) reports, or PPS data. APICC is kept for HCUP SID hospitals that have a matching record in both the PPS and the AHA data. APICC is missing when there is no cost information in the PPS data or the calculated cost/charge values were considered outliers. Several adjustments are made to costs and charges before they are usable in this generalized formula, the most important being the assignment of a portion of ancillary costs to inpatient routine and acute cost centers.

5. Weighted Group Average—GAPICC

The group average CCR is a weighted average for the hospitals in peer groups (defined by state, urban/rural, investor-owned/other, and bed size), using the proportion of group beds as the weight for each hospital. These averages are based on the 4,911 clean observations in the full collection of all HCUP SID 2014 files with both AHA and CMS data as of March 31, 2015. *Clean records* are defined by matching to a cost report, availability of certain completed data items in the report and passing certain edit checks. If there is no clean hospital-specific value for a particular hospital, then the group average can be used instead. Note that group averages can be based on only 1 hospital in the peer group (defined by state and hospital type). The group average may be associated with a non-HCUP hospital. Both operating costs and capital-related costs are included in the calculation of GAPICC.

6. Hospital Type for Grouping—HTYPE

HTYPE is available on the Central Distributor SID Cost-to-Charge file. It is helpful to know how this variable is defined to create peer groups within each state using all hospitals – not only those participating in the Central Distributor SID. Some researchers will find the information below useful with respect to replicability, and reviewers for journal articles might find this more detailed description especially valuable.

The following are values for the HTYPE variable:

- 1= investor-owned, under 100 beds
- 2= investor-owned, 100 or more beds
- 3= not-for-profit, rural, under 100 beds
- 4= not-for-profit, rural, 100 or more beds
- 5= not-for-profit, urban, under 100 beds
- 6= not-for-profit, urban, 100-299 beds
- 7= not-for-profit, urban, 300 or more beds.

State and local hospitals are included in the *not-for-profit* categories. Unfortunately, interns and residents per bed are not available on the AHA survey so a high value of this indicator of teaching status could not be used for grouping. *Urban* is defined as being part of an MSA; *beds* are the total hospital beds set up (as defined in the 2014 AHA Annual Survey Database).

7. Area Wage Index—WI_X

The Area Wage Index is computed by CMS to measure the relative hospital wage level in a geographic area compared to the national average hospital wage level. It is provided on the file to allow researchers to analyze cost differences geographically or to control for price factors beyond the hospital's control. Hospital cost variation has a 0.8 elasticity with the area wage index in some AHRQ published studies, meaning that variation in the hospital cost is roughly proportional to the variation in overall hospital costs. Multivariate studies should not assume strict proportionality.

The index is computed for each urban Core-Based Statistical Area (CBSA) and then linked with the AHA before it is added to the file. If the AHA-reported CBSA does not match the CMS hospital area, then the Area Health Resources Files (AHRF) and other hospitals in the same county are used to find a matching CBSA. All rural areas in each state are combined for a single wage index. This information is available for download from CMS. For the HCUP hospitals in 2014, all were matched to an area wage index using CMS files and the AHA survey.

8. Geographic Adjustment Factor (GAF)

The Capital cost adjustment index for Core Based Statistical Areas is included on the file. It is used in calculating the Medicare reimbursement payments for capital costs. This data element may prove useful in regression calculations. Some partners restrict the release of GAF on the CD-SID CCR file.

9. Variable List

There are eight variables in the HCUP Central Distributor Cost-to-Charge file. The following list summarizes the variables (and their respective labels) included in the Cost-to-Charge data file.

HOSPID	HCUP hospital identification number
APICC	All-payer inpatient CCR, hosp-specific
GAPICC	Group average all-payer inpatient CCR
GAF	Capital cost adjustment index for Core Based Statistical Areas
HTYPE	Hospital type used for grouping
WI_X	Wage Index, source CMS, edited
YEAR	Year for linking to HCUP records
Z013	State postal code