Cost-to-Charge Ratio Files:

2011 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 2011 Central Distributor SID. The participating states are: AZ, AR, CA, CO, FL, HI, KY, MD, MA, ME, MI, MS, NC, NJ, NM, NV, NY, OR, RI, SD, UT, VT, WA, WI, and WV. Where permitted by HCUP State Partners, the dataset provides a hospital-specific CCR and a weighted group average.

   The CCR file can be linked to participating 2011 Central Distributor SID files by using the HOSPID variable (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). 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 result to the Central Distributor SID file by DSHOSPID. Some states will include HOSPID directly on the CD-SID file because they do not release AHAID on the hospital linkage file. For these states, the Cost-to-Charge file can be merged directly onto the CD-SID file by HOSPID.

   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).

2. File Format

   The dataset contains one record for each of 2412 of 2558 Central Distributor SID hospitals in 2011 (unduplicated HOSPIDs). All HCUP hospitals in the file are also in the American Hospital Association (AHA) 2011 survey.

   Analysts might want to use the hospital-specific cost-to-charge when available (1799 cases approximating 75%) and the weighted group average when the hospital-specific CCR is not available (613 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 this year and in earlier years. This analysis used all clean HCUP and non-HCUP records with both AHA and CMS data. (Clean records are defined as having complete CMS schedules and worksheets, containing key variables within an acceptable range.) 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 methods 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.

4. Weighted Group Average—GAPICC

The group average CCR (GAPICC) is a weighted average for the hospitals in the group (defined by state, urban/rural, investor-owned/other, and number of beds), using the proportion of group beds as the weight for each hospital. The groups are defined based on all clean HCUP and non-HCUP records for community hospitals with matching data from the American Hospital Association (AHA) 2011 Annual Survey and CMS accounting database records as of March 31, 2013. Both operating costs and capital-related costs are included.

5. 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.

Unfortunately, data about the ratio of 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 a Metropolitan Statistical Area (MSA); *beds* are the total hospital beds set up (2011 AHA survey). State and local hospitals are included in the not-for-profit categories.

6. Area Wage Index—WI_X

The Area Wage Index is an index 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 .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). All rural areas in each state are combined for a single wage index. This information is available for download from CMS. For the HCUP CD SID hospitals in 2011, all hospitals were matched to an area wage index using CMS files, the AHA survey, and the Area Resource File in cases where the AHA survey was incomplete.

7. 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. However, for a number of states contributing hospital data in the NIS, release of the GAF is not permitted.

8. 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
WI_X	Wage Index, source CMS, edited
Z013	State postal code
APICC	All-payer inpatient CCR, hosp-specific
GAPICC	Group average all-payer inpatient CCR
HTYPE	Hospital type used for grouping
YEAR	Year for linking to HCUP records
GAF	Capital cost adjustment index for Core Based Statistical Areas