USER GUIDE:

COST-TO-CHARGE RATIO (CCR) FOR EMERGENCY DEPARTMENT FILES

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Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Department of Health and Human Resources
Wisconsin Department of Health Services
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EXECUTIVE SUMMARY

- The Healthcare Cost and Utilization Project (HCUP) Cost-to-Charge Ratio (CCR) Files are hospital-level files that can be linked to HCUP inpatient and emergency department databases to facilitate the conversion of total charges into hospital costs (expenses) for providing care. The CCRs are constructed using information from the Healthcare Cost Report Information System (HCRIS) files submitted by hospitals to the Centers for Medicare & Medicaid Services (CMS).
- Separate CCR Files are released for each emergency department (ED) database type. This document describes the following CCR for ED Files:
    - CCR for the HCUP Central Distributor State Emergency Department Databases (CCR for CD-SEDD), 2012–2021
    - CCR for the Nationwide Emergency Department Sample (CCR-NEDS), 2012–2021
- The CCR Files are released for each data year and should be used with the corresponding year and database to ensure an appropriate match for the year and database-specific hospital identifiers.
- This document provides an overview of the CCR for ED Files (e.g., background, file structure, and usage information), as well as information about the CCR methodology (e.g., source data, development process, and validations studies), data elements, file contents, and other considerations and recommendations for use.
- A separate user guide is available for the CCR for Inpatient Files.

OVERVIEW

Background

The Healthcare Cost and Utilization Project (HCUP) Cost-to-Charge Ratio (CCR) for Emergency Department (ED) Files are hospital-level files that can be linked to HCUP ED databases to facilitate the conversion of total charges into hospital costs (expenses) for providing care. The files are designed to supplement the data elements in the HCUP ED databases, which contain data on total charges for each ED visit. *Charges* represent the amount a hospital billed for the case; *costs* reflect the expenses incurred in the production of hospital services, such as wages, supplies, and utility costs. Neither charges nor costs represent the amounts that hospitals receive in payment.

Constructed from appropriate cost centers in the hospital cost reports obtained from the Centers for Medicare & Medicaid Services (CMS) Healthcare Cost Report Information System (HCRIS),[1] the CCR Files are annual datasets that provide hospital-specific CCRs based on all-payer ED costs for nearly every hospital in each year's collection of the HCUP Central Distributor State Emergency Department Databases (CD-SEDD) and Nationwide Emergency Department Sample (NEDS). Specifically, the following files/data years are available:

- CCR for CD-SEDD: 2012–2021
- CCR-NEDS: 2012–2021

See Appendix A for information about the history of CCRs and CMS cost reports.

General File Structure

The HCUP CCR for ED Files provide an estimate of all-payer, ED CCRs for hospitals in corresponding HCUP databases. The publicly available files are provided as comma-separated value (CSV) text files that use a comma to separate values on each record. Records are included for all community hospitals from the corresponding HCUP database that match with both the American Hospital Association (AHA) Annual Survey Database and the CMS HCRIS file for the corresponding fiscal year.

Separate CCR Files are released for each data year and should be used with the corresponding year of the CD-SEDD or NEDS to ensure an appropriate match of the year-specific hospital identifiers. In the case of the CCR for CD-SEDD, three States release State-specific files that are separate from the CCR for CD-SEDD File. Iowa, Minnesota, and Nebraska CCR Files are released as separate, State-specific files available by request from the HCUP Central Distributor to purchasers whose organizational affiliation and ownership meet the Partner's eligibility criteria. All other CD-SEDD States that permit release of the CCR measures are included in the CCR for CD-SEDD File.

[1] For more information, visit www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Cost-Reports.

Usage

Linkage

The CCR Files can be linked to discharge records in the HCUP databases using the HCUP hospital identification number (HOSPID, HOSP_ED), which is a unique hospital number exclusive to the HCUP data. The name of the data element representing the hospital identification number varies by file type, as summarized in Table 1.

For the CCR-NEDS, the CCR records can be merged directly with the discharge records in the corresponding NEDS database using the linkage data element HOSP_ED.

For States that release an HCUP AHA Linkage File, linkage between the CCR File and the CD-SEDD is achieved in two steps, first by linking records from the CCR for CD-SEDD File to the HCUP AHA Linkage File by the data element HOSPID and then by linking the resulting file to the CD-SEDD by State (Z013) and DSHOSPID.

For States that do not release an HCUP AHA Linkage File, HOSPID is included directly on their CD-SEDD File. For these States, the data elements from the CCR File can be merged onto the CD-SEDD by HOSPID. The AHA Linkage Files can be downloaded from the HCUP AHA Linkage Files page on the HCUP User Support (HCUP-US) website.

The HCUP hospital identifier (HOSPID, HOSP_NEDS) on the CCR CSV text file is enclosed in quotations to preserve leading zeros. As a result, some software applications may interpret the data element as a character variable, which in turn would not match the numeric version of the hospital identifier on the CD-SEDD or NEDS. Users should load the hospital identifier data element on the CCR File as numeric or convert it to numeric prior to merging it with HCUP database files.

Cost Computation

The cost of ED care for a discharge is estimated by multiplying TOTCHG on the SEDD (total charges reported on the discharge record) and TOTCHG_ED on the NEDS (total charges for ED services) by the CCR. The data element representing the CCR varies by file type, as summarized in Table 1. For the CCR for CD-SEDD File, both the hospital-specific all-payer ED CCR (APECC) and the group average all-payer ED CCR (GAPECC) are available. (Users may consider overwriting the APECC value with the GAPECC value.) For the CCR-NEDS, a single CCR is provided (CCR_NEDS), with values based on the APECC when available or the GAPECC otherwise.

In addition, CCRs in the CCR-NEDS are perturbed slightly to further protect hospital and Partner identity.

Applying CCRs to the NEDS

NEDS records include both treat-and-release visits (from the SEDD) and ED visits that result in admission (from the State Inpatient Databases or SID). Both types of records can include information on ED charges (HCUP data element TOTCHG_ED).

- For treat-and-release ED visit records (identified by HCUPFILE="SEDD")
  - TOTCHG_ED is the total hospital charge for services performed while the patient was in the ED.
  - CCR_NEDS can be used to convert these ED charges to ED costs.
  - TOTCHG_ED is missing for a small amount of ED treat-and-release records (0.8% of ED treat-and-release records in the 2021 NEDS) but more in prior years (12% of ED treat-and-release records in the 2018 NEDS).

- For admitted ED visit records (identified by HCUPFILE="SID")
  - TOTCHG_ED represents the portion of total inpatient charges attributed to ED unit of the hospital. There may be other services performed while the patient was in the ED (e.g., CT scan, laboratory tests) that will not be captured in TOTCHG_ED because there is no information on a SID record that identifies whether these services occurred while the patient was in the ED or during the inpatient stay. For this reason, ED charges (and costs) for admitted patients are potentially underestimated.
  - CCR_NEDS can be used to convert these ED charges to ED costs, with the understanding that the CCR has not been fine-tuned for the limitations of the charges included in TOTCHG_ED on a SID record.
  - TOTCHG_ED is missing for a substantial number of ED admission records (29% of ED admission records in the 2021 NEDS) because this information is not available for all hospitals.

For the reasons outlined above, users should be cautious when interpreting the ED costs estimated for admitted ED visit records and document the percentage of records that were missing the information.

Table 1. Linkage and CCR Data Elements by CCR File

CCR File	Linkage Data Element	CCR Data Element(s)
CCR for CD-SEDD	HOSPID	APECC, GAPECC
CCR-NEDS	HOSP_ED*	CCR_NEDS

Abbreviations: APECC, all-payer ED cost-to-charge ratio; CCR, cost-to-charge ratio; CD, HCUP Central Distributor; GAPECC, group average all-payer ED cost-to-charge ratio; NEDS, Nationwide Emergency Department Sample; SEDD, State Emergency Department Databases.

* HOSP_ED is reassigned each year and does not (1) link to other HCUP databases or to external databases or (2) track hospitals over years.

Additional Data Elements

In addition to the linkage and CCR data elements summarized above, the CCR Files contain supplemental data elements that may be of interest to users. These data elements are summarized in the Data Elements section.

CCR METHODOLOGY

Development of the CCR Files

Source Data

The CCRs are constructed from cost and charge information contained in hospital cost reports obtained from the CMS HCRIS; this information is delineated by hospital cost center. HCRIS covers Medicare-reimbursable facilities, including hospitals.

Hospital-Specific Cost-to-Charge Ratios

The HCRIS hospital cost reports are downloaded for use by HCUP after most hospitals have filed them. The HCUP convention has been to obtain the publicly available HCRIS cost reports after the first quarter of the second year following the HCRIS data year. For example, the HCRIS 2017 data files were downloaded in April 2019.

Inpatient charges, outpatient charges, and total costs are extracted from HCRIS data by hospital identifier/provider number (CMS Certification Number, or CCN) and HCRIS standard cost center. Additional financial and hospital characteristic data are also extracted at this time.

After the CMS extract has been prepared, cost centers are organized into the following HCUP service groups:

- Routine Care Group
- Specialty Care Group
- Labor & Delivery Services Group
- Intermediate Care Services (Ancillary Services Group 1)
- All Other Non-Accommodation Cost Centers (Ancillary Services Group 2)
- Emergency Services Group

For a complete mapping of HCRIS cost centers to HCUP service groups, see Appendix B.

The Routine Care, Specialty Care, Labor & Delivery, and Ancillary Services Groups are used for calculation of the inpatient CCR. The Emergency Services Group is used to calculate the emergency department CCR.

There are several reasons why the service groupings are used in the calculations. First, grouping standard cost centers can lessen the impact of data entry errors at the hospital level and limit the effect of any misalignment in the mapping of cost and charge data from the hospital accounting systems to the HCRIS cost centers. Second, the creation of service-group level CCRs allows for more sensitive data quality checks (i.e., outlier identification).

Calculation of the service group and hospital-wide CCRs proceeds as follows:

- For each hospital, inpatient charges, outpatient charges, and costs are summed for cost centers in the Emergency Services Group.
- By hospital, emergency services total costs are transformed to outpatient costs by multiplying total costs by the proportion of outpatient charges.
- Finally, the emergency department CCR is calculated as the quotient of emergency services outpatient costs and charges. Note that this CCR is applicable for treat and release (outpatient) emergency department encounters since it is based on outpatient charges and estimated outpatient costs.

Hospital-specific CCRs calculated in this way are not included in the CCR Files when there is no cost information in the HCRIS data.

Both operating costs and capital-related costs are included in the calculation of hospital-specific CCRs.

Group Average Cost-to-Charge Ratios

The group average all-payer ED CCR (GAPECC) is a weighted average for the hospitals in peer groups (defined by four dimensions: State, urbanicity, ownership, and bed size), using the proportion of each hospital's beds relative to its peer group as the weight for each hospital.

These averages are based on clean observations from all hospitals in the SEDD maintained by the Agency for Healthcare Research and Quality (AHRQ), including SEDD that are not released through the HCUP Central Distributor. Clean records are defined as HCUP hospitals that have records in both the AHA and CMS data historically as of March 31, when the CMS files are acquired. These records have a matching hospital in the CMS cost report, have availability of certain completed data items in the report, and pass certain quality checks. Note that a group average can be based on only one hospital in the peer group (defined by State and hospital type). The group average may incorporate non-HCUP hospitals. Both operating costs and capital-related costs are included in the calculation of GAPECC.

The hospital type for grouping peer hospitals (HTYPE) is calculated within State, using hospital characteristics obtained from the AHA Annual Survey. These include hospital urban/rural location, type of ownership/control, and bed size. The GAPECC is calculated within State and for each of these groupings.

Urban is defined as being part of a Metropolitan Statistical Area. For type of ownership/control, State and local nongovernment hospitals are included in the *not-for-profit* categories. *Beds* are the total hospital beds set up (as reported in each year's AHA Annual Survey Database). *Teaching status*, which is often used for grouping HCUP hospitals, was not incorporated into the definition of HTYPE. This indicator is not present in the CMS hospital cost reports. A proxy measure, the ratio of interns and residents per bed, was tested in regression analyses, and the cost ratios by the proxy for teaching status were not significantly different. Therefore, only ownership and bed size were used for defining HTYPE. (See Table 2 for a summary of HTYPE values.)

Outliers

The hospital-specific CCR is set to missing (masked) if any of the following conditions are met:

- The inpatient hospital-specific CCR was identified as an outlier and masked (see Appendix C for inpatient CCR outlier information)
- The Emergency Services Group CCR is less than zero or greater than 4

The ED CCR upper limit of 4.0 identifies only about 0.5 percent of hospitals as outliers. Note that the CCR-NEDS CCR upper limit is set at 1.87 to further protect hospital confidentiality.

DATA ELEMENTS

Table 2 provides a summary of data elements included on the CCR for ED Files.

Common Data Elements

As reviewed in Table 1, linkage variables (HOSPID, HOSP_ED) and CCR variables (APECC, GAPECC, CCR_NEDS) are provided on all CCR for ED Files. These data elements allow users to merge the CCR Files with HCUP databases and to convert hospital charges to hospital costs.

All CCR Files also include data year (YEAR) and area wage index (WAGEINDEX or WI_X), which is an index computed by CMS to indicate the relative hospital wage level in a geographic area compared with the national average hospital wage level (see Appendix D for more information). Wage index is WI_X in all years of the CCR for CD-SEDD and WAGEINDEX in all years of the CCR-NEDS.

Data Elements Available on a Subset of Files

Additional data elements are available on only some CCR for ED Files.

The CCR for CD-SEDD Files also include hospital type for grouping peer hospitals (HTYPE). The GAPECC is calculated within State and for each of these groupings. Although HTYPE is not provided on the CCR-NEDS, it is helpful to know how this variable is defined to create peer groups using all hospitals within each State. (The Group Average Cost-to-Charge Ratios development section provides more information about how HTYPE is used to calculate GAPECC.)

The CCR for CD-SEDD Files include State postal code (Z013) as well as the geographic adjustment factor (GAF), which represents the capital cost adjustment index for Core-Based Statistical Areas (CBSAs). (See Appendix D for more information). GAF is used in calculating the Medicare reimbursement payments for capital costs. This data element may prove useful in regression calculations. However, analysts should note that for a number of States contributing hospital data in the CD-SEDD, permission was not provided to release values of GAF.

Table 2. Data Elements on the CCR for ED Files

Data Element Category	Data Element	Data Type	Coding Notes	CCR Files
Hospital ID Number	HOSPID	Character*	HCUP hospital identification number	CD-SEDD, 2012–2021
	HOSP_ED	Character*	N hospital identification number	NEDS 2012–2021
Cost-to-Charge Ratio	APECC	Numeric (decimal values)	Hospital-specific all-payer ED CCR. Set to missing when there is no cost information in the HCRIS (PPS) data or the calculated cost-to-charge value is deemed an outlier.	CD-SEDD, 2012–2021
	GAPECC	Numeric (decimal values)	Group average all-payer ED CCR, which is a weighted average for the hospitals in peer groups (see HTYPE variable), using the proportion of each hospital's beds relative to its peer group as the weight for each hospital.	CD-SEDD, 2012–2021
	CCR_NEDS	Numeric (decimal values)	NEDS-specific CCR populated with the hospital-specific, all-payer ED CCR (APECC) when available and hospital group average CCR (GAPECC) when the APECC is not available.	NEDS 2012–2021
Hospital Characteristics	HTYPE	Numeric	Hospital type for grouping peer hospitals, calculated within State, using bed size, ownership/control, and urban/rural location. 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.	CD-SEDD, 2012–2021
	Z013	Character	Two-character State postal code (from AHA)	CD-SEDD, 2012–2021
Area Wage Index	WI_X	Numeric	Area wage index computed by CMS to measure the relative hospital wage level in a CBSA compared with the national average hospital wage level.	CD-SEDD, 2012–2021
	WAGEINDEX	Numeric	Area wage index computed by CMS to measure the relative hospital wage level in a CBSA compared with the national average hospital wage level.	NEDS 2012–2021

Data Element Category	Data Element	Data Type	Coding Notes	CCR Files
Geographic Adjustment Factor	GAF	Numeric (decimal values)	Capital cost adjustment factor for CBSAs	CD-SEDD, 2012–2021
Year	YEAR	Numeric	Data year	CD-SEDD, 2012–2021; NEDS 2012–2021

Abbreviations: AHA, American Hospital Association; CBSA, Core-Based Statistical Area; CCR, cost-to-charge ratio; CD, HCUP Central Distributor; CMS, Centers for Medicare & Medicaid Services; HCRIS, Healthcare Cost Report Information System; HCUP, Healthcare Cost and Utilization Project; NEDS, Nationwide Emergency Department Sample; PPS, Prospective Payment System; SEDD, State Emergency Department Databases.

CONSIDERATIONS

File Updates

AHRQ released revised versions of the 2017–2018 CCR for CD-SEDD Files in September 2021. These files were updated to accord with current Partner restrictions and to add State data that were not permissible at the time of the original release. See the tables provided in the CCR for CD-SEDD section for comparisons between file versions.

FILE- AND YEAR-SPECIFIC INFORMATION

CCR for CD-SEDD

Table 3 provides the count of records (hospitals) included in the CCR for CD-SEDD Files each year compared with the count of all hospitals in the SEDD maintained by AHRQ (including SEDD that are not released through the HCUP Central Distributor).

Table 3. CCR for CD-SEDD Record (Hospital) Counts by Year

Year	Number of Records (Hospitals)		
	CCR for CD-SEDD[a]	CCR for CD-SEDD Separate Files (Combined)	Total SEDD[b]
2021	2,152	320	3,610
2020	2,201	323	3,638
2019	2,185	324	3,646
2018 v2	2,191	324	3,590
2018 v1	1,718	324	3,542
2017 v3	1,763	325	3,514
2017 v2	1,458	325	3,514
2017 v1	1,299	325	3,514
2016	1,442	323	3,427
2015	1,441	329	3,368
2014	1,387	331	2,916
2013	1,394	330	2,859

Year	Number of Records (Hospitals)		
	CCR for CD-SEDD[a]	CCR for CD-SEDD Separate Files (Combined)	Total SEDD[b]
2021	2,152	320	3,610
2020	2,201	323	3,638
2019	2,185	324	3,646
2012	1,331	330	2,787

Abbreviations: AHRQ, Agency for Healthcare Research and Quality; CCR, cost-to-charge ratio; CD, HCUP Central Distributor; SEDD, State Emergency Department Databases.

[a] Excludes States that did not permit AHRQ to release their CCR measures.

[b] This represents the count of all hospitals in the SEDD maintained by AHRQ (including SEDD that are not released through the HCUP Central Distributor).

Table 4 provides the count of records with hospital-specific and group average CCRs. Where permitted by HCUP Partner organizations, the CCR for CD-SEDD File includes a hospital-specific all-payer ED CCR, APECC. For all hospitals, there is also a weighted group average, GAPECC. Analysts can use the APECC, when available, and can otherwise use the weighted group average, GAPECC.

Table 4. Records (Hospitals) in the CCR for CD-SEDD, by Year and Presence of APECC and GAPECC

Year	Number of Records (Hospitals) With APECC	Percent With APECC	Number of Records (Hospitals) With GAPECC Only
2021	1,314	61%	838
2020	1,342	61%	859
2019	1,333	61%	852
2018 v2	1,366	62%	825
2018	1,324	77%	394
2017 v3	1,071	61%	692
2017 v2	1,071	73%	387
2017 v1	924	71%	375
2016	1,072	74%	370
2015	1,077	75%	364
2014	1,023	74%	364
2013	1,017	73%	377
2012	951	71%	380

Abbreviations: APECC, all-payer ED cost-to-charge ratio; CCR, cost-to-charge ratio; CD, HCUP Central Distributor; GAPECC, group average all-payer ED cost-to-charge ratio; SEDD, State Emergency Department Databases.

Participating States

Almost all States participating in the HCUP Central Distributor are included in the CCR for CD-SEDD File. Table 5 lists the States included in each year's file. Three States—Iowa, Minnesota, and Nebraska—release their CCR measures in separate, State-specific files for certain years.

These files are available by request from the HCUP Central Distributor to purchasers whose organizational affiliation and ownership meet the Partner's eligibility criteria. One State, South Carolina, does not release HOSPID or, consequently, CCR for its CD-SEDD. States added to version 2 or 3 files are bolded.

Table 5. States Included in the CCR for CD-SEDD, by Data Year

Year	States in CCR for CD-SEDD File	State-Specific Files
2021	AK AR AZ CA CO DC FL GA IN KS KY MA MD ME MI MO NC NJ NY OR RI SD UT VT WI (25)	IA MN NE
2020	**AK** AR AZ CA CA DC FL GA IN KS KY MA MD ME MI MO NC NJ NV NY OR RI SD UT VT WI (26)	IA MN NE
2019	AR AZ CA CO DC FL GA IN KS KY MA MD ME MI MO NC NJ NV NY OR RI SD UT VT WI (25)	IA MN NE
2018 v2	AR AZ CA CO DC FL GA **IN** KS KY MA MD **ME MI MO** NC NJ NV NY OR RI **SD UT** VT WI (25)	IA MN NE
2018	AR AZ CA CO DC FL GA KS KY MA MD NC NJ NV NY OR RI VT WI (19)	IA MN NE
2017 v3	AR AZ CO DC FL GA **IN** KS KY MA MD **ME MO** NC NJ NV NY OR RI **SD** UT VT WI (23)	IA MN NE
2017 v2	AR AZ CO DC FL GA KS KY MA MD NC NJ NV **NY** OR RI UT VT WI (19)	IA MN NE
2017 v1	AR AZ CO DC FL GA KS KY MA MD NC NJ NV OR RI UT VT WI (18)	IA MN NE
2016	AR AZ DC FL GA HI KS KY MA MD ME NC NJ NV NY OR RI UT VT WI (20)	IA MN NE
2015	AR AZ FL GA HI KS KY MA MD ME NC NJ NV NY OR RI UT VT WI (19)	IA MN NE
2014	AR AZ FI, GA HI KS KY MA MD ME NC NJ NV NY RI UT VT WI (18)	IA MN NE
2013	AR AZ FL GA HI KS KY MA MD ME NC NJ NV NY RI UT VT WI (18)	IA MN NE
2012	AZ FL GA HI KS KY MA MD ME NC NJ NV NY RI UT VT WI (17)	IA MN NE

Abbreviations: CCR, cost-to-charge ratio; CD, HCUP Central Distributor; SEDD, State Emergency Department Databases.

Notes: States listed in bold text were added to the revised annual CCR for CD-SEDD File.

CCR-NEDS

The CCR-NEDS datasets contain a record for each hospital in the NEDS (see Table 6).

Table 6. Records (Hospitals) in the CCR-NEDS

Year	Number of Records (Hospitals) in the CCR-NEDS
2021	993
2020	995
2019	989
2018	990
2017	984
2016	953

Year	Number of Records (Hospitals) in the CCR-NEDS
2015	953
2014	945
2013	947
2012	950

Abbreviations: CCR, cost-to-charge ratio; NEDS, Nationwide Emergency Department Sample.

REFERENCES

Friedman B, De La Mare J, Andrews R, McKenzie DH. Practical options for estimating cost of hospital inpatient stays. J Health Care Finance. 2002;29(1):1-13.

Pettengill J, Vertrees J. Reliability and validity in hospital case-mix measurement. Health Care Financ Rev. 1982;4(2):101-28.

Pickens GT, Moore B, Smith MW, McDermott KW, Mummert A, Karaca Z. Methods for estimating the cost of treat-and-release emergency department visits [published online ahead of print August 5, 2021]. Health Serv Res. https://doi.org/10.1111/1475-6773.13709

APPENDIX A: ORIGINS OF COST-TO-CHARGE RATIOS AND COST REPORTS

CCRs have likely been used on an ad hoc basis by hospitals for estimating treatment costs for a considerable time. The impetus for creating a national database of hospital accounting data was Medicare prospective payment, which was established by the Social Security Amendments Act of 1983, with implementation starting in 1984. At that time, CMS, then known as the Health Care Financing Administration (HFCA), established the inpatient prospective payment system (PPS) as a means of controlling rapidly increasing hospital expenditures that threatened solvency of the Medicare Trust Fund. The fundamental concepts behind PPS were (1) creation of categories of inpatient encounters within which intensity of service delivery was similar (diagnosis-related groups, or DRGs) and (2) reimbursement to hospitals based on the costs of services within DRGs. This led to development of the cost reports, used by HCFA to estimate national costs of service delivery for DRGs, among other uses. DRG cost estimates relied on CCRs calculated from the cost reports and were integral to creation of DRG "relative weights," which determine payments to hospitals based on DRGs (see Pettengill and Vertrees, 1982, for a discussion of initial development of DRGs and relative weights).

Once the cost reports became accessible to the public, CCRs began being used to estimate service delivery costs for individual hospitals, hospital systems, and peer groups. This in turn led to a focus on hospital cost-efficiency analysis and benchmarking. AHRQ developed a methodology for estimating hospital inpatient costs based on the cost reports in the early 2000s (Friedman et al., 2002). More recently, AHRQ developed a methodology for estimating the cost of treat-and-release emergency department visits (Pickens et al., 2021).

APPENDIX B: ASSIGNMENT OF HCRIS COST CENTERS TO HCUP SERVICE GROUPS

The table below details the mapping between HCRIS cost centers and HCUP service groups.

Table B1. Assignment of HCRIS Cost Centers to HCUP Service Groups

HCRIS Standard Cost Center Description	Inpatient Cost-to-Charge Ratios					Emergency Department Cost-to-Charge Ratios
	Routine Care Group	Specialty Care Group	Labor & Delivery Group	Ancillary Services Group 1	Ancillary Services Group 2	Emergency Services Group
Adults & Pediatrics (General Routine Care)	X					
Intensive Care Unit		X				
Coronary Care Unit		X				
Burn Intensive Care Unit		X				
Surgical Intensive Care Unit		X				
Other Intensive Care		X				
Inpatient Psychiatric Facility Subprovider				X		
Inpatient Rehabilitation Facility Subprovider				X		
Other Subprovider				X		
Nursery		X				
Skilled Nursing Facility				X		
Nursing Facility				X		
Other Long-Term Care				X		
Operating Room, Endoscopy, Prostheses					X	
Recovery Room					X	
Delivery Room & Labor Room			X			
Anesthesiology & Acupuncture					X	
Radiology-Diagnostic					X	X
Radiology-Therapeutic					X	
Radioisotope					X	
CAT Scan					X	X
MRI					X	
Cardiac Catheterization Lab					X	
Laboratory					X	X
PBP Clinical Lab Service Program Only					X	
Whole Blood & Packed Red Blood Cells					X	
Blood Storing, Processing, & Transfusing					X	

HCRIS Standard Cost Center Description	Inpatient Cost-to-Charge Ratios					Emergency Department Cost-to-Charge Ratios
	Routine Care Group	Specialty Care Group	Labor & Delivery Group	Ancillary Services Group 1	Ancillary Services Group 2	Emergency Services Group
Intravenous Therapy					X	
Respiratory Therapy					X	
Physical Therapy					X	
Occupational Therapy					X	
Speech Pathology					X	
Electrocardiology					X	
Electroencephalography					X	
Medical Supplies Charged to Patients					X	
Implants Charged to Patients					X	
Drugs Charged to Patients					X	X
Renal Dialysis					X	
Ambulatory Surgery Center (Non-distinct Part)					X	
Other Ancillary					X	
Rural Health Clinic					X	
Federally Qualified Health Center					X	
Clinic					X	
Emergency Room					X	X
Observation Beds					X	X
Other Outpatient Service					X	
Home Program Dialysis					X	
Ambulance Services					X	
Durable Medical Equipment -Rented					X	
Durable Medical Equipment -Sold					X	
Other Reimbursable Cost Centers (excluding Home Health Agency and Comprehensive Outpatient Rehabilitation Facility)					X	

Abbreviations: CAT, computerized axial tomography; HCRIS, Healthcare Cost Report Information System; HCUP, Healthcare Cost and Utilization Project; MRI, magnetic resonance imaging; PRP, provider-based physician.

APPENDIX C: INPATIENT CCR OUTLIERS

For the ED CCRs, the hospital-specific CCR is set to missing (masked) if the inpatient CCR was identified as an outlier and masked.

HCUP inpatient CCR outliers are identified using upper and lower limits for hospital-wide, routine care, specialty care, labor and delivery, and ancillary services CCRs. Specifically, the hospital-specific CCR is set to missing if any of these conditions are met:

- The Routine Care Group inpatient CCR is less than 0 or greater than 4.
- The Labor & Delivery Group inpatient CCR is greater than 4.
- The Specialty Care Group inpatient CCR is greater than 4.
- The Combined Ancillary Services Group CCR is less than 0 or greater than 4.
- The hospital-wide inpatient CCR is less than .05 or greater than 2.

The inpatient CCR upper limit of 2.0 identifies about 2.5 percent of hospitals as outliers.

APPENDIX D: ADDITIONAL DATA ELEMENT INFORMATION

Area Wage Index (WAGEINDEX or WI_X)

Area wage index is provided on the file to allow researchers to analyze cost differences geographically or to control for price factors beyond the hospital's control. Multivariate studies should not assume strict proportionality. Some analysts use the area wage index to adjust the labor portion of the hospital's estimated cost to reflect local labor market conditions.

The index is computed for each urban CBSA and then linked with the AHA data 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 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.[2]

For the HCUP hospitals in each year, all hospitals were matched to an area wage index using CMS files, the AHA Annual Survey, and the Area Health Resources Files in cases where the AHA Survey was incomplete.

Geographic Adjustment Factor (GAF)

GAF represents the capital cost adjustment index CBSAs and is used in calculating the Medicare reimbursement payments for capital costs. This data element may prove useful in regression calculations. However, analysts should note that for a number of States contributing hospital data in the CD-SEDD, permission was not provided to release values of GAF. GAF values are available for download from CMS.[3]

[2] Visit www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Wage-Index-Files for more information. Navigate to the Wage Index page for the year of interest.

[3] Visit https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/FY2020-IPPS-Final-Rule-Home-Page for more information.