

Methodology to calculate inpatient net patient revenue per case mix adjusted discharges and outpatient net patient revenue per intensity adjusted outpatient visits by payer¹

Created: April 17, 2026

- Input data and resources..... 2
- Replication steps 3
 - Step 1. Prepare base dataset using Hospital Annual Financial Complete Dataset... 3
- Section 1. Inpatient measurement 3
 - Step 2. Create license level listing with all facilities under the same license 3
 - Step 3. Calculate case-mix index by payer at hospital level using Patient Discharge Data 4
 - Step 4. Calculate inpatient net patient revenue per case-mix adjusted discharges by payer..... 5
- Section 2. Outpatient measurement..... 5
 - Step 5. Create a list of all claim lines for each HAFDR facility for each patient-day . 5
 - Step 6. Assign APC Codes and Weights to claims 6
 - Step 7. Identify ambulatory and ancillary claims based on Chapter 4000 Definition. 7
 - Step 8. Aggregate the data to patient-day, facility number, facility name, payer, reporting period begin, reporting period end date level..... 8
 - Step 9. Aggregate the data to facility number, facility name, payer, reporting period begin date, reporting period end date level..... 8
 - Step 10. Calculate average visit intensity (AVI) at the facility, year level for commercial, Medicare and Medi-Cal 9
 - Step 11. Export the data from the HPD for additional calculations 9
 - Step 12. Calculate Outpatient NPR per Intensity Adjusted Outpatient Visit by payer9

¹ Note: we use Commercial and Other Third Party interchangeably.

Input data and resources

1. **Public data link for Complete datasets:** [Hospital Annual Financial Disclosure Report – Complete Data Set - Dataset - California Health and Human Services Open Data Portal](#)
2. **Public data link for Selected & Pivot:** [Hospital Annual Financial Data - Selected Data & Pivot Tables - Dataset - California Health and Human Services Open Data Portal](#)
3. **Licensed Facility Listings:** [Licensed Healthcare Facility Listing - Dataset - California Health and Human Services Open Data Portal](#)
4. **Public data and documentation link for case mix:** [Case Mix Index - Dataset - California Health and Human Services Open Data Portal](#)
5. **Patient Level Discharge Data:** apply for access [Request Data - HCAI](#)
6. **CMS DRG weights by DRG Grouper software version:** available as Appendix J in Data dictionary for Patient Discharge Data
7. **Health Care Payments Database:** apply for access [HPD Data Access and Release - HCAI](#)
8. **CMS Addendum A:** <https://www.cms.gov/medicare/payment/prospective-payment-systems/hospital-outpatient-pps/quarterly-addenda-updates>
9. **HCAI Parent facility number - NPI (National Provider Identifier) crosswalk Public Use File:** <https://hcai.ca.gov/document/facility-number-npi-crosswalk-fy-22-23/>
10. **APC Grouper software:** <https://www.cms.gov/medicare/coding-billing/outpatient-code-editor-occe/quarterly-release-files>
11. **HAFDR Chapter 4000 for Outpatient visit definitions:** <https://hcai.ca.gov/wp-content/uploads/2020/10/Chpt4000.pdf>

Replication steps

Step 1. Prepare base dataset using Hospital Annual Financial Complete Dataset

- a. Append 'Financial and Utilization Data' sheet from Hospital Annual Financial Disclosure Report files (Input #1) into one file
- b. Merge with Selected datasets (Input #2) to get TYPE_HOSP variables
- c. Filter to keep Comparable hospitals (TYPE_HOSP=Comparable)
- d. Create year variable by using year of the reporting period end date
- e. Remove duplicates
 - i. Calculate period length as the difference in days between reporting end date and reporting begin date
 - ii. Sort by hospital id (HCAI ID), year, period length (descending), and end date (descending)
 - iii. Keep first record per hospital per year with the longest period or most recent
- f. Keep reporting periods ending in 2022 and 2023
- g. Aggregate gross revenue, net revenue, discharges and visits by payer by summing up traditional and managed care quantities
- h. Keep the following variables:
 - i. Hospital id (HCAI ID)
 - ii. Hospital name
 - iii. Reporting begin date
 - iv. Reporting end date
 - v. Year
 - vi. Outpatient visits total and by payer (commercial, Medicare and Medi-Cal)
 - vii. Discharges total and by payer (commercial, Medicare and Medi-Cal)
 - viii. Net patient revenue by payer (commercial, Medicare and Medi-Cal)
 - ix. Net patient revenue from managed care by payer (commercial, Medicare and Medi-Cal)
 - x. Inpatient and outpatient net patient revenue from traditional care by payer (commercial, Medicare and Medi-Cal)
 - xi. Gross patient revenue from managed care by payer (commercial, Medicare and Medi-Cal)
 - xii. Gross inpatient and outpatient patient revenue from managed care by payer (commercial, Medicare and Medi-Cal)

Section 1. Inpatient measurement

Step 2. Create license level listing with all facilities under the same license

- a. Combine Licensed Facility listings (Input #3) into one file
- b. Create year variable based on the source file listing

- c. For each Facility HCAI ID, check the first and last dates under the license number. The first date is earliest facility status date with status “Open.” If facility changed its license number, the start date with the new license is the end date with the previous license. If facility continues under the same license based on the latest year, assign “2999-12-31” as end date.
- d. Using the facility license category, identify and assign Parent facility ID (HCAI ID) for each license.
- e. Merge with the base dataset from Step 1 on Year and hospital id (HCAI ID) and parent HCAI ID in Licensed facility listing
- f. Keep Parent HCAI ID (OSHPD ID), License number, Facility HCAI ID (OSHPD ID), reporting period begin and end dates
- g. Check that all parent HCAI IDs have license numbers
- h. Check that all facility HCAI IDs have parent HCAI IDs and license numbers during the analysis period, and that time under the same license is without the gaps and transition of facilities between license numbers and parent HCAI IDs is correctly captured.

Step 3. Calculate case-mix index by payer at hospital level using Patient Discharge Data

- a. Aggregate 2021-2024 Patient Discharge Data (Input #5) by HCAI ID (OSHPD ID), discharge date, payer and DRG.
 - i. Commercial payer is defined by the aggregation of payer categories “Private Coverage” (code 03) and “Worker Compensation” (code 04). See all payer categories in [PDD documentation](#).
- b. Combine aggregated data into one file
- c. Merge with dataset from Step 2 on facility HCAI ID (OSHPD ID) and discharge date being between reporting period begin and end date
- d. Merge with DRG weights dataset (Input #6) on a DRG grouper software version and DRG code
- e. If DRG grouper version has capped weights, use them; otherwise use the usual weights
- f. Calculate weighted discharges by multiplying discharges by weights
- g. Sum discharges and weighted discharges by Parent HCAI ID, payer and reporting period begin and end dates.
- h. Calculate case-mix index on Parent HCAI ID, payer and reporting period begin and end dates level by dividing weighted discharges by discharges
- i. Round case-mix index to 5 decimals
- j. Pivot table to create case-mix columns by payer for each Parent HCAI ID, reporting period begin and end dates
- k. Join to the base dataset from Step 1 on Parent HCAI ID, reporting period begin and end dates

Step 4. Calculate inpatient net patient revenue per case-mix adjusted discharges by payer

- a. Calculate estimated inpatient net revenue for managed care for commercial payers by multiplying net patient revenue from managed care by a ratio of gross inpatient revenue from managed care to gross revenue from managed care

*Commercial net patient revenue from managed care * (commercial gross inpatient revenue from managed care / commercial gross revenue from managed care)*

- b. Calculate commercial case-mix adjusted discharges (CMAD) by multiplying a sum of commercial discharges from traditional and managed care by case mix index
- c. Calculate commercial inpatient net patient revenue per CMAD by dividing a sum of commercial inpatient net revenue from traditional care and estimated inpatient net revenue from commercial managed care by total commercial CMADs
- d. Repeat steps a-c for Medicare and Medi-Cal payers
- e. Some hospitals do not have calculated measures for some payers. A common reason for nulls would be if a hospital did not report any payer discharges and revenue and thus would not have reported any inpatient revenue.

Section 2. Outpatient measurement

Step 5. Create a list of all claim lines for each HAFDR facility for each patient-day

- a. Using the Health Care Payments Database (HPD), pull the list of claim lines for each patient day for each facility (Input data #7). This should include the following variables on each claim:

Table 1. Claim fields from Health Care Payment Database

Variable	Definition
Date of service	This field identifies the first date of service for this service line.
Payer type	This field contains information about the member’s type of insurance or insurance product, which should include commercial, Medicare and Medi-Cal or other.
Revenue code	Valid codes and descriptions are maintained by the National Uniform Billing Committee (NUBC). This field is required for institutional claims.

Insured member's unique id	This field contains an ID that represents a unique member.
Facility billing NPI	This field contains the provider's National Provider Identification Number used by the U.S. Centers for Medicare & Medicaid Services (CMS).
Type of bill	This field contains a code that identifies the reported type of bill used for facility claims (e.g., hospital inpatient, hospital outpatient, skilled nursing facility (SNF), etc.).

- b. Keep only outpatient hospital claims, exclude any inpatient and professional claims. Outpatient facility claims include those where the first 2 characters of bill type are in (13, 14, 43, 44, 85)
- c. Create year variable by using year of date of service
- d. Merge with HCAI Parent facility number - NPI crosswalk public use file (Input data #9) on NPI and year. Keep claims only for the NPIs listed in the public use file
- e. Merge with base dataset from Step 1 on HCAI ID
- f. Filter the claims data to dates between reporting begin and end dates reported to HAFDR for each facility
 - i. For instance, if the facility fiscal year is from June 1, 2021 (reporting period begin date) to May 30, 2022 (reporting period end date), filter to include only claims with date of service between these dates

Step 6. Assign APC Codes and Weights to claims

- a. Assign APC codes to each claim service line using CMS APC Code Grouper Software (Input data #10)
 - i. If the facility is a Critical Access Hospital, run the CMS APC Code Grouper Software by changing the bill type from 85x to bill type to 131, in order to run the APC grouper software on these claims
- b. Download Addendum A for year 2022 and 2023 (July file for each fiscal year) (Input data #8)
- c. Append Addendum A files for the two years
- d. Create a new variable named conversion factor as payment rate divided by relative weight
- e. Calculate the mean of conversion factor. Replace the missing conversion factor values with the mean

- f. Recalculate relative weight if it is missing using payment rate and the implemented mean conversion factor as payment rate divided by conversion factor
- g. Merge the CMS Addendum A output with the claims data from Step 6.a, using APC code and calendar year of claim's service date
- h. Create a flag for each row based on whether the procedure has an assigned APC weight or not with the flag=1 meaning that there is an APC weight assigned to the procedure

Step 7. Identify ambulatory and ancillary claims based on Chapter 4000 Definition

- a. For each claim line, create an ambulatory center flag based on the revenue code's first three or four digits as listed on Table 2 below where the flag=1 if the claim line is in the category
- b. For each claim line, create an ancillary center flag based on the revenue code's first three or four digits as listed on Table 2 below where the flag=1 if the claim line is in the category

Table 2. Ambulatory and ancillary center categories and revenue codes

Type of Center	Category of claim	Revenue code –first three or four digits
Ambulatory	Emergency	045
	Medical transportation	054
	Sat Ambulatory Surgical Care	049
	Outpatient Chemical Dependency	090, 095, 0944, 0945
	Psychiatric	0912, 0913
	Clinic	051, 052
	Observation	076
	Home health	056, 057, 058
	Hospice	065
	Outpatient surgery	049
	Adult day	310
	Other	036
Ancillary	Ancillary	072, 071, 037, 027, 062, 029, 030, 031, 038, 048, 074, 032, 033, 034, 061, 040, 035, 025, 063, 089, 041, 046, 082, 083, 084, 085, 088, 079, 075, 042, 044, 043, 081, 073, 026, 047, 092, 094, 077, 0483, 0481, 0922, 0918, 0914, 0915, 0916

Step 8. Aggregate the data to patient-day, facility number, facility name, payer, reporting period begin, reporting period end date level

- a. Calculate total number of ambulatory center visits with APC weights at the patient-day, facility number, payer level
 - i. Using the flag from Step 7, calculate the total number of unique ambulatory center visits with APC weights assigned
 - ii. For instance, if the patient visited “Clinic” ambulatory center more than once on the same day, this counts as one. If the patient visited both “Clinic” and “Outpatient Surgery” ambulatory centers on the same day, this counts as a total of two
- b. Calculate number of ancillary visits with APC weights at the patient-day, facility number, payer level
 - i. Using the flag from Step 7, calculate ancillary visits with APC weights as maximum of ancillary visit flag at the aggregation level.
 - ii. For ancillary center, the result should either be one or zero. If a patient visited more than one ancillary center on the same day, this still counts as one
- c. Any visits on separate days by the same patient count separately as the visit occurs on a separate patient day
- d. Sum up APC weights at the aggregation level

Step 9. Aggregate the data to facility number, facility name, payer, reporting period begin date, reporting period end date level

- a. Sum up the APC weights by payer type for commercial, Medicare and Medi-Cal and create a new variable for each payer’s total APC weight
- b. Calculate the total number of visits with APC weights by payer type: commercial, Medicare and Medi-Cal
 - i. If the total number of ambulatory center visits with APC weights calculated in Step 8.a is greater than 0, then total number of visits at the patient day level is equal to total number of ambulatory visits
 - ii. If the total number of ambulatory center visits with APC weights equals zero, then use number of ancillary visits (0 or 1) with APC weights calculated in Step 8.b
 - iii. Sum up at the aggregation level

Total visits with APC weights by payer= Sum (If “number of ambulatory center visits with APC weights”)>0 then “number of ambulatory center visits with APC weights” else “number of ancillary visits with APC weights”) for each payer

Step 10. Calculate average visit intensity (AVI) at the facility, year level for commercial, Medicare and Medi-Cal

- a. Use the sum of APC weights for Medicare calculated in Step 9-a and total number of visits with APC weights calculated in Step 9-b for Medicare.
- b. If the total visits with APC weights for Medicare is equal to zero, skip AVI calculation at this payer level for the facility
- c. Calculate average visit intensity for Medicare as ratio of sum of APC weights Medicare to number of visits with APC weights Medicare] at the facility for the specific year
- d. Repeat Steps 10 a-c for commercial and Medi-Cal to calculate average visit intensity for Commercial and average visit intensity for Medi-Cal

Step 11. Export the data from the HPD for additional calculations

- a. Export the following variables from the HPD:
 - i. Hospital id (HCAI ID)
 - ii. Hospital name
 - iii. Reporting begin date
 - iv. Reporting end date
 - v. Year
 - vi. Average visit intensity by payer (commercial, Medicare and Medi-Cal)

Step 12. Calculate Outpatient NPR per Intensity Adjusted Outpatient Visit by payer

- a. Join dataset from step 11 with the base dataset from Step 1
- b. Calculate estimated outpatient net revenue for Commercial payers by subtracting sum of commercial inpatient net revenue from traditional care and estimated inpatient net revenue from commercial managed care from Commercial net patient revenue

Commercial net patient revenue - (commercial inpatient net revenue from traditional care + estimated inpatient net revenue from commercial managed care)

- c. Calculate commercial Intensity Adjusted Outpatient Visits by multiplying a sum of commercial outpatient visits from traditional and managed care by Average visit Intensity from Step 10.
- d. Calculate commercial outpatient net revenue per Intensity Adjusted Outpatient visits by dividing an estimated outpatient net revenue from commercial payers by commercial intensity adjusted outpatient visits
- e. Repeat steps a-c for Medicare and Medi-Cal payers

- f. A common reason for nulls would be if a hospital did not report any payer visits and thus would not have reported any outpatient net revenue, visits were not found or APC weights did not get assigned in the HPD.