Hospital Internal Resource Costs and Medicare Fee-for-Service Payment for Kidney Transplants

Commissioned by Sanofi U.S.

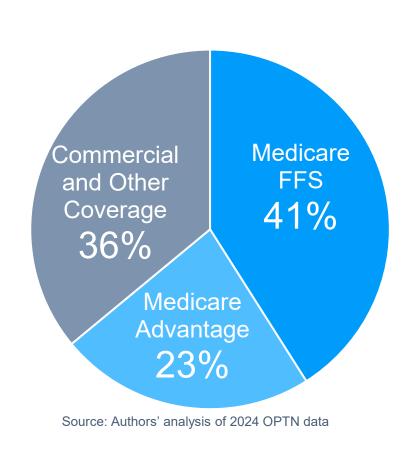
Intended for payers, formulary committees, or other similar entities for purposes of population-based drug selection, coverage, and/or reimbursement decision making, pursuant to FD&C Act Section 502(a). AUTHORS: Hanaa Siddiqi, MPH, ASA, MAAA, Associate Actuary; Gabriela Dieguez, FSA, MAAA, Principal and Consulting Actuary; Charmaine Girdish, MPH, Healthcare Consultant; Siyi Lu, MS, Senior Healthcare Data Analyst; and Carol Bazell, MD, MPH, Principal. May 2025.

In 2024, there were over 27,000 kidney transplants in the U.S¹. While Medicare fee-for-service (FFS) continues to be the dominant payer for kidney transplants¹, there has been an increase in the share of transplants paid by Medicare Advantage, as enrollment of beneficiaries with ESRD has grown in recent years² following the 21st Century Cures Act³. The Center for Medicare and Medicaid Innovation's mandatory Increasing Organ Transplant Access (IOTA) Model (scheduled to start in July 2025) includes 103 transplant center participants and aims to increase access to life-saving transplants for patients living with end-stage renal disease (ESRD) and reduce Medicare expenditures while improving quality of care⁴.

We examined the landscape of kidney transplants, as well as kidney transplant admission payment under the Inpatient Prospective Payment System (IPPS) and hospital internal resource costs for Medicare FFS beneficiaries in fiscal year (FY) 2024.

THE LANDSCAPE OF KIDNEY TRANSPLANTS IN THE U.S. (2024)

CHARACTERISTICS OF KIDNEY TRANSPLANT ADMISSIONS IN MEDICARE FFS (FY 2024)



Over **90%** of kidney transplants

received induction therapy⁵,

consistent with immunosuppressive therapy as

the standard of care for reducing the risk of

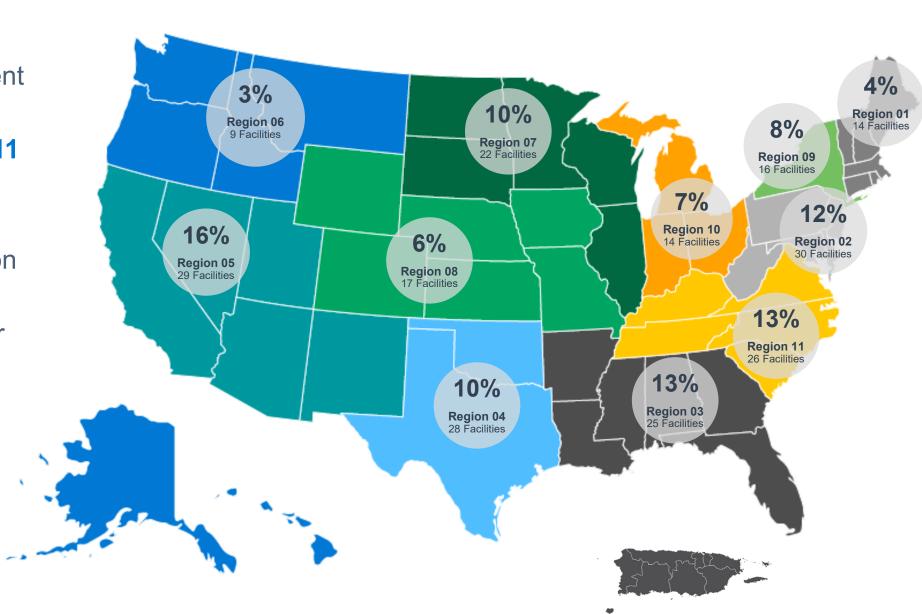
rejection and reflecting the complexity of the

64% of all kidney transplants in 2024 were paid for by

Medicare,

including Medicare FFS and Medicare Advantage¹.

The Organ Procurement and Transplantation Network (OPTN) has 11 geographic regions across the U.S. to facilitate transplantation within each area⁷. The distribution of all-payer kidney transplants varies by these regions.



Source: Authors' analysis of 2024 data from Organ Procurement and Transplantation Network (OPTN) with all primary payer transplants and kidney transplant facilities.

Most kidney transplants are assigned to one of three Medicare Severity Diagnosis Related Groups (MS-DRGs) under Medicare's IPPS8.

650: Kidney Transplant with Hemodialysis with Major Complication or Comorbidities (MCC) 651: Kidney Transplant with Hemodialysis without MCC

652: Kidney Transplant

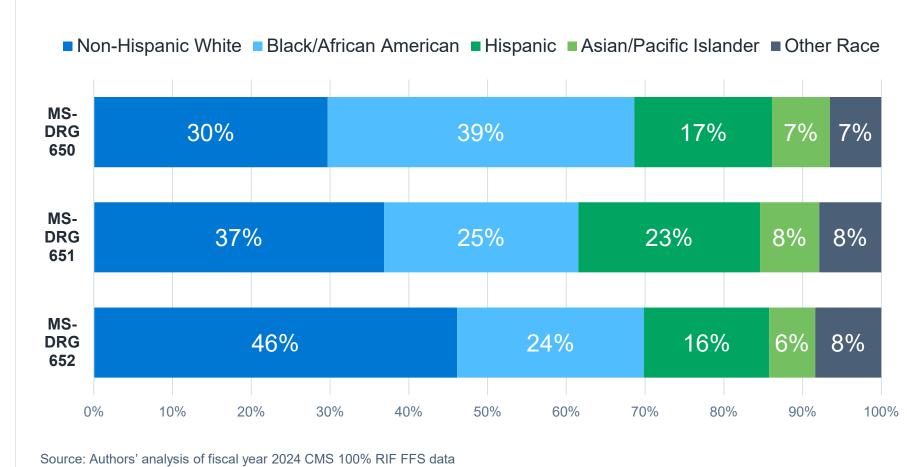
Source: Authors' analysis of fiscal year 2024 CMS 100% RIF FFS data

patient⁶.

MS-DRG	650	651	652
Transplant Admission Distribution	27%	10%	63%
% with Intensive Care Unit (ICU) Stays	33%	20%	24%
% with Deceased Donor Kidney	96%	96%	73%
Geometric Mean Length of Stay	6.5	5.8	4.5

37% of all kidney transplant admissions include hemodialysis, and 27% include hemodialysis and major complications or comorbidities.

The distribution of race and ethnicity among kidney transplant recipients varies by MS-DRG. MS-DRG 650 has the highest percentage of Black/African American kidney transplant recipients, MS-DRG 651 has the highest percentage of Hispanic transplant recipients, and MS-DRG 652 has the highest percentage of Non-Hispanic White transplant recipients.



HOSPITAL INTERNAL RESOURCE COSTS OF KIDNEY TRANSPLANT ADMISSIONS IN MEDICARE FFS (FY 2024)

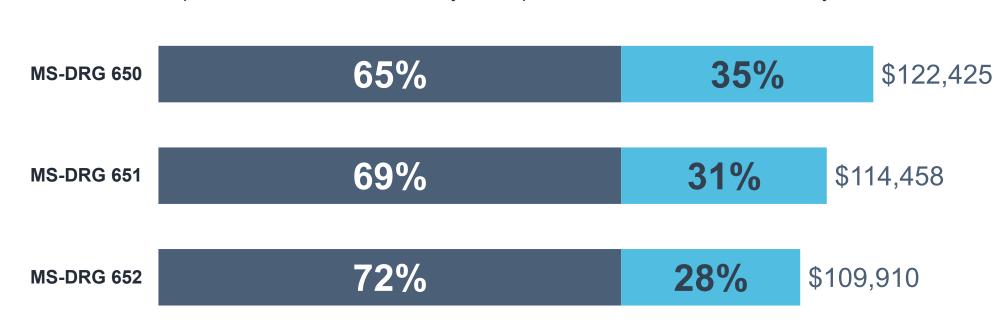
Total hospital internal costs for kidney transplants range from \$109K-\$122K per admission, inclusive of kidney acquisition costs.

Kidney acquisition costs make up 65% to 72% of total hospital internal costs for kidney transplant admissions.

About 77% of hospital internal costs reimbursed by the IPPS (excluding kidney acquisition costs) are associated with drugs, operating room, intensive care days, and routine bed days.

ICU stay, donor type, and hospital length-of-stay impact hospital internal resource costs but are not used in MS-DRG assignment⁹.

■ Kidney Acquisition Costs* ■ Hospital Internal Costs for Kidney Transplant Admissions Reimbursed by IPPS

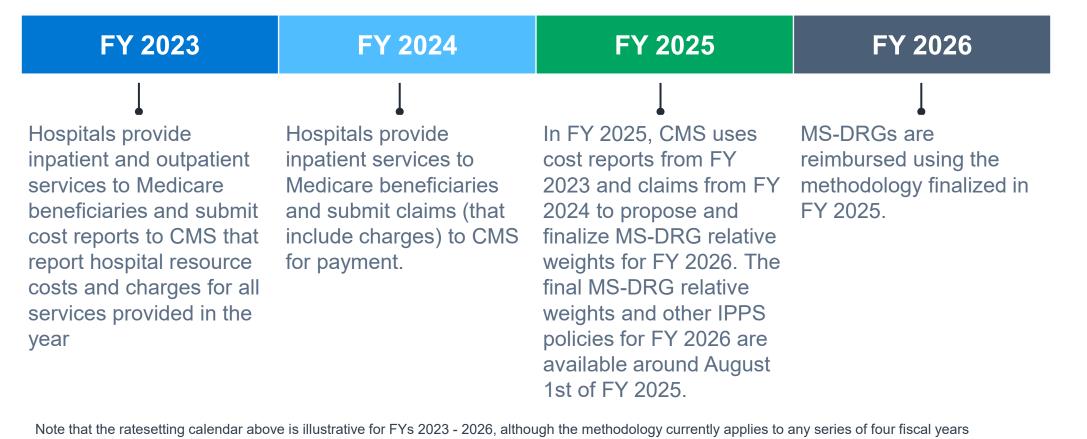


Source: Authors' analysis of fiscal year 2024 CMS 100% RIF FFS data

*Medicare pays separately for kidney acquisition costs, outside of the IPPS¹⁰, and these are assumed to be paid at cost. Kidney acquisition costs include costs beyond the organ cost and can include costs for services such as tissue typing, donor and recipient evaluations, organ excision costs such as operating room and ICU, organ transportation, and preservation¹¹.

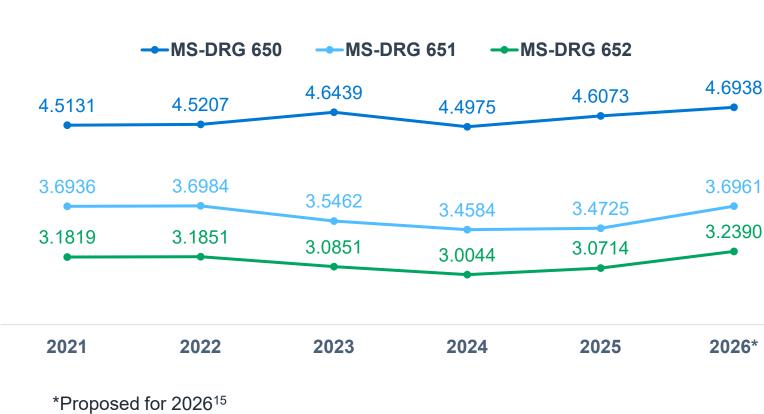
IPPS RATESETTING

IPPS payment is based on MS-DRG relative weights, which reflect relative average hospital internal resource costs to treat Medicare FFS patients discharged from the MS-DRG¹². CMS uses hospital-level costs and charges to annually recalibrate the MS-DRG relative weights¹³.



The **relative weights** for kidney transplant MS-DRGs decreased in 2024 compared to 2023, although they show year-over-year increases in 2025 and 2026 (proposed).

Relative Weights by Fiscal Year and MS-DRG^{14,15}



HOSPITAL PAYMENT FOR KIDNEY TRANSPLANT ADMISSIONS IN MEDICARE FFS (FY 2024)

Standardizing payment removes geographic and other adjustments not directly related to kidney transplant admission care from the total IPPS payment. This allows comparisons of hospital resource use for transplant admissions¹⁶.

Payment adjustments can include additional payments such as Indirect Medical Education (IME)¹⁷ to compensate hospitals for costs related to teaching medical residents and **Disproportionate Share Hospital (DSH)**¹⁸ payments to compensate hospitals for treating a high proportion of lowincome individuals.

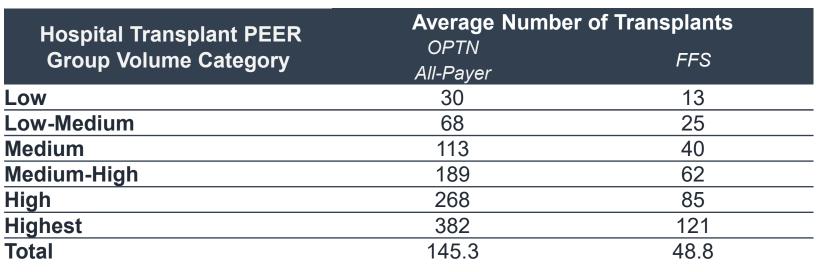
Average IPPS payment is greatest for MS-DRG 650, and on average, the standardized payment is approximately 70% of the total IPPS payment.

FY 2024 Payments Total IPPS Payment Standardized Payment \$51,908 \$40,466 \$38,731 \$9,016 **Additional Adjustments** \$32,882 **IME/DSH Payments** \$6,991 \$7,865 \$6,002 \$36,617 \$26,518 \$26,105 \$22,293 **All DRGs MS-DRG 652 MS-DRG 651 MS-DRG 650** Source: Authors' analysis of fiscal year 2024 CMS 100% RIF FFS data

HOSPITAL AND ADMISSION CHARACTERISTICS BY KIDNEY TRANSPLANT VOLUME (FY 2024) Over 40% of kidney transplants paid by Medicare FFS occur in

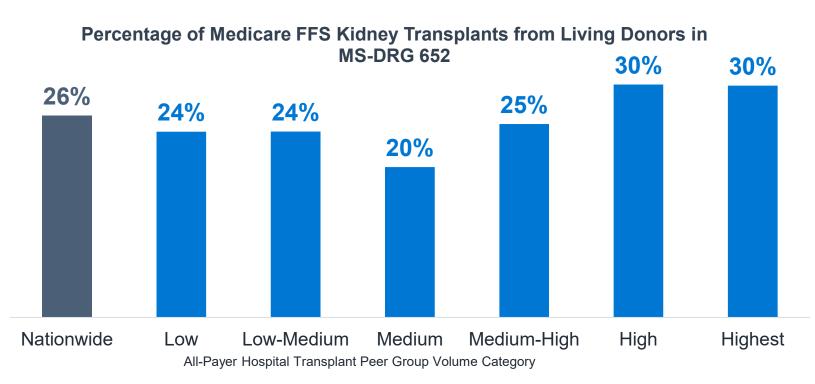
20% of hospitals performing kidney transplants*.

We assessed kidney transplant characteristics by all-payer **hospital** transplant volume category. **Average Number of Transplants**



Hospital transplant peer group volume categories are defined using OPTN all-payer data *Source: Authors' analysis of fiscal year 2024 CMS 100% RIF FFS data

Higher volume hospitals have lower ICU rates.



Higher volume hospitals also have a greater percentage of **MS-DRG 652** transplants from living donors.

Source: Authors' analysis of fiscal year 2024 CMS 100% RIF FFS data

METHODOLOGY AND DATA SOURCES Kidney Transplant Characteristics Kidney Transplant Volume Analysis

Cost and Payment Analysis • Using FY 2024 medical claims data from CMS Medicare 100% Research Identifiable Files (RIF), we identified kidney transplants where Medicare FFS is primary payer using inpatient admissions to MS-DRGs 650-652. Followed CMS methodology for converting billed charges on the kidney transplant claims to standardized charges¹⁹ and mapped inpatient claim lines by revenue code to cost centers using hospital cost reports and converted charges to hospital internal costs. IPPS payments include additional payments to hospitals that are designed to compensate hospitals for

incremental costs of teaching residents (Indirect Medical Education or "IME")¹⁷, serving a disproportionate share of low-income patients (Disproportionate Share Hospital or "DSH" and uncompensated care)18, and other "passthrough" expenses²⁰. Payment standardization removes these payments, along with geographical and other The standardized payment refers to Final Standard Payment Amount which is determined by CMS' PRICER software output²¹. This amount is never used for hospital payments. It is used for comparisons across different regions of the country for value-based purchasing initiatives and for research. It is a standard Medicare payment

amount, without the geographical payment adjustments, some of the other add-on payments that are paid to the

 ICU stays were identified by charges under the following revenue codes: 0200 - Intensive Care Unit-General Classification; 0201 - Intensive Care Unit-Surgical: 0202 – Intensive Care Unit-Medical: 0203 – Intensive Care Unit-Pediatric; 0204 – Intensive Care Unit-Psychiatric; 0207 – Intensive Care Unit-Burn Care; 0208 - Intensive Care Unit-Trauma; 0209 -Intensive Care Unit-Other Intensive Care; 0233 Incremental Nursing Living donor kidney transplants were identified by charges under revenue code 0811 (Acquisition of Body Components, Living Donor),

which specifies the living donor type for reporting hospital charges for Length of stay was calculated based on the number of days between the claim's admission date and discharge date, inclusive. Race and ethnicity were defined using the Research Triangle Institute (RTI) race code²² from the CMS Medicare Beneficiary Summary File

Using all-payer data from Organ Procurement and Transplant Network, we determined the total number of allpayer kidney transplants in calendar year 2024 for each hospital. Hospitals were ranked by volume and stratified into peer group volume categories by quintiles. To differentiate higher volume centers, the top quintile was split into deciles, yielding a total of 6 volume categories from lowest volume to highest volume.

The CMS 100% RIF database is accessed through the Innovator Research program. The Medicare 100% Innovator database contains all Medicare Parts A, B, and D paid claims incurred by 100% of Medicare FFS beneficiaries. The database is composed of longitudinal information including diagnosis codes, procedure codes, MS-DRGs, HCPCS codes, NDC codes, site-of-service information, beneficiary age, eligibility status, and an indicator for HMO enrollment. Providers, formularies, and health plans are identifiable, and demographic detail includes 9-digit zip and race/ethnicity. Allowed amounts (combination of plan paid and member cost-sharing, including federal reinsurance and coverage gap discount for Part D claims) are included for all claim types.

hospitals, and reductions for sequestration. CMS provides this field on all FFS claims in the 100% RIF. REFERENCES

coverage refers to Veteran's Administration benefits, Children's Health Insurance Program, self pay, or unknown coverage. This work was supported in part by Health Resources and Services Administration contract HHSH250-2019-00001C. The content is the responsibility of the authors alone and does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government. Nguyen KH, Oh EG, Meyers DJ, Rivera-Hernandez M, Kim D, Mehrotra R, Trivedi AN. Medicare Advantage Enrollment Following the 21st Century Cures Act in Adults With End-Stage Renal Disease. JAMA Netw Open. 2024 Sep 3;7(9):e2432772 21st Century Cures Act, HR 34, 114th Cong (2015). Pub L No. 114-255. https://www.congress.gov/bill/114th-congress/house-bill/34/text. Increasing Organ Transplant Access (IOTA) Model | CMS. https://www.cms.gov/priorities/innovation/innovation-models/iota. Accessed April 30th, 2025. Data on file. United Network for Organ Sharing (UNOS) data: Analysis of utilization of antibody immunosuppression for induction therapy for

https://optn.transplant.hrsa.gov/data/view-data-reports/build-advanced/. FFS includes Medicare FFS, Medicaid and other government. Other

Based on The Organ Procurement and Transplantation Network (OPTN) data as of March 31st, 2025. Accessed April 1st, 2025.

- transplants performed from 01/01/2010 to 03/31/2024. Sanofi; 2024. Kidney Disease: Improving Global Outcomes (KIDIGO). Clinical Practice Guideline for the Care of Kidney Transplant Recipients American Journal of Transplantation 2009; 9 (Suppl 3): S104-S105. https://kdigo.org/wp-content/uploads/2022/09/KDIGO-2009-Transplant-Recipient-Guideline-English.pdf. Accessed May 28th, 2025. distribution data (https://optn.transplant.hrsa.gov/data/view-data-reports/build-advanced/) accessed April 9th, 2025, Kidney transplant facility data (https://optn.transplant.hrsa.gov/data/view-data-reports/build-advanced) accessed April 30th, 2025. This work was supported in part by Health Resources and Services Administration contract HHSH250-2019-00001C. The content is the responsibility of the authors alone and does
- The Organ Procurement and Transplantation Network (OPTN). Regions OPTN. https://optn.transplant.hrsa.gov/about/regions/. Transplant not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government. $Acute\ Inpatient\ PPS\ |\ CMS.\ https://public-inspection.federalregister.gov/2025-06271.pdf.\ Accessed\ May\ 5^{th},\ 2025.$
- Defining the Medicare Severity Diagnosis Related Groups (MS-DRGs), Version 42.0. https://www.cms.gov/icd10m/fy2025-version42.0-fullcode-cms/fullcode_cms/Defining_the_Medicare_Severity_Diagnosis_Related_Groups_%28MS-DRGs%29.pdf. Accessed May 5th, 2025. 21. Claim Final Standard Payment Amount | ResDAC. https://resdac.org/cms-data/variables/claim-final-standard-payment-amount. Accessed May Organ Donation and Transplant Reimbursement; p. 3. CMS. https://www.cms.gov/Regulations-and-22. Research Triangle Institute (RTI) Race Code | ResDAC. https://resdac.org/cms-data/variables/research-triangle-institute-rti-race-code. Guidance/Guidance/Transmittals/downloads/R471pr1.pdf. Accessed April 30th, 2025. 11. eCFR :: 42 CFR Part 413 Subpart L -- Payment of Organ Acquisition Costs for Transplant Hospitals. Organ Procurement Organizations, and Histocompatibility Laboratories. https://www.ecfr.gov/current/title-42/chapter-IV/subchapter-B/part-413/subpart-L. Accessed April 30th, 2025.
- MLN/MLNProducts/html/medicare-payment-systems.html. Accessed May 5th, 2025. Recalibration of the FY 2025 MS-DRG relative weights. Fed Regist. 2024;89(167):69109-69115. https://www.govinfo.gov/content/pkg/FR-2024-08-28/pdf/2024-17021.pdf, Accessed May 5th .2025. 14. FYs 2021 - 2025 IPPS Final Rule Home Pages, Table 5 Final Rule and Correction Notice MS-DRGs, Relative Weighting Factors and Geometric

mean.zip. Accessed April 30th, 2025:

CMS Standardization Methodology For Allowed Amount – v.14.

and Arithmetic Mean Length of Stay.

12. MLN6922507 - Medicare Payment Systems. https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-

FY 2022: https://www.cms.gov/files/zip/fy2022-ipps-fr-table-5-fy-2022-ms-drgs-relative-weighting-factors-and-geometric-and-arithmetic-

(MBSF) within the CMS Medicare 100% Research Identifiable Files

FY 2021: https://www.cms.gov/files/zip/fy-2021-ipps-fr-table-5.zip. Accessed April 30th, 2025;

FY 2023: https://www.cms.gov/files/zip/fy2023-ipps-fr-table-5.zip. Accessed April 30th, 2025;

FY 2024: https://www.cms.gov/files/zip/fy2024-ipps-fr-table-5.zip. Accessed April 30th, 2025

 $\% 20 Detailed \% 20 Methods \% 20\% 28 updated \% 20 October \% 202024\% 29. pdf. \ Accessed \ April \ 30^{th}, \ 2025.$

 $Stay.\ https://www.cms.gov/files/zip/fy2026-ipps-nprm-table-5.zip.\ Accessed\ April\ 30th,\ 2025.$

FY 2025: https://www.cms.gov/files/zip/fy-2025-ipps-final-rule-table-5.zip. Accessed April 30th, 2025

classification of a given hospital may change over time.

CMS 100% Research Identifiable Files (RIF)

LIMITATIONS This analysis summarizes hospital kidney transplant data from fiscal year 2024 using CMS' RIF data. Analyses of different years, data sources, or methodologies may produce different results. Kidney transplant information provided in this analysis is for the Medicare FFS population and should not be construed to be representative of kidney transplant admissions paid by other payers. Our analysis relies on data reported and paid through January 2025, allowing for 4 months of claims runout which is generally adequate for reporting hospital admission information. However, results may change with additional runout time and a higher claims

Hanaa Siddiqi, Gabriela Dieguez, Charmaine Girdish, Siyi Lu, and Carol Bazell are employees of Milliman, Inc. The American Academy of Actuaries requires its members to identify their credentials in their work product. Hanaa Siddiqi and Gabriela Dieguez are members of the American Academy of Actuaries and meet its relevant qualification requirements. We acknowledge Allison Halpren, MPH for her analytic contributions.

This report was commissioned by Sanofi U.S., a manufacturer of induction therapy used in

completion rate. Kidney transplant peer group volume categories were determined using OPTN

all-payer hospital kidney transplant volume in the corresponding calendar year, and peer group

Milliman

pps/indirect-medical-education-ime. Accessed April 30th, 2025. Disproportionate Share Hospital (DSH) | CMS. www.cms.gov.https://www.cms.gov/medicare/payment/prospective-payment-systems/acuteinpatient-pps/disproportionate-share-hospital-dsh. Accessed April 30th, 2025. Standardizing Charges. https://mearis-impl.cms.gov/assets/pdfs/NTAP_Appendix_A.pdf. Accessed April 30th, 2025. Claim Pass Thru Per Diem Amount | ResDAC. resdac.org. https://resdac.org/cms-data/variables/claim-pass-thru-diem-amount. Accessed April

15. FY 2026 IPPS Proposed Rule Home Page. Proposed MS-DRGs, Relative Weighting Factors and Geometric and Arithmetic Mean Length of

https://resdac.org/sites/datadocumentation.resdac.org/files/CMS%20Parts%20A%20 and %20B%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20Payment%20Standardization%20-lines/cmS%20-lines/cmS%20-li

17. Indirect Medical Education (IME) | CMS. www.cms.gov. https://www.cms.gov/medicare/payment/prospective-payment-systems/acute-inpatient-

Accessed May 8th, 2025. © 2025 Sanofi. All rights reserved. | MAT-US-2410250-v2.0-05/2025