Kidney Transplants in the United States: A Clinical and Financial Assessment in the Medicare FFS population

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).

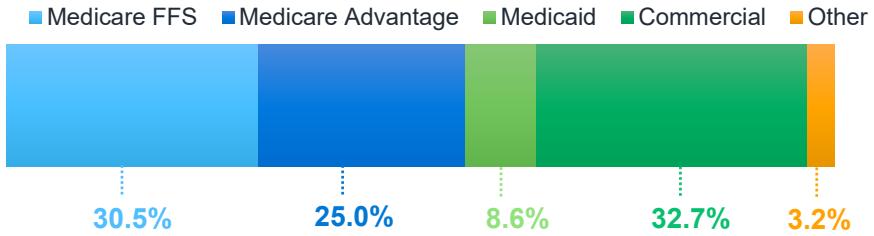
AUTHORS: Charmaine Girdish, MPH, Healthcare Consultant; Gabriela Dieguez, FSA, MAAA, Principal and Consulting Actuary; and Carol Bazell, MD, MPH, Principal. Milliman, Inc. July 2026.

In fiscal year (FY) 2025, Medicare fee-for-service (FFS) remained the dominant payer for kidney transplant admissions, though Medicare Advantage (MA) enrollment among individuals with End-Stage Renal Disease (ESRD) doubled from 2020 to 2024 following the 21st Century Cures Act, which expanded eligibility to all ESRD beneficiaries in 2021[1,2]. A key Medicare initiative is the Increasing Organ Transplant Access (IOTA) Model[3] — a six-year, mandatory model that began July 1, 2025—which incentivizes certain hospitals to increase the number of kidney transplants by maximizing use of deceased donor kidneys, facilitating more living donor transplants, and improving quality of care. In this evolving policy and payer environment, we examined the kidney transplant landscape and assessed kidney transplant admission financial information under the Inpatient Prospective Payment System (IPPS)[4] and hospital internal resource costs for Medicare FFS beneficiaries in FY 2025.

THE LANDSCAPE OF KIDNEY TRANSPLANTS IN THE U.S. (2025)

Medicare was the primary payer for most kidney transplants in 2025, where the percent of kidney transplants paid by MA increased from **21% in 2023** to **25% in 2025**.

Distribution of U.S. Kidney Transplants by Primary Payer, 2025



Hospitals reported nearly 9% of kidney transplants as paid by Medicaid; however, Medicare (FFS or MA) was likely the ultimate primary payer for most of these transplants due to Medicare ESRD entitlement rules[5].

Source: Authors' analysis of 2023 and 2025 Organ Procurement and Transplantation Network (OPTN)[6] data

94%

of kidney transplants received induction therapy[7], consistent with immunosuppressive therapy as the standard of care for reducing the risk of rejection[8].

IOTA Participation

Half of all donation service areas (DSAs) were randomly assigned to IOTA[9], with mandatory participation for eligible hospitals within those DSAs.

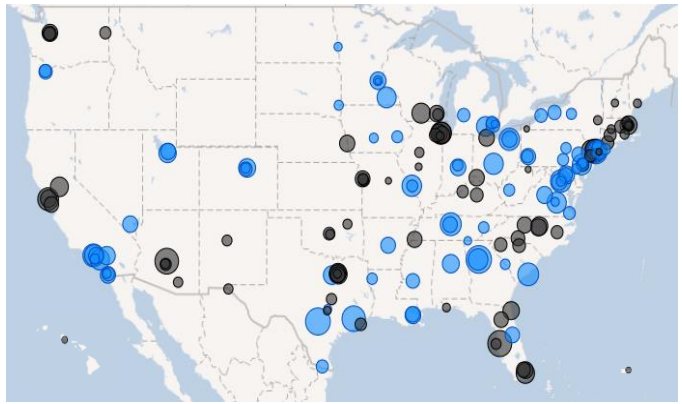
Following the model's first performance year (ending June 30, 2026), the Centers for Medicare and Medicaid Services (CMS) will assess each participating hospital across three domains of achievement, efficiency and quality.

For the model's first performance year, financial incentives applied to kidney transplants where Medicare FFS was the primary or secondary payer, and beginning July 1, 2026, these incentives also apply to kidney transplants where MA is the primary or secondary payer[10].

Given its reach, IOTA's program performance has the potential to influence the kidney transplant landscape in the coming years.

Map of U.S. Kidney Transplant Hospitals by IOTA Participation

Bubble size reflects All-Payer kidney transplant volume



Source: Authors' analysis of 2025 OPTN data[11] with All-Payer transplants and kidney transplant hospitals, cross-referenced with IOTA participant data[3].

CHARACTERISTICS OF KIDNEY TRANSPLANT ADMISSIONS IN MEDICARE FFS (FY 2025)

Most kidney transplants are assigned to one of three Medicare Severity Diagnosis Related Groups (MS-DRGs)[12] under Medicare's IPPS.

650 Kidney Transplant with Hemodialysis with Major Complication or Comorbidities (MCC)

651 Kidney Transplant with Hemodialysis without MCC

652 Kidney Transplant

MS-DRG	650	651	652
Transplant Admission Distribution	29%	10%	61%
% with Deceased Donor Kidney	95%	96%	71%
Geometric Mean Length of Stay (days)	6.4	5.4	4.3
Total Standardized Hospital Internal Cost per Transplant *(inclusive of kidney acquisition costs*)*	$128,882	$121,580	$115,709

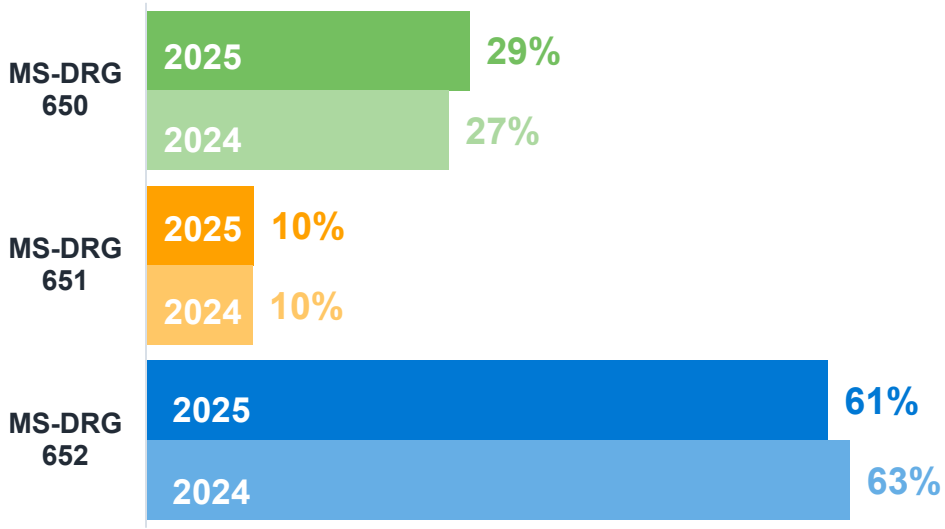
Source: Authors' analysis of fiscal year 2025 CMS 100% RIF FFS data, and cost report data to calculate kidney acquisition costs

In FY 2025, total hospital internal costs for kidney transplants range from **$116K-$129K** per admission, inclusive of kidney acquisition costs.

Kidney acquisition costs* make up **65% to 73%** of total hospital costs for kidney transplant admissions.

39% of all kidney transplant admissions **include hemodialysis**, and **29% include hemodialysis and major complications or comorbidities**.

An increase in the proportion of MS-DRG 650 and a corresponding decrease in the proportion of MS-DRG 652 occurred from FY 2024 to FY 2025.



*Medicare pays separately for kidney acquisition costs, outside of the IPPS[13], 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 preservation[14].

HOSPITAL COSTS AND IPPS PAYMENT 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-DRG[15]. CMS uses hospital-level costs and **charges to annually recalibrate the MS-DRG relative weights[16]**.

Although CMS updates MS-DRG classifications and relative weights annually, MS-DRG relative weights typically reflect new technologies and changes in practice patterns **2 to 3 years after they are introduced**. The table below outlines the CMS IPPS ratesetting timeline

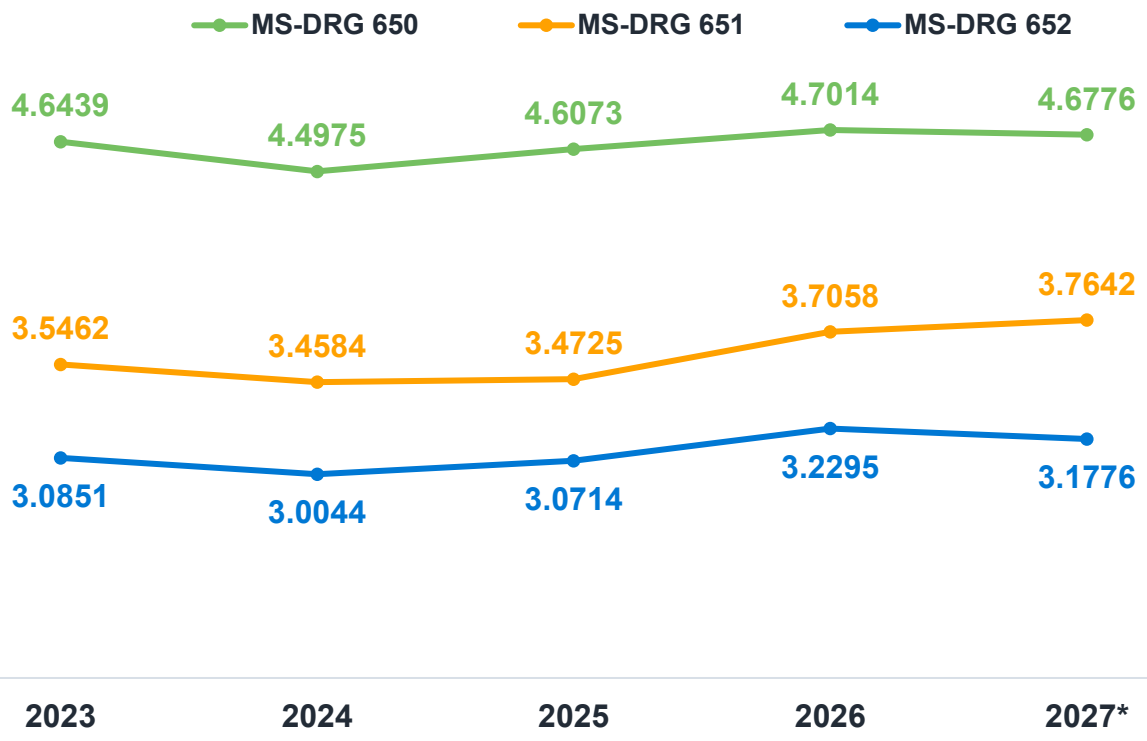
FY 2024	Hospitals provide inpatient and outpatient services to Medicare beneficiaries and submit cost reports to CMS that report hospital resource costs and charges for all services provided in the year. CMS uses these cost reports to calculate national average cost-to-charge ratios (CCRs).
FY 2025	Hospitals provide inpatient services to Medicare beneficiaries and submit claims (that include charges) to CMS for payment.
FY 2026	In FY 2026, CMS applies national average CCRs from FY 2024 cost reports to claims from FY 2025 to convert MS-DRG level charges to costs to propose and finalize MS-DRG relative weights for FY 2027. The final MS-DRG relative weights and other IPPS policies for FY 2027 are available around August 1st of FY 2026.
FY 2027	MS-DRGs are reimbursed using the methodology finalized in FY 2026.

Note that the ratesetting calendar above is illustrative for FYs 2024 - 2027, although the methodology currently applies to any series of four fiscal years.

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

Relative weights for **MS-DRGs 650 and 652 are proposed to decline slightly in 2027[18].**

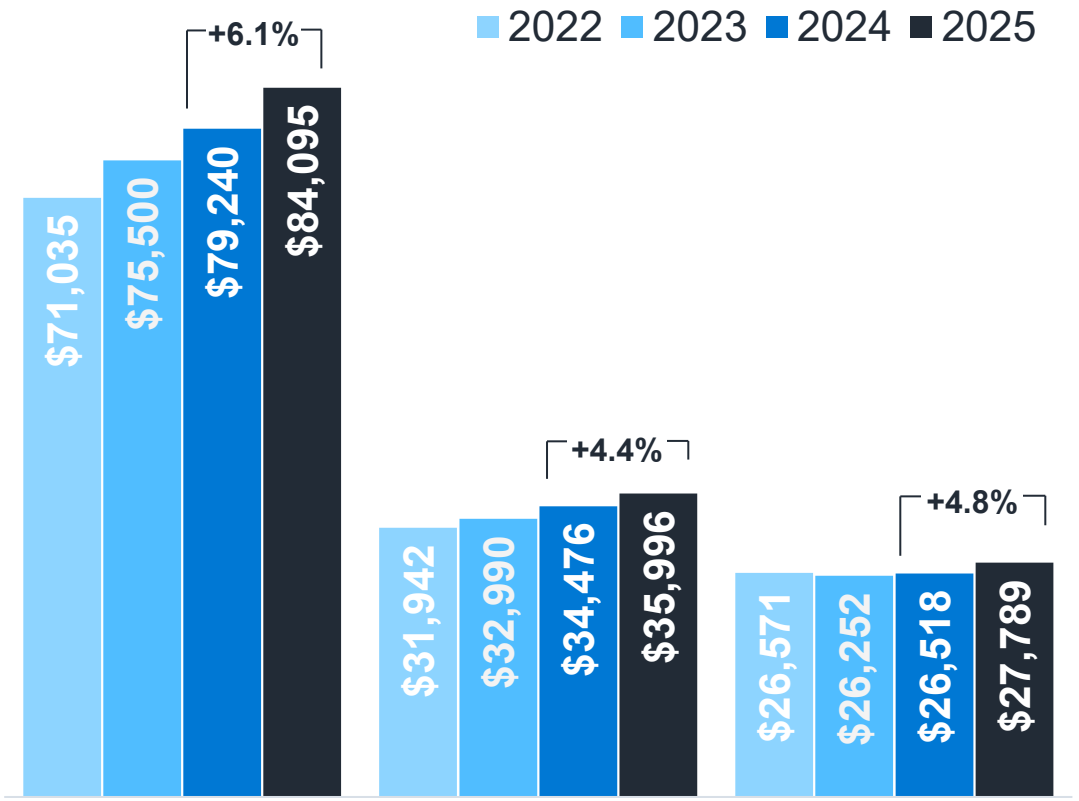
Relative Weight by Fiscal Year and MS-DRG[17]



*Proposed for 2027[18]

HOSPITAL FINANCIAL INFORMATION FOR KIDNEY TRANSPLANT ADMISSIONS IN MEDICARE FFS (FY 2025)

Average Organ Acquisitions Cost, Standardized Hospital Internal Costs and Final Standardized Amounts per Kidney Transplant Admission by Fiscal Year

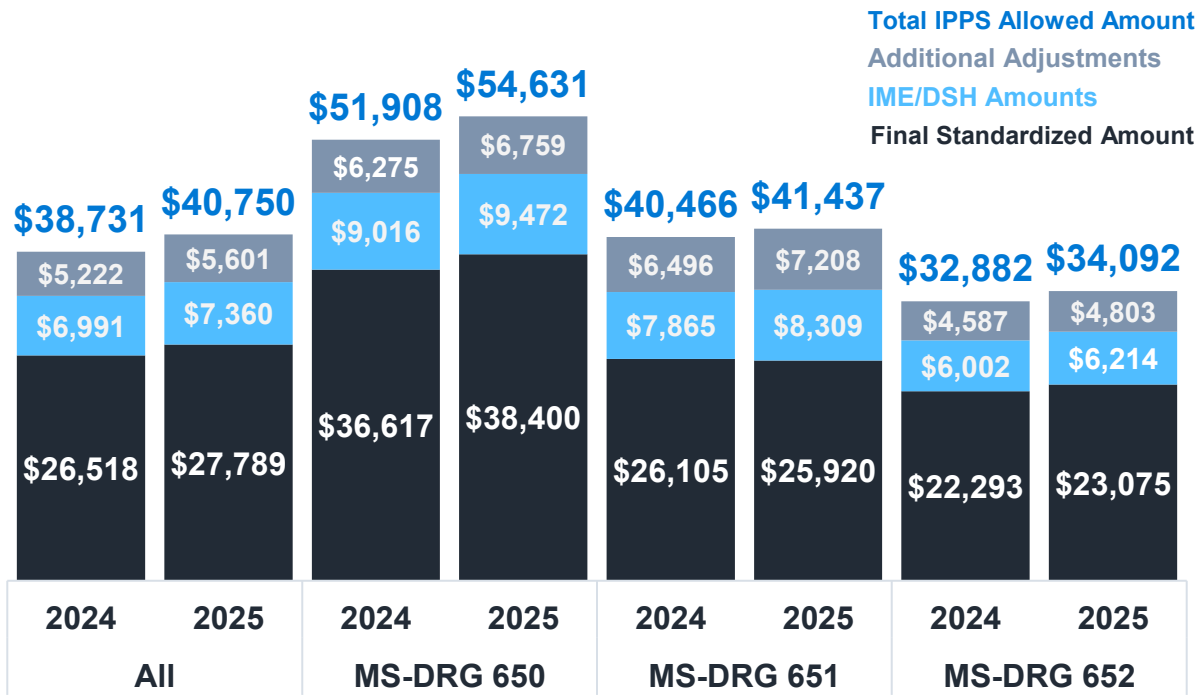


Source: Authors' analysis of fiscal year 2022 - 2025 CMS 100% RIF FFS data

Standardizing amounts removes geographic and other adjustments not directly related to kidney transplant admission care from the total IPPS Allowed Amount[20]. This allows comparisons of hospital resource use for transplant admissions.

Payment adjustments can include additional amounts that go to hospitals such as **Indirect Medical Education (IME)**[21] to compensate hospitals for costs related to teaching medical residents and **Disproportionate Share Hospital (DSH)**[22] to compensate hospitals for treating a high proportion of low-income individuals.

Across all MS-DRGs, the Final Standardized Amount **is less than 70%** of the total IPPS Allowed Amount in FY 2024 and FY 2025.



Source: Authors' analysis of fiscal year 2024 - 2025 CMS 100% RIF FFS data

KIDNEY TRANSPLANT VOLUME - HOSPITAL PEER GROUPS

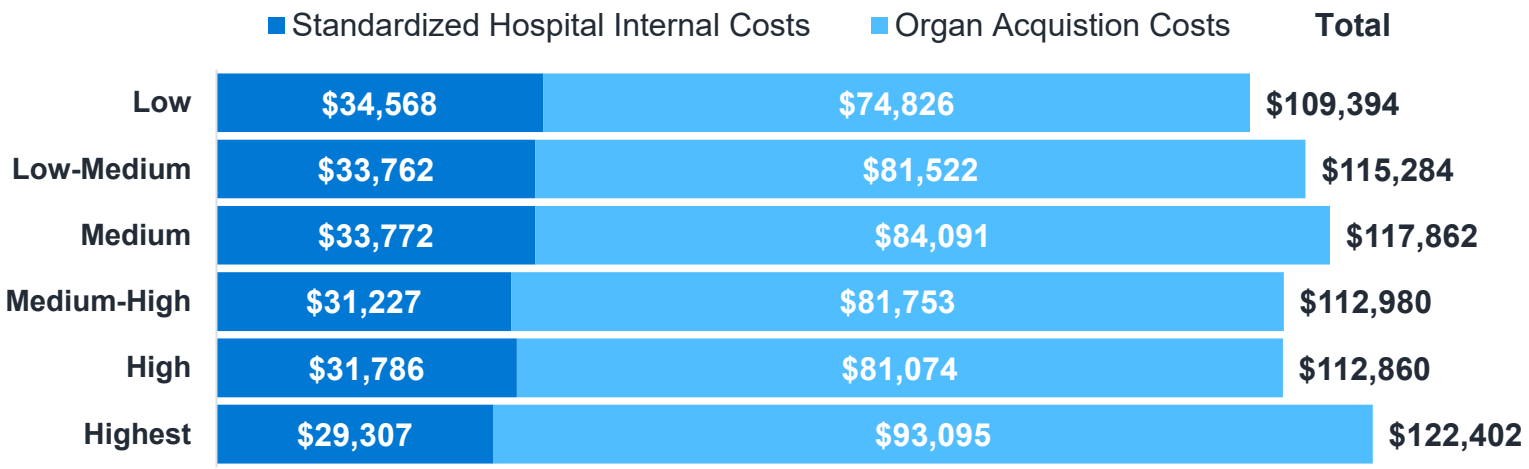
Kidney transplant hospital volume peer groups span a broad range of kidney transplant volume levels, allowing for categorization across low- to high-volume hospitals.

Hospital Transplant Volume Peer Group	Hospital Counts	% Hospital Distribution	Average Transplants per Hospital: All-Payer	Average Transplants per Hospital: Medicare FFS*	% of All-Payer Kidney Transplants Paid by Medicare FFS*
Low	39	20%	18	7	37%
Low-Medium	39	20%	61	20	33%
Medium	39	20%	104	38	36%
Medium-High	39	20%	182	55	30%
High	19	10%	260	80	31%
Highest	20	10%	383	114	30%
Total	**195**	**100%**	**137.6**	**43.5**	**32%**

**Where Medicare FFS was the primary payer*

- Hospitals were ranked by OPTN All-Payer kidney transplant volume in 2025[11] from lowest to highest volume.
- Hospitals were then divided into quintiles (five groups) based on transplant volume.
- The top quintile was further split to identify the top decile of the highest-volume hospitals to appropriately differentiate high-volume hospitals.
- Hospitals were assigned to one of **six transplant volume categories.**

Total Standardized Hospital Internal Costs per Transplant (MS-DRG 652)



Source: Authors' analysis of fiscal year 2025 CMS 100% RIF FFS data

- For MS-DRG 652, which represents nearly two-thirds of Medicare FFS transplants nationally, hospitals' per-transplant internal costs (excluding kidney acquisition) generally decrease with all-payer volume. This suggests **increasing operational efficiency is associated with higher transplant volume.**
- In contrast, per-transplant kidney acquisition costs do not systematically vary with transplant volume except for the highest-volume hospitals that have the highest kidney acquisition costs.
- For these highest-volume hospitals, multiple factors may contribute to this, such as more pretransplant services, greater patient complexity, broader geographic reach with reliance on advanced preservation, and higher operational demands.

METHODOLOGY and DATASOURCES

Cost and Payment Analysis

- Using FY 2025 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 charges[23], mapped inpatient claim lines by revenue code to cost centers using a revenue code-to-cost center crosswalk, and converted charges to hospital internal costs using hospital-specific cost-to-charge ratios (CCRs) from hospital cost reported.
- IPPS payments include additional payments to hospitals that are designed to compensate hospitals for incremental costs of teaching residents (Indirect Medical Education or "IME")[21], serving a disproportionate share of low-income patients (Disproportionate Share Hospital or "DSH" and uncompensated care)[22], and other "pass-through" expenses[24]. Payment standardization removes these payments, along with geographical and other adjustments[20].
- The Final Standardized Amount refers to Final Standard Payment Amount which is determined by CMS' PRICER software output[19]. 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 hospitals, and reductions for sequestration. CMS provides this field on all FFS claims in the 100% RIF.
- Organ acquisition costs were obtained from 2023 and 2024 cost reports.

Kidney Transplant Characteristics

- Deceased donor kidney transplants were identified by charges under revenue code 0812 (Acquisition of Body Components-Cadaver Donor).
- Geometric mean length of stay was calculated based on the number of days between the claim's admission date and discharge date, inclusive.

Kidney Transplant Volume Analysis

Using all-payer data from Organ Procurement and Transplant Network[11], we determined the total number of all-payer kidney transplants in calendar year 2025 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.

CMS 100% Research Identifiable Files (RIF)

The CMS 100% RIF 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.

CMS Medicare Hospital Cost Reports

Medicare-certified institutional providers are required to submit an annual cost report to their Medicare Administrative Contractor. Cost reports contain provider information such as facility characteristics, utilization data, cost and charges by cost center (in total and for Medicare), Medicare settlement data, and financial statement data. CMS maintains the cost report data in the Healthcare Provider Cost Reporting Information system (HCRIS). FY 2023-2024 hospital cost reports were used to obtain hospital-specific departmental CCRs and kidney acquisition costs.

LIMITATIONS

This analysis summarizes hospital kidney transplant data from fiscal year 2025 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 for FY 2025 (October 2024 – September 2025) which was reported and paid through December 2025, allowing for 3 months of claims runout. This is generally adequate for reporting hospital admission information; however, values may fluctuate with additional runout time and a higher claims completion rate.

The percentage of kidney transplants that were from deceased donors is included in this infographic. Note that the living donor percentage cannot be inferred from the deceased donor percentage because donor type includes living, deceased, and unknown.

Kidney transplant peer group categories were determined using OPTN all-payer hospital kidney transplant volume in the corresponding calendar year. Because annual transplant volume fluctuates, peer group classification of a given hospital may change over time.

Charmaine Girdish, Gabriela Dieguez, and Carol Bazell are employees of Milliman, Inc. The American Academy of Actuaries requires its members to identify their credentials in their work product. Gabriela Dieguez is a member of the American Academy of Actuaries and meet its relevant qualification requirements.

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

REFERENCES

1. Medicare Payment Advisory Commission. The Medicare Advantage program: status report. January 2026. https://www.medpac.gov/wp-content/uploads/2026/01/Tab-N-MA_Status-Jan-2026.pdf. Accessed April 14, 2026
2. 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. Accessed March 27, 2026.
3. Increasing Organ Transplant Access (IOTA) Model | CMS. https://www.cms.gov/priorities/innovation/innovation-models/iota. Accessed March 27, 2026.
4. FY 2026 IPPS Final Rule Home Page | CMS. https://www.cms.gov/medicare/payment/prospective-payment-systems/acute-inpatient-pps/fy-2026-ipps-final-rule-home-page, https://public-inspection.federalregister.gov/2025-06271.pdf. Accessed March 27, 2026.
5. eCFR : 42 CFR 406.13 -- Individual who has end-stage renal disease. https://www.ecfr.gov/current/title-42/chapter-IV/subchapter-B/part-406/subpart-B/section-406.13. Accessed May 5, 2026.
6. Based on The Organ Procurement and Transplantation Network (OPTN) data as of April 26, 2026. Accessed April 27, 2026. https://optn.transplant.hrsa.gov/data/view-data-reports/build-advanced/. FFS includes Medicare FFS, Medicaid and other government. Other 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.
7. Data on file. United Network for Organ Sharing (UNOS) data: Milliman's analysis of utilization of antibody immunosuppression for induction therapy for kidney transplants performed from 01/01/2025 to 12/31/2025.
8. 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 March 27, 2026.
9. eCFR :: 42 CFR Part 512 Subpart D -- Increasing Organ Transplant Access (IOTA) Model . https://www.ecfr.gov/current/title-42/chapter-IV/subchapter-H/part-512/subpart-D. Accessed March 27, 2026.
10. Increasing Organ Transplant Access Performance Year 2 Model Update — Quick Reference | CMS. https://www.cms.gov/priorities/innovation/increasing-organ-transplant-access-performance-year-2-model-update-quick-reference. Accessed June 12, 2026
11. Based on The Organ Procurement and Transplantation Network (OPTN) data as of January 13, 2026. Accessed January 14, 2026. https://optn.transplant.hrsa.gov/data/view-data-reports/build-advanced/. 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.
12. Defining the Medicare Severity Diagnosis Related Groups (MS-DRGs). https://www.cms.gov/icd10m/fy2025-version42.1-fullcode-cms/fullcode_cms/Defining_the_Medicare_Severity_Diagnosis_Related_Groups_(MS-DRGs).pdf. Accessed March 27, 2026.
13. Organ Donation and Transplant Reimbursement; p. 3. CMS. https://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/downloads/R471pr1.pdf. Accessed March 27, 2026.
14. 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 March 27, 2026.
15. MLN6922507 - Medicare Payment Systems. https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/html/medicare-payment-systems.html. Accessed March 27, 2026.
16. Recalibration of the FY 2027 MS-DRG relative weights. Fed Regist. 2026;91(71):19390-19395. https://www.govinfo.gov/content/pkg/FR-2026-04-14/pdf/2026-07203.pdf. Accessed April 14, 2026.
17. FYs 2023 - 2026 IPPS Final Rule Home Pages, Table 5 Final Rule and Correction Notice MS-DRGs, Relative Weighting Factors and Geometric and Arithmetic Mean Length of Stay.
    FY 2023: https://www.cms.gov/files/zip/fy2023-ipps-fr-table-5.zip. Accessed April 30, 2025;
    FY 2024: https://www.cms.gov/files/zip/fy2024-ipps-fr-table-5.zip. Accessed April 30, 2025;
    FY 2025: https://www.cms.gov/files/zip/fy-2025-ipps-final-rule-table-5.zip. Accessed April 30, 2025;
    FY 2026: https://www.cms.gov/files/zip/fy2026-ipps-fr-table-5.zip. Accessed March 27, 2026.
18. FY 2027 IPPS Proposed Rule Home Page. Proposed MS-DRGs, Relative Weighting Factors and Geometric and Arithmetic Mean Length of Stay. https://www.cms.gov/files/zip/fy2027-ipps-nprm-table-5.zip. Accessed April 12, 2026.
19. Claim Final Standard Payment Amount | ResDAC. https://resdac.org/cms-data/variables/claim-final-standard-payment-amount. Accessed March 27, 2026.
20. CMS Standardization Methodology For Allowed Amount – v.14. https://resdac.org/sites/datadocumentation.resdac.org/files/CMS%20Parts%20A%20and%20B%20Payment%20Standardization%20-%20Detailed%20Methods%20%28updated%20October%202024%29.pdf. Accessed March 27, 2026
21. Indirect Medical Education (IME) | CMS. www.cms.gov. https://www.cms.gov/medicare/payment/prospective-payment-systems/acute-inpatient-pps/indirect-medical-education-ime. Accessed March 27, 2026.
22. Disproportionate Share Hospital (DSH) | CMS. https://www.cms.gov/medicare/payment/prospective-payment-systems/acute-inpatient-pps/disproportionate-share-hospital-dsh. Accessed March 27, 2026.
23. Standardizing Charges. https://mearis-impl.cms.gov/assets/pdfs/NTAP_Appendix_A.pdf. Accessed March 27, 2026.
24. Claim Pass Thru Per Diem Amount | ResDAC. resdac.org. https://resdac.org/cms-data/variables/claim-pass-thru-diem-amount. Accessed March 27, 2026.

© 2026 Sanofi. All rights reserved. | MAT-US-2410250-v3.0-07/2026