

Hospital Internal Resource Costs and Reimbursement for Kidney Transplants

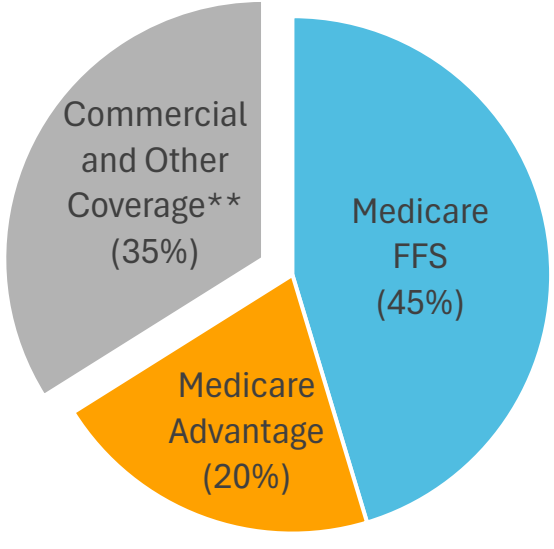
Commissioned by Sanofi U.S.

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There were over 27,000 kidney transplants in the U.S. in 2023, and two-thirds of them were paid for by Medicare.¹ We examined the landscape of current reimbursement and hospital internal resource costs for kidney transplants among Medicare fee-for-service (FFS) beneficiaries.* We estimated Medicare reimbursement, including kidney acquisition payment, was 8% to 12% higher than hospital internal costs. Detailed findings are available in this [report](#).

*Internal costs represent the cost to hospitals of caring for patients and vary by admission complexity. We followed the Medicare FFS Inpatient Prospective Payment System (IPPS) methodology for estimating hospital internal resource costs.²

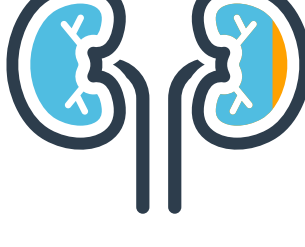
THE LANDSCAPE OF KIDNEY TRANSPLANTS IN THE U.S.



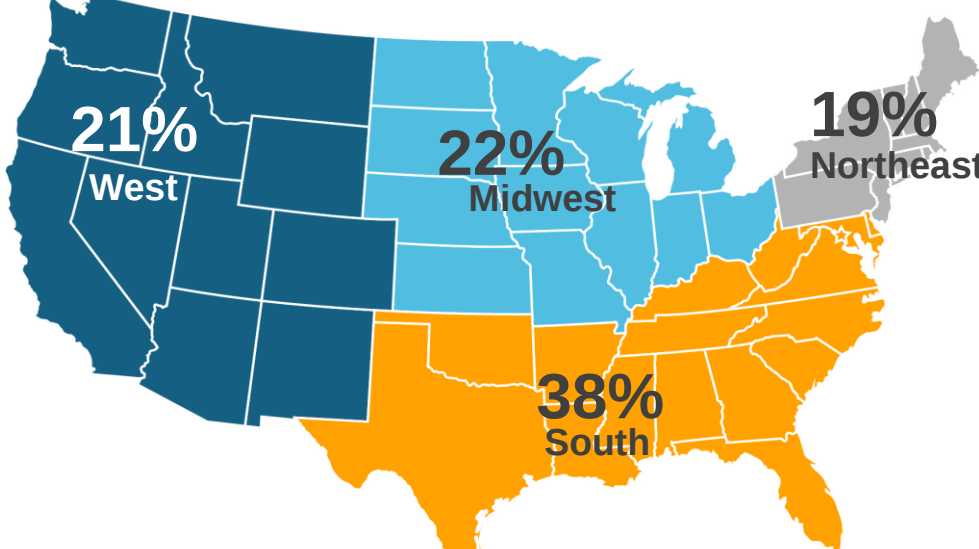
65% of all kidney transplants were paid for by **Medicare** through Medicare FFS and Medicare Advantage programs.¹

**Other coverage includes Veterans Administration, Children's Health Insurance Program, self pay, and unknown coverage.

Over **90%** of kidney transplants received **induction therapy**³, consistent with immunosuppressive therapy as the standard of care for reducing the risk of rejection and reflecting the complexity of the patient.



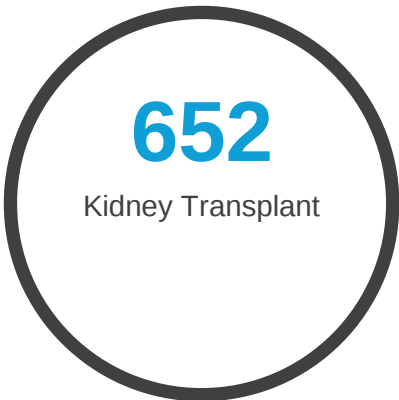
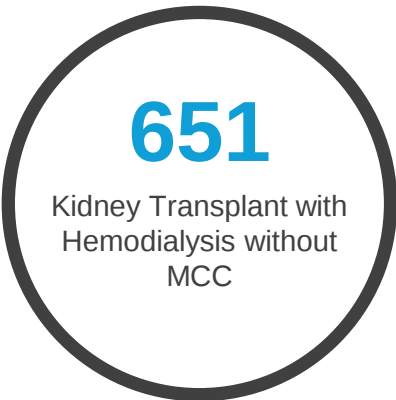
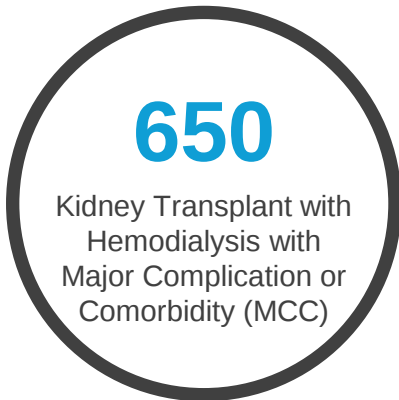
50% of transplanted patients were **Black or Hispanic**. 61% were male, and about 40% were between ages 50 and 64.¹



38% of transplants occurred in the South census region.¹

CHARACTERISTICS OF MEDICARE FFS KIDNEY TRANSPLANT ADMISSIONS

Kidney transplants are assigned to **one of three** Medicare Severity Diagnosis Related Groups (**MS-DRGs**) under Medicare's Inpatient Prospective Payment System (IPPS):²



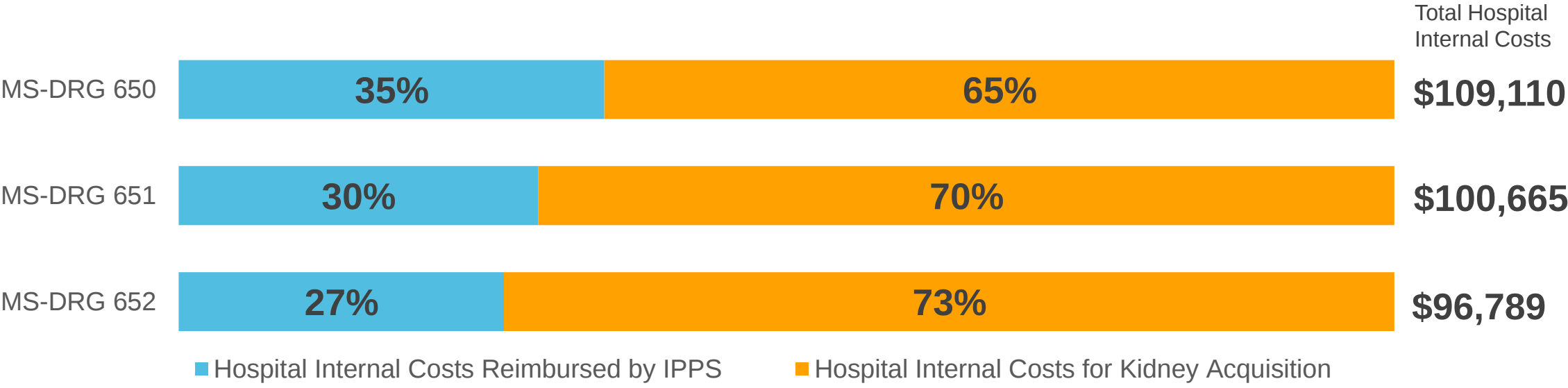
IPPS payment is based on **MS-DRG relative weights which reflect relative hospital internal resource costs**. Intensive care unit (ICU) stay and donor type affect hospital internal resource costs but do not directly impact MS-DRG assignment. **Length of stay also impacts hospital internal resource costs** and increases as the MS-DRG relative weight increases.

MS-DRG	650	651	652
Transplant Admission Distribution	27%	11%	63%
% with Hemodialysis	100%	100%	0%
% with ICU Stay	34%	21%	27%
% with Living Donor Kidney	4%	3%	24%
Geometric Mean Length of Stay	6.8	5.8	4.6
Fiscal Year 2022 MS-DRG Relative Weight ⁴	4.5207	3.6984	3.1851

Source: Authors' analysis of fiscal year 2022 CMS 100% Limited Data Set (100% LDS) from [report](#).

HOSPITAL INTERNAL RESOURCE COSTS OF TRANSPLANT ADMISSIONS

Total hospital internal costs ranged from **\$97K-\$109K**. Kidney acquisition costs made up **65% to 73%** of total hospital internal costs for kidney transplant admissions. **Kidney acquisition costs were separately reimbursed outside of the IPPS**.⁵ About **80%** of hospital internal costs reimbursed by the **IPPS** were associated with **drugs, operating room, intensive care days, and routine hospital days**.

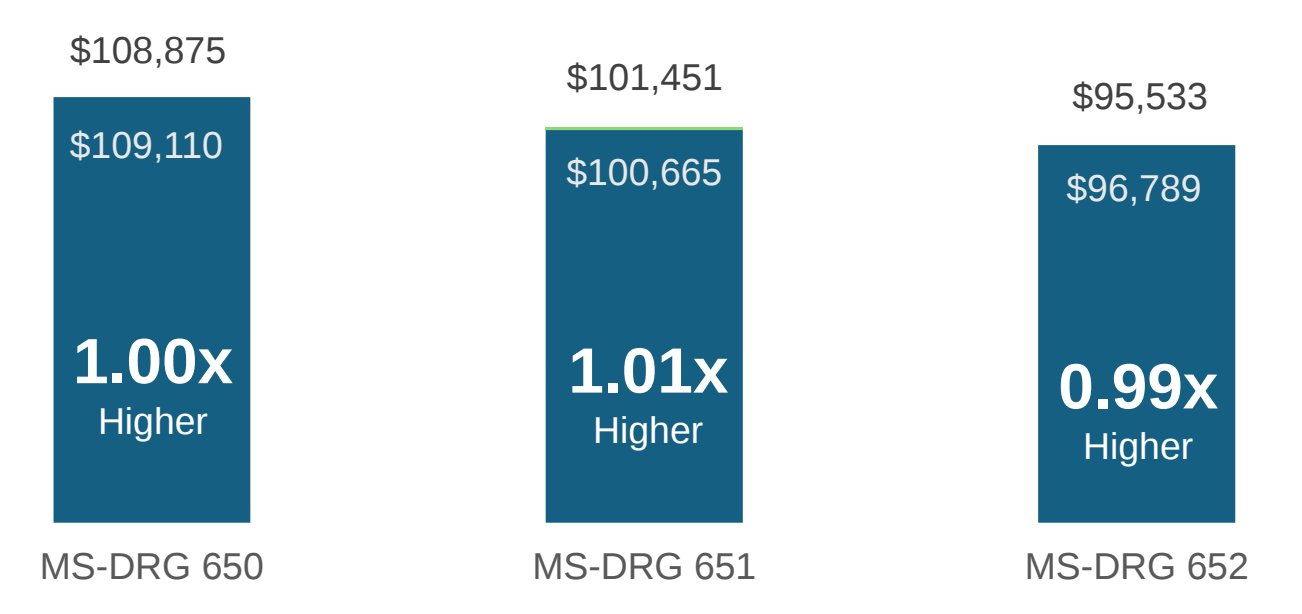
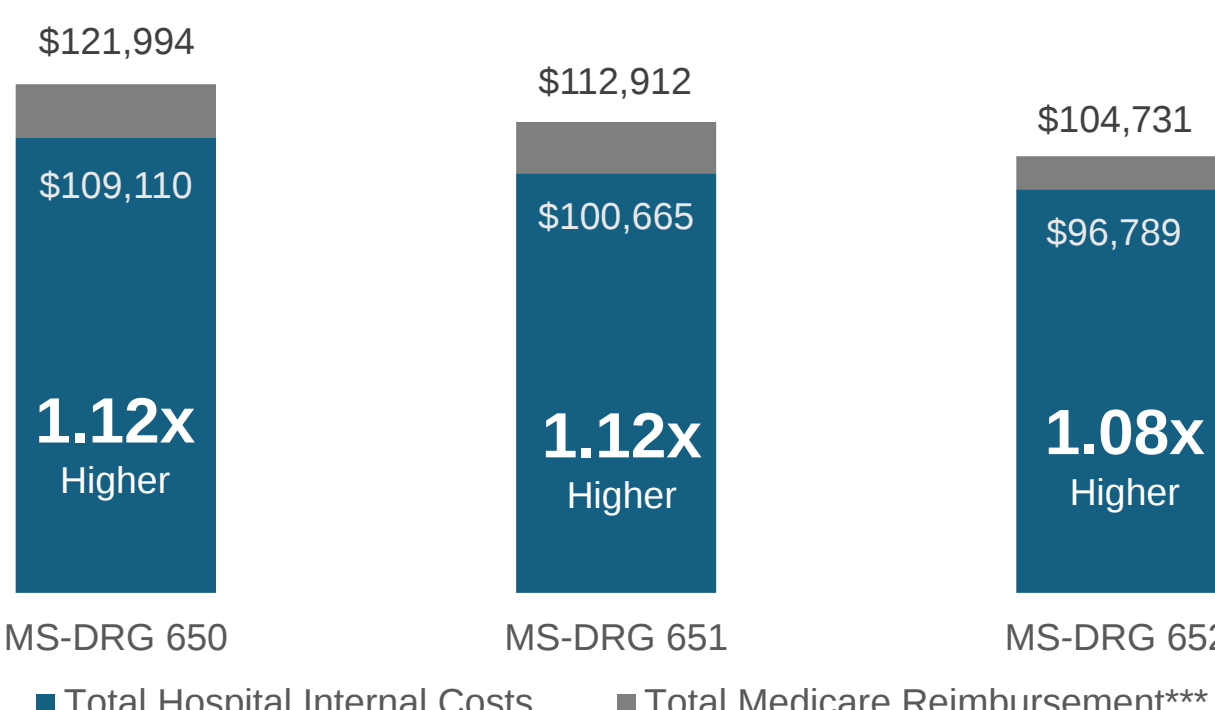


Source: Authors' analysis of fiscal year 2022 CMS 100% LDS from [report](#) and Medicare hospital cost reports for Medicare share of total kidney acquisition cost.^{6,7}

HOSPITAL REIMBURSEMENT

Total Medicare reimbursement exceeded total hospital internal costs, including kidney acquisition cost, by an average of 8% to 12%. IPPS reimbursement **includes payment adjustments unrelated to inpatient care** for the specific admissions. These are designed to compensate hospitals for incremental costs of **teaching residents** (Indirect Medical Education or "IME"), serving **a disproportionate share of low-income patients** (Disproportionate Share Hospital or "DSH" and uncompensated care), and other "pass-through" expenses.^{8,9,10} Most hospitals performing Medicare FFS kidney transplants were located in urban areas and trained medical residents. Nine percent of transplant admissions qualified for a high-cost outlier payment.

Total Medicare reimbursement*** was
1.08x
to
1.12x
higher than total hospital internal costs



When IME, DSH, uncompensated care, and pass-through payments are **excluded**, adjusted total Medicare reimbursement**** was

0.99x
to
1.01x
relative to total hospital internal costs

Source: Authors' analysis of fiscal year 2022 CMS 100% LDS from [report](#) and Medicare hospital cost reports for Medicare share of total kidney acquisition cost.^{6,7}

***Sequestration is removed from total Medicare reimbursement.¹¹

****IME, DSH, uncompensated care, pass-through, and sequestration are removed from adjusted total Medicare reimbursement.

This analysis provides kidney transplant centers, clinicians, patient advocacy groups, payers, federal and state governments, and other interested parties with information for assessing reimbursement adequacy for kidney transplant admissions.

METHODOLOGY AND DATA SOURCES

Kidney transplant admissions analyzed were limited to those where Medicare FFS was the primary payer using inpatient claims from the Centers for Medicare and Medicaid Services (CMS) 100% Limited Data Set (100% LDS) for fiscal year 2022. We excluded simultaneous transplants of kidney and another organ in our analysis. We identified sole kidney transplants assigned to the following MS-DRGs:

- 650: Kidney Transplant with Hemodialysis with Major Complication or Comorbidity (MCC)
- 651: Kidney Transplant with Hemodialysis without MCC
- 652: Kidney Transplant

We summarized billed charges by revenue codes, estimated hospital internal costs (excluding organ acquisition costs) per Medicare IPPS methodology for setting MS-DRG relative weights², and summarized Medicare FFS allowed costs in total and excluding payment adjustments made under the IPPS.

Medicare does not reimburse kidney acquisition costs through the kidney transplant MS-DRG, but rather pays for reasonable and necessary costs, claimed through the Medicare Cost Report filed by the hospital where the transplant was performed.^{5,6} Medicare pays a hospital for the Medicare share of total kidney acquisition cost for that hospital based on the ratio of Medicare usable kidneys to total usable kidneys reported on the Medicare Cost Report.⁷ Medicare payment for organ acquisition includes but is not limited to costs associated with candidate evaluation, maintenance on the list, deceased and living kidney donation and costs of pre-transplant staff.¹² In this analysis, we used fiscal year 2022 Medicare Cost Reports to estimate the Medicare share of the hospital internal cost for kidney acquisition and assumed hospital payment for kidney acquisition was equal to hospital internal cost. At any given hospital, we assumed the kidney acquisition cost and payment for every single transplant admission is the same regardless of MS-DRG or donor type.

We estimate reimbursement is 8-12% higher than total hospital internal costs by comparing:

- Total allowed costs under IPPS for the kidney transplant (including add on amounts such as Indirect Medical Education, Disproportionate Share Hospital, and excluding sequestration), see Figure 12 from Milliman [report](#)
- Data on file, United Network for Organ Sharing (UNOS) data: Analysis of utilization of antibody immunosuppression for induction therapy for transplants performed from 01/01/2010 to 03/31/2024. Sanofi; 2024.
- FY 2022 IPPS Final Rule Home Page, Table 5 FY 2022 Final Rule and Correction Notice MS-DRGs, Relative Weighting Factors and Geometric and Arithmetic Mean Length of Stay. CMS. Published December 17, 2021. Accessed April 30, 2024. <https://www.cms.gov/files/zip/fy2022-ipp-s-fr-table-5-fy-2022-ms-drgs-relative-weighting-factors-and-geometric-and-arithmetic-mean-length-of-stay>
- Organ Donation and Transplant Reimbursement; p. 3. CMS. Accessed May 9, 2024. <https://www.cms.gov/data-research/statistics-trends-and-reports/cost-reports>
- Medicare Hospital Cost Reports for fiscal year 2022. CMS. Accessed June 6, 2024. <https://www.cms.gov/Regulations-and-Guidance/Transmittals/downloads/R471pr1.pdf>
- Organ Donation and Transplant Reimbursement; p. 23. CMS. Accessed June 6, 2024. <https://www.cms.gov/Regulations-and-Guidance/Transmittals/downloads/R471pr1.pdf>
- Indirect Medical Education (IME). CMS. Published September 6, 2023. Accessed April 30, 2024. <https://www.cms.gov/medicare/payment/prospective-payment-systems/acute-inpatient-pps/indirect-medical-education-ime>
- Disproportionate Share Hospital (DSH). CMS. Published April 10, 2024. Accessed April 30, 2024. <https://www.cms.gov/medicare/payment/prospective-payment-systems/acute-inpatient-pps/disproportionate-share-hospital-dsh>
- Claim Pass Thru Per Diem Amount. ResDAC. Published 2024. Accessed April 30, 2024. <https://resdac.org/cms-data/variables/claim-pass-thru-di-em-amount>
- United States. Balanced Budget and Emergency Deficit Control Act of 1985, Part C. Pub L No. 99-177, 99 Stat. 1037 (Dec 12, 1985), as amended through Pub L No. 118-31 (Dec 22, 2023). Govinfo. Accessed April 30, 2024. <https://www.govinfo.gov/app/collection/comps/>
- Comparative Review of Adult Kidney Transplant Medicare Cost Report Reimbursement in U. S. Transplant Hospitals. American Transplant Congress. Accessed August 6, 2024. <https://atcmeeetingabstracts.com/abstract/comparative-review-of-adult-kidney-transplant-medicare-cost-report-reimbursement-in-u-s-transplant-hospitals/>

LIMITATIONS

These results are representative of patients with Medicare FFS coverage. Results for other payers and markets will differ from these. Results presented here are based on analysis of fiscal year 2022 CMS 100% LDS claims and Medicare cost reports. Different data sets, time periods, and methodologies may produce different results. Hanaa Siddiqi, Gabriela Dieguez, 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. This report was commissioned by Sanofi U.S., a manufacturer of induction therapy used in kidney transplants.

REFERENCES

- Based on OPTN data as of July 22, 2024. Accessed July 15, 2024. <https://optn.transplant.hrsa.gov/data/view-data-reports/national-data/>. 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 HHS250-2019-00001C. 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.
- Medicare Program; Hospital Inpatient Prospective Payment Systems for Acute Care Hospitals and the Long Term Care Hospital Prospective Payment System and Policy Changes and Fiscal Year 2022 Rates; Quality Programs and Medicare Promoting Interoperability Program Requirements for Eligible Hospitals and Critical Access Hospitals; Changes to Medicaid Provider Enrollment; and Changes to the Medicare Shared Savings Program. Published August 13, 2021. Accessed April 30, 2024. <https://www.govinfo.gov/content/pkg/FR-2021-08-13/pdf/2021-16519.pdf>
- Data on file, United Network for Organ Sharing (UNOS) data: Analysis of utilization of antibody immunosuppression for induction therapy for transplants performed from 01/01/2010 to 03/31/2024. Sanofi; 2024.
- FY 2022 IPPS Final Rule Home Page, Table 5 FY 2022 Final Rule and Correction Notice MS-DRGs, Relative Weighting Factors and Geometric and Arithmetic Mean Length of Stay. CMS. Published December 17, 2021. Accessed April 30, 2024. <https://www.cms.gov/files/zip/fy2022-ipp-s-fr-table-5-fy-2022-ms-drgs-relative-weighting-factors-and-geometric-and-arithmetic-mean-length-of-stay>
- Organ Donation and Transplant Reimbursement; p. 3. CMS. Accessed May 9, 2024. <https://www.cms.gov/data-research/statistics-trends-and-reports/cost-reports>
- Medicare Hospital Cost Reports for fiscal year 2022. CMS. Accessed June 6, 2024. <https://www.cms.gov/Regulations-and-Guidance/Transmittals/downloads/R471pr1.pdf>
- Organ Donation and Transplant Reimbursement; p. 23. CMS. Accessed June 6, 2024. <https://www.cms.gov/Regulations-and-Guidance/Transmittals/downloads/R471pr1.pdf>
- Indirect Medical Education (IME). CMS. Published September 6, 2023. Accessed April 30, 2024. <https://www.cms.gov/medicare/payment/prospective-payment-systems/acute-inpatient-pps/indirect-medical-education-ime>
- Disproportionate Share Hospital (DSH). CMS. Published April 10, 2024. Accessed April 30, 2024. <https://www.cms.gov/medicare/payment/prospective-payment-systems/acute-inpatient-pps/disproportionate-share-hospital-dsh>
- Claim Pass Thru Per Diem Amount. ResDAC. Published 2024. Accessed April 30, 2024. <https://resdac.org/cms-data/variables/claim-pass-thru-di-em-amount>
- United States. Balanced Budget and Emergency Deficit Control Act of 1985, Part C. Pub L No. 99-177, 99 Stat. 1037 (Dec 12, 1985), as amended through Pub L No. 118-31 (Dec 22, 2023). Govinfo. Accessed April 30, 2024. <https://www.govinfo.gov/app/collection/comps/>
- Comparative Review of Adult Kidney Transplant Medicare Cost Report Reimbursement in U. S. Transplant Hospitals. American Transplant Congress. Accessed August 6, 2024. <https://atcmeeetingabstracts.com/abstract/comparative-review-of-adult-kidney-transplant-medicare-cost-report-reimbursement-in-u-s-transplant-hospitals/>

The complete findings and details of our analysis are available in a Milliman report. For more information and references, please visit <https://www.milliman.com/en/insight/kidney-transplantation-admissions-medicare-ffs-population>