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

Commissioned by Sanofi U.S.

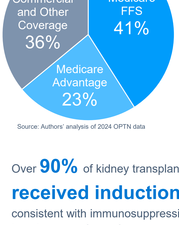
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In 2024, there were over **27,000 kidney transplants in the U.S[1]**. While Medicare fee-for-service (FFS) continues to be the dominant payer for kidney transplants[1], there has been an increase in the share of transplants paid by Medicare Advantage, as enrollment of beneficiaries with ESRD has grown in recent years[2] following the 21st Century Cures Act[3]. 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 care[4].

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)

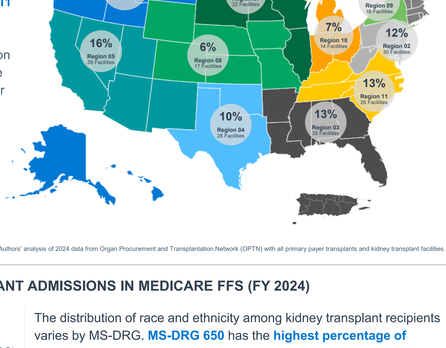


Source: Authors' analysis of 2024 OPTN data

64% of all kidney transplants in 2024 were paid for by **Medicare**, including Medicare FFS and Medicare Advantage[1].

Over **90%** of kidney transplants **received induction therapy**[5], consistent with immunosuppressive therapy as the standard of care for reducing the risk of rejection and reflecting the complexity of the patient[6].

The Organ Procurement and Transplantation Network (OPTN) has **11 geographic regions** across the U.S. to facilitate transplantation within each area[7]. 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.

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

Most kidney transplants are assigned to **one of three** Medicare Severity Diagnosis Related Groups (**MS-DRGs**) under Medicare's IPPS[8].

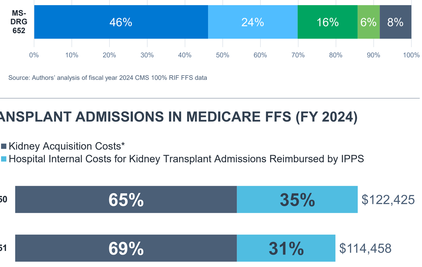
650: Kidney Transplant with Hemodialysis with Major Complication or Comorbidities (MCC)
651: Kidney Transplant with Hemodialysis without MCC
652: Kidney Transplant

MS-DRG	650	651	652
Transplant Admission Distribution	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

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

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.



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

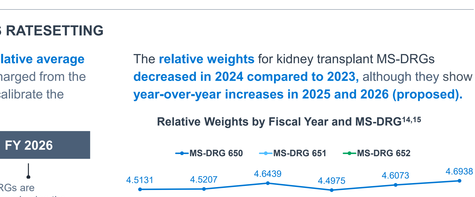
HOSPITAL INTERNAL RESOURCE COSTS OF KIDNEY TRANSPLANT ADMISSIONS IN MEDICARE FFS (FY 2024)

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 assignment[9].



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

*Medicare pays separately for kidney acquisition costs, outside of the IPPS[10], 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[11].

IPPS RATESETTING

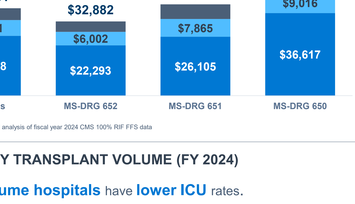
IPPS payment is based on **MS-DRG relative weights,** which reflect **relative average hospital internal resource costs** to treat Medicare FFS patients discharged from the MS-DRG[12]. CMS uses hospital-level costs and charges to annually recalibrate the MS-DRG relative weights[13].

FY 2023	FY 2024	FY 2025	FY 2026
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	Hospitals provide inpatient services to Medicare beneficiaries and submit claims (that include charges) to CMS for payment.	In FY 2025, CMS uses cost reports from FY 2023 and claims from FY 2024 to propose and finalize MS-DRG relative weights for FY 2026. The final MS-DRG relative weights and other IPPS policies for FY 2026 are available around August 1st of FY 2025.	MS-DRGs are reimbursed using the methodology finalized in FY 2025.

Note that the ratesetting calendar above is illustrative for FYs 2023 - 2026, 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 show **year-over-year increases in 2025 and 2026 (proposed).**

Relative Weights by Fiscal Year and MS-DRG[14,15]



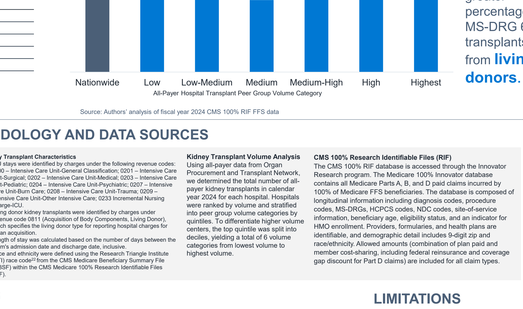
*Proposed for 2026[15]

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 admissions[16].

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 low-income individuals.

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



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**.

Hospital Transplant PEER Group Volume Category	Average Number of Transplants OPTN All-Payer	FFS
Low	30	13
Low-Medium	68	25
Medium	113	40
Medium-High	189	62
High	268	85
Highest	382	121
Total	145.3	48.8

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.

Percentage of Medicare FFS Kidney Transplants from Living Donors in MS-DRG 652

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

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 charges[19] 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 "pass-through" expenses[20]. Payment standardization removes these payments, along with geographical and other adjustments[16].
- The standardized payment refers to Final Standard Payment Amount which is determined by CMS' PRICER software output[21]. 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.

Kidney Transplant Characteristics

- 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 Charge-ICU.
- 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 organ acquisition.
- 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 code[22] from the CMS Medicare Beneficiary Summary File (MBSF) within the CMS Medicare 100% Research Identifiable Files (RIF).

Kidney Transplant Volume Analysis

Using all-payer data from Organ Procurement and Transplant Network, we determined the total number of all-payer 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.

CMS 100% Research Identifiable Files (RIF)

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.

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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 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 classification of a given hospital may change over time.

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.

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