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U.S. Government Cost Savings Driven by the National Kidney Registry

The National Kidney Registry (NKR) has facilitated over 11,000 U.S. living donor kidney transplants (LDKT). These transplants have saved the U.S. Government over $3 billion and have saved or improved the lives of 22,000 patients - every facilitated living donor transplant removes a patient from the wait list and allows another patient to move up on the wait list to receive a deceased donor transplant sooner.

	Total	Patient Avg
Total 10-Year Dialysis-Related Costs Saved	$8.33 billion	$769k
Total 10-Year Transplant-Related Expenses	($4.86 billion)	($448k)
Net Savings by NKR LDKT	**$3.47 billion**	**$320k**

End Stage Renal Disease (ESRD) is a major contributor to morbidity and mortality within the U.S. population. As the primary source of financial coverage for ESRD, Medicare spends over $45 billion annually on dialysis.

From 2008 to June 2025, the NKR facilitated nearly 11,000 LDKT who would have otherwise remained on dialysis. Deputy Secretary of Health and Human Services Jim O'Neill in a September 18, 2025, press conference stated that "a single kidney transplant saves Medicare more than half a million dollars in dialysis." This cost saving estimate is in line with our cost saving estimates which indicate that the NKR has saved Medicare $5.89 billion in dialysis costs.

When other cost savings are included (e.g. social security disability, etc.) and expenses related to the transplant are factored in, the NKR-facilitated transplants have saved the U.S. government $3.47 billion.

The detailed cost saving used to derive the U.S. government savings of $3.47 billion are itemized below:

Table 1. U.S. Government Cost Savings Summary

	Total	Patient Avg
Patients on Dialysis	10,835	
10-Year Dialysis Cost	$5.89 billion	$543k
10-Year Disability Cost	$1.01 billion	$93k
10-Year Waitlist Maintenance Cost	$608 million	$56k
10-Year Death Costs	$826 million	$130k
Total 10-Year Costs	**$8.33 billion**	**$769k**

The detailed expenses used to derive the U.S. government savings of $3.47 billion are itemized below:

Table 2. U.S. Government Expenses Summary

	Total	Patient Avg
LDKT Facilitated by NKR	10,835	
10-Year LDKT Surgical and Medical Costs	$1.55 billion	$143k
10-Year Immunosuppressant Costs	$2.59 billion	$239k
10-Year Death With Functioning Graft Costs	$184 million	$177k
10-Year Graft Failure Costs	$108 million	$93k
10-Year Graft Failure-Related Death Costs	$59 million	$232k
10-Year Post-Graft Failure Dialysis & Immunos	$137 million	$151k
10-Year Post-Graft Failure Disability Cost	$43 million	$47k
10-Year Retransplant Cost	$116 million	$186k
10-Year Retransplant Immunotherapy Cost	$70 million	$112k
Total 10-Year Costs	**$4.86 billion**	**$448k**

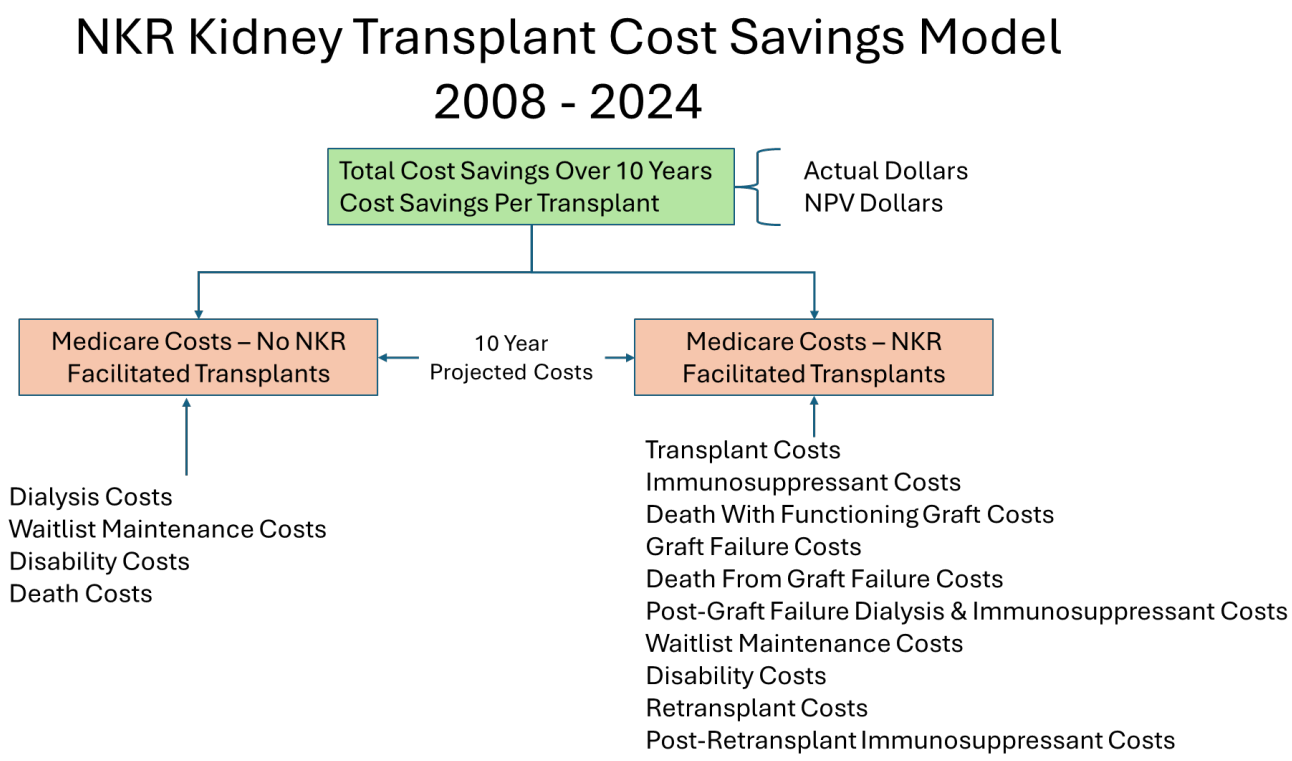
Introduction and Statement of Purpose:

The purpose of this paper is to report the results of a study that estimates the savings to the U.S. government resulting from the 10,835 living donor kidney transplants (LDKT) facilitated by the National Kidney Registry (NKR) between January 2008 and June 2025. Cost savings for each year (2008-2025) are determined by calculating the costs associated with the NKR-facilitated LDKTs over 10 years from the transplant year, and by calculating the costs assuming the patients had not received a transplant but instead were maintained on chronic hemodialysis treatment. The difference between these two costs is the savings that can be attributed to the NKR's transplant efforts.

Assumptions and Methodology:

Determining LDKT cost savings is a two-sided issue. On one side are the costs to Medicare for patients with ESRD who do not receive a transplant. On the other side of the savings calculation are the costs incurred by Medicare for patients who do receive a LDKT. Figure 1 lists the specific cost categories for each situation.

Figure 1



For each year (2008 – 2025), the model sums the specific costs for both sides of the savings equation for the next 10 years. For example, the calculations for the 2008 NKR transplants involve costs extending through 2017. The 2025 calculations include all costs for the years from 2025 to 2034. A key input to the model is the number of NKR-facilitated transplants each year, totaling 10,835 LDKTs between 2008 and June 30, 2025. A substantial number of other inputs are used in the model to calculate the various costs identified in Appendix A, Figure A-1. Among these inputs are four annual costs (in 2024 dollars), which serve as the basis for the cost calculations discussed in the following section (see Figure 2).

Figure 2

Annual Costs Inputs

Model Inputs	Annual Cost (2024 Dollars)*
Dialysis Treatment	$99,000
Waitlist Maintenance	$76,000**
Disability Cost	$22,000
Death While on Dialysis	$135,000
	*Costs rounded to the nearest $000
	**One Time Cost Reported to O.A.C.C.

Cost Calculations – Assuming No NKR-Facilitated Transplants

For each year (2008-2025), the model calculates four different costs that the U.S. Government would pay if the NKR had not facilitated any transplants. These are costs associated with dialysis treatments, waitlist maintenance, payments to patients who are forced to go on disability, and costs that are incurred if patients die while on dialysis. This section summarizes these cost calculations. The details behind the calculations are provided in Appendix B.

Dialysis Treatment and Related Costs:

This study assumes that all patients who are waiting for a transplant require dialysis treatment. For example, in 2024, the NKR-facilitated 1,743 LDKTs— if these patients had not received a transplant, they would have required dialysis each year over the 10-year time horizon (2024–2033) or until death. The total dialysis-related costs for 2024 are $908.9 million. Appendix B-1 describes the specific methodology used to make that calculation.

Assuming the 10,835 NKR transplants had not occurred since 2008, the total dialysis-related costs paid by the U.S. Government are calculated to be $5.89 billion. [1]

Waitlist Maintenance Costs:

In addition to the dialysis costs, patients on the kidney transplant waiting list also incur a one-time waiting list maintenance cost, including costs associated with the evaluation process to determine whether the individual is a candidate for a transplant. Further, there are ongoing care and related medical services costs that are covered by Medicare for waitlisted patients. Xingxing Cheng, et.al. report that these costs in 2017 averaged about $62,000 per transplant.[2] The cost model developed for this study projects that the total waitlist maintenance costs paid by Medicare in 2024 to be $109 million had the 1,743 people not had a transplant facilitated by the NKR. The total waitlist maintenance costs had the 10,835 NKR transplants not occurred are projected to be $608 million. Appendix B-2 shows the methodology used to arrive at these costs.

Disability Costs:

Dialysis often requires multiple sessions per week, with each session lasting about 3–5 hours. Many dialysis patients experience exhaustion that lingers for hours or days after each session, making it difficult or impossible to continue working. Erickson et al. report that 93% of dialysis patients receive Social Security Disability Insurance (SSDI) or Supplemental Security Income (SSI).[3] The Social Security Administration estimates that the average disability benefit is about $1,500 per month or $18,000 annually.[4]

This study assumes that disabled dialysis patients who do not receive a transplant continue to receive disability payments until they die. For each year covered in this study (2008-2025), the cost model projects the disability cost to the U.S. Government over a ten-year time horizon. For example, the 2024 disability cost is estimated to be $180.6 million. Appendix B -3 illustrates the methodology used to calculate disability costs.

The total projected disability cost had the NKR not facilitated the 10,835 transplants between 2008 and 2025 is $1.0 billion.

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[1] An unknown number of these patients may have located a donor through other sources (e.g. direct donation), resulting in lower dialysis costs. Part or all of this cost reduction would be offset by increased Medicare costs associated with these transplants.

[2] Cheng XS, Han J, Braggs-Gresham JL, et al. Trends in Cost Attributable to Kidney Transplantation Evaluation and Waiting List Management in the United States, 2012-2017. *JAMA Netw Open*. 2022;5(3):e221847. Published 2022 Mar 1.

[3] Erickson KF, Zhao B, Ho V, Winkelmayer WC. Employment among Patients Starting Dialysis in the United States. *Clin J Am Soc Nephrol*. 2018;13(2):265-273.

[4] *Selected Data from Social Security's Disability Program: Disabled Worker Average Benefits*. Social Security Administration. https://www.ssa.gov/oact/STATS/dib-g3.html. Accessed August 14, 2025.

Death on Dialysis Cost:

Dialysis is a life-saving treatment for individuals with severe kidney failure or end-stage renal disease (ESRD). Yet, despite its critical role, people undergoing dialysis face a higher risk of mortality compared to the general population. The increased mortality rate is a result of several potential health risks these people face, including infections, heightened risk of cardiovascular complications, electrolyte imbalance, and internal hemorrhaging. Figure A-3 in Appendix A shows the death rate for patients on dialysis as reported by the USRDS.

Wong et al. indicate that in 2014, the Medicare cost payments to dialysis patients in their last year of life was about $20,000.[5] Using a 3% inflation rate, this cost is projected to be $28,000 by 2024. Additionally, the 2022 USRDS Annual Report indicates that the Medicare cost for patients who die while on dialysis was $100,000, which was approximately $106,000 by 2024.[6] This provides a total estimated annual cost per death of approximately $135,000 (see Appendix A, Figure A-1).

For each year covered in this study (2008-2025), the cost model projects the death on dialysis cost to the U.S. Government over a ten-year time horizon. For example, the 2024 death cost is estimated to be $42.6 million. Appendix B-4 illustrates the methodology used to calculate death costs.

The total projected death cost had the NKR not facilitated the 10,835 transplants between 2008 and 2025 is $826 million.

Total Costs Assuming No NKR-Facilitated Transplants

The costs that the U.S. Government would have paid had the NKR not facilitated nearly 11,000 LDKTs since 2008 include dialysis and related treatment costs, waitlist maintenance costs, disability costs, and death costs while on dialysis. Figure 3 summarizes these costs for the 2008 through 2025 timeframe.

Thus, without the NKR, the U.S. Government is projected to have incurred $8.3 billion in costs ($768,620 per missed transplant) for the patients who would have remained on dialysis until death. As shown in Figure 3, the per-patient cost for just dialysis treatment is projected to average $543,609. This is consistent with a statement made by Deputy Secretary of Health and Human Services, Jim O'Neill, at a September 18, 2025, press conference entitled "Expanding

[5] Wong SPY, Yu MK, Green PK, Liu CF, Hebert PL, O'Hare AM. End-of-Life Care for Patients With Advanced Kidney Disease in the US Veterans Affairs Health Care System, 2000-2011. *Am J Kidney Dis*. 2018;72(1):42-49.
[6] United States Renal Data System (USRDS). 2022 Annual Data Report: Epidemiology of Kidney Disease in the United States.

Organ Access to Patients and Restoring Trust" in which he stated that "a single kidney transplant saves Medicare more than half a million dollars in dialysis."[7]

Figure 3

U.S. Government Cost Summary – Assuming No NKR Transplants

	Total (2008 --- 2025)		Per Patient Average
Patients on Dialysis	**10,835**		
Total 10-Year Dialysis Cost	$5,890,000,000		$543,609
Total 10-Year Disability Cost	$1,006,000,000		$92,847
Total 10-Year Waitlist Maintenance Cost	$608,000,000		$56,114
Total 10-Year Deaths While on Dialysis	6,348		
Total 10-Year Death Costs	$826,000,000		$130,115
Total 10-Year Costs	**$8,328,000,000**		$768,620

While the above discussion assumes that there were no NKR transplants, the objective of this study is to determine the cost savings to the government due to NKR's facilitation of 10,835 LDKTs since 2008. This requires that the costs associated with transplants be compared with the $8.3 billion cost, assuming no transplants. The following section itemizes the specific costs associated with these transplants.

Cost Calculations – With NKR-Facilitated Transplants

Previously, Figure 1 listed the different costs that are incurred when the NKR-facilitated kidney transplants are performed. This section reports the totals for each of these costs to the U.S. Government for the 10,835 NKR-facilitated transplants performed between 2008 and 2025. The cost calculations are based on the input values displayed in Appendix A. The details behind the cost calculations for each of the cost categories are provided in Appendix C. Among these inputs are nine annual costs (in 2024 dollars), which serve as the basis for the cost calculations discussed in the following section (see Figure 4).

[7] U.S. Department of Health and Human Services. Expanding Organ Access to Patients [Internet]. YouTube. Published September 18, 2025. Accessed September 30, 2025. Available from: https://www.youtube.com/live/dzkWdO3btmo?si=qvWlizOTkqD5nVUh

Figure 4

Annual Cost Inputs

Model Inputs	Annual Cost (2024 Dollars)*
Dialysis Treatment	$99,000
Disability Cost	$22,000
Death While on Dialysis	$135,000
Retransplant	$174,000
Death Post-Transplant	$173,000
Death After Graft Failure - Year 1	$641,000
Death After Graft Failure - Year 2	$255,000
Death After Graft Failure - Year 2	$202,000
	*Costs rounded to the nearest $000

LDKT Surgical and Medical Costs:

There has been a dramatic annual growth in the number of NKR transplants. In 2008, only 22 patients were transplanted with the NKR's aid, but by 2024, the number had increased to 1,743. In the American Journal of Transplantation, Axelrod et al. stated that the average cost of a LDKT was $94,000.[8] A 2015 study published in the same journal and authored by Held et al. reported the average kidney transplant cost at $145,000.[9] A 2024 article by McCormick et al. reported an average transplant cost of $114,000.[10] For this study, a total direct medical cost associated with a second transplant is set at $115,000. [8,9,10] In addition, the 2024 USRDS Annual Report, Figure 9.11d, indicates that kidney transplant Medicare fee-for-service of

[8] Axelrod DA, Schnitzler MA, Xiao H, et al. An economic assessment of contemporary kidney transplant practice. Am J Transplant. 2018;18(5):1168-1176.
[9] Held PJ, McCormick F, Ojo A, Roberts JP. A Cost-Benefit Analysis of Government Compensation of Kidney Donors. *Am J Transplant*. 2016;16(3):877-885.
[10] McCormick F, Held PJ, Chertow GM, Peters TG, Roberts JP. Projecting the Economic Impact of Compensating Living Kidney Donors in the United States: Cost-Benefit Analysis Demonstrates Substantial Patient and Societal Gains. *Value Health*. 2022;25(12):2028-2033.

$45,000 per year pertains to each transplant, bringing the 2024 total transplant cost to $160,000 (see Appendix A, Figure A-1).

For each year, 2008-2025, the cost model projects the transplant cost over a ten-year time horizon. For example, the transplant cost for the 1,743 transplants facilitated by the NKR in 2024 is estimated to be $278.9 million between 2024 and 2033. Appendix C-1 illustrates the methodology used to calculate transplant surgical and medical costs.

The total projected estimated Medicare medical and surgical transplant cost for the 10,835 is $1.55 billion.

Immunosuppressant Cost After LDKT:

This study assumes that all transplanted patients will receive immunosuppressant treatment until they either die from non-graft-related causes or experience graft failure. The 2024 USRDS Annual Report indicates that the average annual cost of immunosuppressants is $23,100.[11] Many patients who have received a kidney transplant and are on immunotherapy can be expected to incur health-related costs that are covered by Medicare. Accurate data for these costs is difficult to pinpoint. For this study, the total annual immunosuppressant cost is set at $25,000 (see Appendix A, Figure A-1).

The cost model calculates the immunosuppressant cost over a ten-year time horizon from the year of transplant. For example, the 10-year immunosuppressant treatment cost for the 1,743 transplants facilitated by the NKR in 2024 is estimated to be $465.2 million. Appendix C-2 illustrates the methodology used to calculate immunosuppressant costs.

The total estimated Medicare immunosuppressant cost for the 10,835 NKR transplants between 2008 and 2025 is $2.59 billion.

Post-Transplant Death Cost – Non-Graft Failure Related

The United States Renal Data System (USRDS) 2023 Annual Report notes that about 2% of kidney transplant recipients die in the first year following transplant, and most of these deaths (about 70%) are from causes other than graft failure.[12] Based on these findings, this study sets the non-graft-related mortality rate at 1% each year following the transplant. A 2020 study conducted by Sussell et al. reports that the cost of a non-graft post-transplant death

[11] United States Renal Data System. 2024 *USRDS Annual Data Report: Epidemiology of kidney disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2024.

[12] United States Renal Data System. 2023 *USRDS Annual Data Report: Epidemiology of kidney disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2023.

averaged $153,400.[13] Using this figure and a 3% inflation rate, a death cost value of $172,600 is employed in this study (see Appendix A, Figure A-1).

For each year between 2008 and 2025, the model calculates the total non-graft-related costs over a 10-year time horizon. Based on the 1,743 NKR transplants in 2024, the total death cost for 166 patient deaths is $32.8 million. Appendix C-3 shows the cost calculation methodology. The cumulative non-graft-related death cost for the 10,835 transplants and resulting 1,037 deaths between 2008 and 2025 is $184 million.

Graft Failure Cost

While kidney transplants provide the best approach to helping patients with ESRD, there is a risk that the transplanted graft will fail. Grafts can fail for a variety of reasons. Based on OPTN data, this study assumes that the graft failure rate is 1.2% (see Appendix A, Figure A-1).[14] The graft failure cost in 2024 dollars is $90,700.[15]

The model calculates the total 10-year graft failure cost for each year, 2008-2025. Based on the 1,743 transplants in 2024, by 2033, a total of 188 graft failures is estimated to have occurred, resulting in a total graft failure cost of $19.4 million. The model used in this study estimates that the total graft failures for the 10,835 NKR transplants facilitated between 2008 and 2025 are 1,162, and the cost associated with these is $108 million. Appendix C-4 provides the calculation methods used to arrive at these costs.

Post-Transplant Death Cost – Graft-Failure Related

The previous section identified the costs associated with graft failures. Unfortunately, some of these graft failures end in the deaths of the transplant recipients before they have an opportunity to receive second transplants.[16] The 9.4% annual post-transplant mortality rate in the each of the first 3 years post-graft failure reported by Kaplan and Meier-Kriesche from a 10-year USRDS dataset is used in this study. The Medicare cost for patients who die following graft failure varies depending on a variety of medical factors.[17] For this paper, we reference the 2016 USRDS Annual Report which calculates an average death cost after graft

[13] Sussell J, Silverstein AR, Goutam P, et al. The economic burden of kidney graft failure in the United States. *Am J Transplant*. 2020;20(5):1323-1333.
[14] Lentine KL, Smith JM, Lyden GR, et al. OPTN/SRTR 2023 Annual Data Report: Kidney. *Am J Transplant*. 2025;25(2S1):S22-S137.
[15] Schnitzler MA, Skeans MA, Axelrod DA, et al. OPTN/SRTR 2016 Annual Data Report: Economics. *Am J Transplant*. 2018;18 Suppl 1:464-503.
[16] This study assumes that retransplants occur three years post graft failure for all patients who survive to that point.
[17] Kaplan B, Meier-Kriesche HU. Death after graft loss: an important late study endpoint in kidney transplantation. *Am J Transplant*. 2002;2(10):970-974.

failure of $506,000, $201,400, and $154,200 in post-transplant years 1,2 and 3 respectively.[18] After applying a 3% per year medical inflation rate, this paper uses a year 1 post-transplant death cost in 2024 of $641,000. Death costs for years 2 and 3 post-graft failure are $255,000 and $202,000 (see Appendix A, Figure A-1).

The cost model developed for this study calculates the 10-year total death cost post-graft failure for the 1,743 NKR transplants in 2024 to be $10.6 million and the total cost for the 10,835 transplants facilitated by the NKR between 2008 and 2025 to be $82 million. Appendix C-5 illustrates the methodology used to perform these calculations.

Dialysis and Immunosuppressant Cost – Post-Graft Failure

Transplant recipients who experience graft failure will require dialysis. Additionally, a study by Sawinski et al. reports that 78.5% of patients with graft failure remain on immunosuppressant medications.[19] Therefore, patients who survive after graft failure incur dialysis costs, and most also incur immunosuppressant treatment costs. Annual dialysis costs used in this study are shown in Appendix A, Figure A-2, and the annual immunosuppressant cost (2024 dollars) is $25,000 (see Appendix A, Figure A-1).

The total post-graft failure dialysis and immunosuppressant treatment costs for the 1,743 transplants conducted in 2024 projected over the years 2024-2033 are $21.9 million. The total 10-year cost for the 10,835 NKR-facilitated transplants for the years 2008 through 2033 is $138 million. Appendix C-6 provides the methodology behind these calculations.

Disability Cost – Post Graft Failure

Transplant recipients who experience graft failure go back on dialysis until they either receive a retransplant or die. A study by Erickson et al. indicates that 93% of these dialysis patients go on disability.[21] The Social Security Administration estimates that the average disability benefit is about $1,500 per month or $18,000 annually.[22]

Considering the year 2024 in which the NKR-facilitated 1,743 LDKTs, the total disability cost for graft failure patients over the years 2024-2033 is estimated to be $7.8 million. The total 10-year cost for the 10,835 NKR-facilitated transplants for the years 2008 through 2033 is $43 million. The methodology behind these calculations is provided in Appendix C-7.

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[18] United States Renal Data System. 2016 *USRDS Annual Data Report: Epidemiology of kidney disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2016.

[19] Sawinski D, Andy C, John G. Impact of immunosuppression withdrawal on dialysis survival among failed kidney transplant recipients. *Am J Transplant.* 2025;25(suppl 1):S437.

[21] Erickson KF, Zhao B, Ho V, Winkelmayer WC. Employment among Patients Starting Dialysis in the United States. *Clin J Am Soc Nephrol*. 2018;13(2):265-273.

[22] *Selected Data from Social Security's Disability Program: Disabled Worker Average Benefits*. Social Security Administration. https://www.ssa.gov/oact/STATS/dib-g3.html. Accessed August 14, 2025.

Retransplant Cost

Transplant Recipients who experience graft failure and survive three years from the initial transplant are assumed to receive a retransplant in three years. For example, in 2024, there are estimated to be 21 graft failures. Of these, five patients are projected to die, leaving 16 to be retransplanted 3 years later in 2027. A study by Sussell et al. reports the retransplant cost (in 2024 dollars) to be $174,000 (see Appendix A, Figure A-1). [23] Continuing the 2024 example over the 10-year time horizon to 2033, a total of 101 retransplants are projected at a total cost of $20.95 million. Over the 2008-2025 existence of the NKR, a total of 627 retransplants are projected for a total cost of $117 million. Appendix C-8 shows the methodology behind these calculations.

Immunosuppressant Treatment After Retransplant

All transplant recipients who suffer graft failure and survive three years are assumed to receive a retransplant 3 years post-graft failure. The retransplanted patients must then go on immunosuppressant medications. Previously, we indicated that the annual immunosuppressant treatment cost (in 2024 dollars) is $25,000. For example, in 2024, of the 1,743 NKR transplants, 21 patients are expected to incur a graft failure. By 2027, a total of 16 of these patients are expected to be alive and will receive a retransplant. These patients will most likely require immunosuppressant medications for the rest of their lives.

Appendix C-9 shows how the 2024 total immunosuppressant cost ($12.5 million) is calculated over the 10-year horizon (2024-2033). The total retransplant immunosuppressant cost for the years 2008-2025 is $70 million.

Total Cost Associated NKR-Facilitated Transplants

Ten specific cost categories associated with NKR-facilitated LDKTs have been described. The model developed for this study has been used to calculate the total cost over the subsequent 10-Years for NKR transplants that were performed each year between 2008 and 2025. Figure 5 summarizes the total costs for the individual cost categories, indicating a total cost for the 10,835 NKR transplants of $4.86 billion. The average total transplant cost is $448,000.

[23] Sussell J, Silverstein AR, Goutam P, et al. The economic burden of kidney graft failure in the United States. *Am J Transplant*. 2020;20(5):1323-1333.

Figure 5

U.S. Government Cost Summary – 10,835 NKR Transplants

	Total (2008 --- 2025)		Per Patient Average
LDKT Facilitated by NKR	**10,835**		
Total 10-Year LDKT Surgical and Medical Costs	$1,553,000,000		$143,332
Total 10-Year Immunospressant Costs After LDKT	$2,590,000,000		$239,040
Total 10-Year Post Transplant Deaths With Graft Function	1,037		
Total 10-Year Post-Transplant Death With Graft Function Costs	$184,000,000		$177,435
Total 10-Year Graft Failures	1,162		
Total 10-Year Graft Failure Cost	$108,000,000		$92,943
Total Deaths Following Graft Failure	254		
Total 10-Year Post-Transplant Graft Failure-Related Death Cost	$59,000,000		$232,283
Total 10-Year Dialysis & Immunotherapy Cost - After Graft Failure	$137,000,000		$150,881
Total 10-Year Disability Cost - Post-Graft Failure	$43,000,000		$47,357
Total 10-Year Retransplants	622		
Total 10-Year Retransplant Cost	$116,000,000		$186,428
Total 10-Year Immunotherapy Cost After Retransplant	$70,000,000		$112,499
Total 10 Year LDKT Costs	**$4,857,000,000**		**$448,269**

NKR Transplant Cost Savings Summary and Conclusions

Treating patients with ESRD in the U.S. is very costly to the federal government. According to the 2023 USRDS Annual Report, in 2021, the Medicare spending on ESRD patients was $52.3 billion.[24] For patients with ESRD who meet transplant health requirements, kidney transplantation (living or deceased donor) is the preferred treatment. The alternative is to remain on long-term dialysis.

However, there are significant costs associated with both transplants and dialysis treatment. An article by McCormick et al. is one of many that have attempted to measure the financial and societal benefits of transplant compared to dialysis.[25] While these studies demonstrate a significant cost-benefit of transplants, each year, many ESRD patients are forced to remain on dialysis due to a shortage of kidney donors.

To help address this donor shortage, the National Kidney Registry began facilitating LDKTs in 2008. Between 2008 and the second quarter of 2025, the NKR has facilitated 10,835 transplants. The purpose of this study is to estimate the cost savings to the U.S. Government resulting from NKR transplants. The methodology employed calculates the cost savings for each

[24] United States Renal Data System. 2023 *USRDS Annual Data Report: Epidemiology of kidney disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2023

[25] McCormick F, Held PJ, Chertow GM, Peters TG, Roberts JP. Projecting the Economic Impact of Compensating Living Kidney Donors in the United States: Cost-Benefit Analysis Demonstrates Substantial Patient and Societal Gains. *Value Health*. 2022;25(12):2028-2033.

year's transplants over a subsequent 10-year period. Costs with and without the NKR transplants are calculated. The summary results of these calculations are displayed in Figure 6. The total savings from the NKR transplants are estimated to be $3.47 billion, which amounts to slightly more than $320,000 per transplant. Using a discount rate of 4%, the present value savings in 2024 are $2.95 billion or $272,000 per transplant. Figure 7 displays cumulative savings growth over the NKR's 18 years of operation.

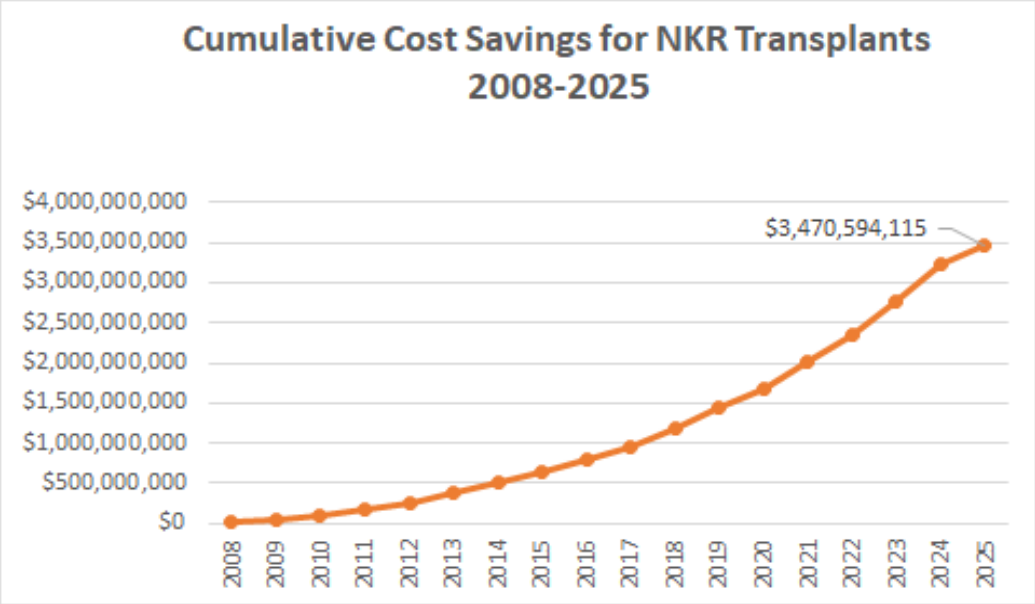
Figure 6

NKR Transplants – Cost Savings Summary

Net 10-Year Savings (Loss) from LDKT	$3,471,000,000
Net 10-Year Savings Per LDKT	$320,351

In addition to the savings that NKR-facilitated transplants provide to the U.S. Government, another important benefit is the reduction in patient deaths. As shown in Figures 3 and 5, had the NKR not facilitated the 10,835 transplants since 2008, an estimated 6,348 people would have died while on long-term dialysis (see Figure 3). However, some transplant recipients die from non-graft-related causes or after graft failure. Figure 5 shows that of the 10,835 transplants that have been performed over the 18 years of NKR's operation, 1,037 recipients are projected to have died from non-graft-related causes. In addition, of the 1,162 who are projected to have suffered from graft failures, an estimated 249 deaths are expected. These calculations indicate a 5,062 reduction in patient deaths that result from the NKR transplants.

Figure 7



The bottom line is that NKR transplants have likely saved the U.S. Government well over $3.5 billion and have resulted in over 5,000 fewer patient deaths since 2008.

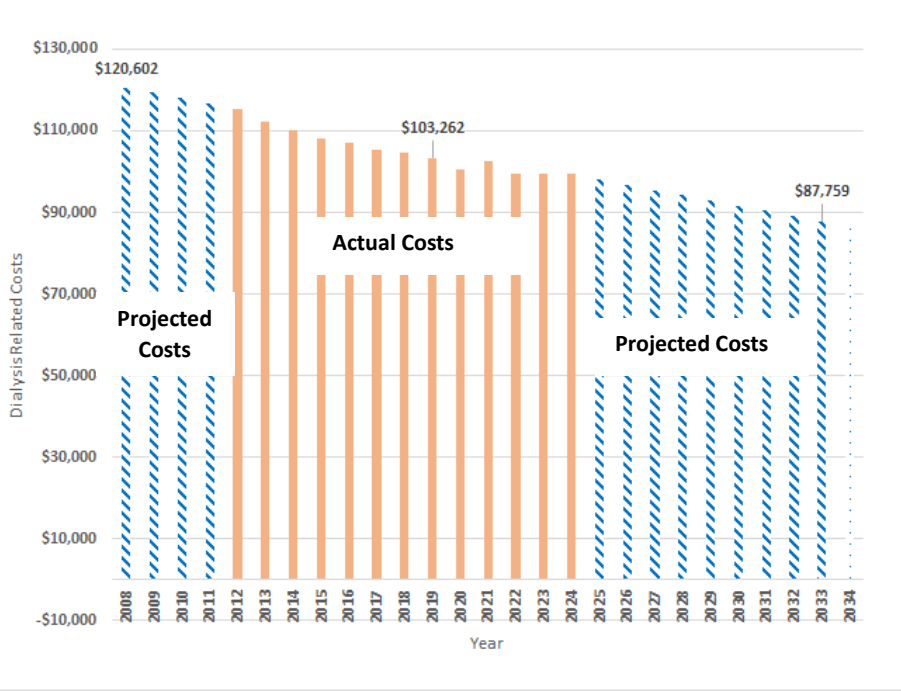
Appendix – A

Figure A – 1: Cost Savings Model – Key Inputs[26]

Initial Annual Dialysis Cost (2024)	$99,369
LDKT Surgical and Medical Cost	$160,000
Annual Immunosuppressants Cost After Transplant	$25,000
Death Cost Post Transplant - Not Related To Graft failure	$172,600
Discount Rate	4.00%
LDKT Graft Failure Cost	$90,700
Waitlist Maintenance (2024 Cost)	76,252
Proportion Dialysis Patients on Disability	93.00%
Annual Disability Cost	$18,000
Medical Services Inflation Rate	3.00%
Re-Transplant Cost	$174,000
Include Disability Cost Savings	Yes
Death Cost on Dialysis	$135,000
Graft Failure Rate	**1.20%**
Post Transplant Mortality Rate	1.00%
Mortality Rate After Graft Failure - Before Re-Transplant	9.40%
Death Cost (graft failure then death) first year	$641,000
Death Cost (graft failure then death) second year	$255,000
Death Cost (graft failure then death) third year	$202,000
Percent of Post Graft Failure Dialysis Patients Going on Immunotherapy	78.50%

[26] Note: Costs are in 2024 Dollars. These values are deflated for years prior to 2025 and inflated for years after 2024.

Figure A – 2: Annual Dialysis Treatment and Related Costs[27]



[27] United States Renal Data System. 2024 *USRDS Annual Data Report: Epidemiology of kidney disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2024.

Figure A - 3

Death Rate By Years on Dialysis[28]

Years on Dialysis	Mortality Rate
1	18.10%
2	11.80%
3	11.80%
4	9.80%
5	7.80%
6	6.80%
7	5.80%
8	4.80%
9	3.80%
10	2.80%

[28] United States Renal Data System. 2023 *USRDS Annual Data Report: Epidemiology of kidney disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2023.

Appendix – B

B-1: Dialysis Cost Calculation Method – Patients Not Transplanted

This study assumes that all patients who are not transplanted will be on dialysis until death. The annual dialysis and related medical treatment costs for each year included in this study are shown in Appendix A, Figure A–2. For each year from 2008 through 2025, the total ten-year dialysis cost is computed as:

10-Year Dialysis Cost = (Potential NKR Transplants – Deaths) x Annual Dialysis Cost

2024 Example (Cost for 2024 through 2033):

The NKR-facilitated 1,743 LDKTs in 2024. Appendix A, Figure A-3, shows an 18.1% mortality rate for year 1 dialysis patients. Thus:

2024 Deaths = 1,743 x 18.1% = 315

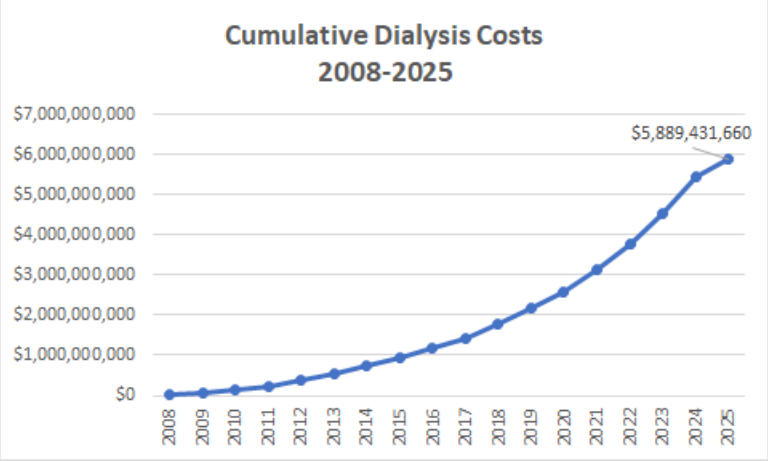
2024 Dialysis Cost = (1,743 – 315) x $99,369 = $141,850,937

2025 Deaths = (1,743 – 2024 Deaths) x 11.8% = 168

2025 Dialysis Cost = (1,743 – 315 – 168) x $98,079 = $123,488,326

Continuing through 2033, the total 10-year dialysis cost for the 1,743 patients is $908 million. Using the same methodology for the years 2008 through 2025, the total dialysis-related cost that Medicare would have paid had the NKR not facilitated the 10,835 transplants is $5.89 billion (see Figure B-1).

Figure B-1



B-2: Waitlist Maintenance Cost Calculation Method – Patients Not Transplanted

This study assumes that all patients who are not transplanted will be on the transplant waiting list until death. The one time waiting list maintenance cost in 2017 was reported to be $62,000 in 2017. This value is inflated by 3% per year for years 2018-2025 and deflated by 3% per year for years 2008 to 2016. For example, the annual waitlist maintenance cost in 2024 is calculated to be $76,252. For 2008 through 2025, the total ten-year waitlist maintenance cost is computed as:

10-Year Waitlist Cost = (Potential NKR Transplants – Deaths) x Annual Waitlist Maintenance Cost

2024 Example (Cost for 2024 through 2033):

The NKR-facilitated 1,743 LDKTs in 2024. Appendix A, Figure A-3, shows an 18.1% mortality rate for year 1 dialysis patients. Thus:

2024 Deaths = 1,743 x 18.1% = 315

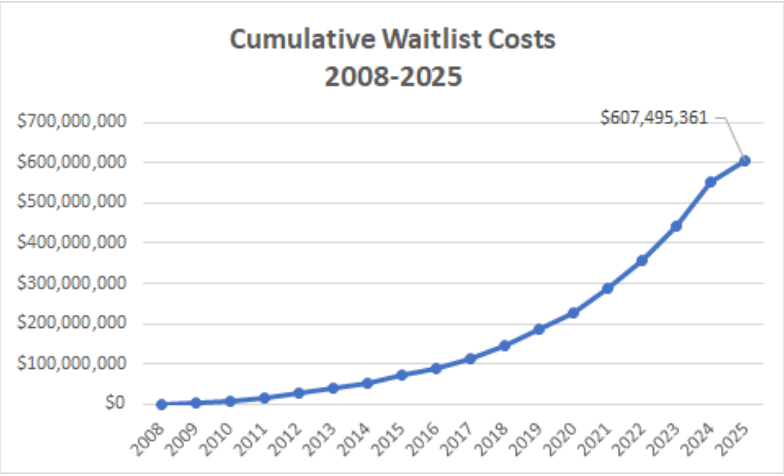
2024 Waitlist Maintenance Cost = (1,743 – 315) x $76,252 = $108,851,283

2025 Deaths = (1,743 – 2024 Deaths) x 11.8% = 168

2025 Waitlist Maintenance Cost = (1,743 – 315 – 168) x $78.540 = $98,887,036

Continuing through 2033, the total 10-year waitlist cost for the 1,743 patients is $108.9 million. Using the same methodology for the years 2008 through 2025, the total waitlist maintenance-related cost that Medicare would have paid had the NKR not facilitated the 10,835 transplants is $608 million (see Figure B-2).

Figure B-2



B-3: Disability Cost Calculation Method – Patients Not Transplanted

This study assumes that 93% of patients will receive disability payments while on dialysis until death. The annual disability cost as of 2024 is $18,000. For each year from 2008 through 2025, the total ten-year disability cost is computed as:

10-Year Dialysis Cost = (Potential NKR Transplants – Deaths) x % on Disability x Annual Disability Cost

2024 Example (Cost for 2024 through 2033):

The NKR-facilitated 1,743 LDKTs in 2024. Appendix A, Figure A-3, shows an 18.1% mortality rate for year 1 dialysis patients. Thus:

2024 Deaths = 1,743 x 18.1% = 315

2024 Disability Cost = (1,743 – 315) x 93% x $18,000 = $23,896,635

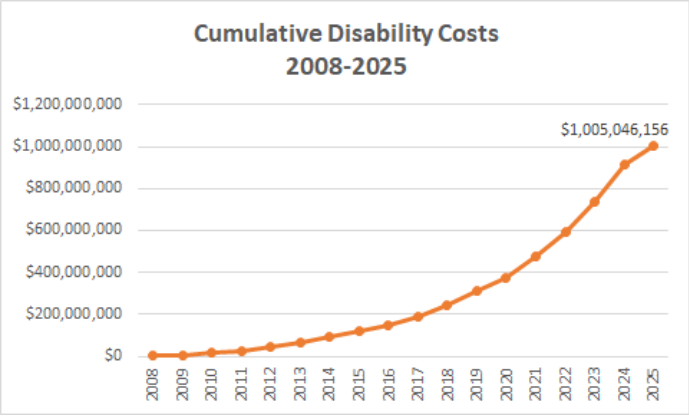
This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1)

2025 Deaths = (1,743 – 2024 Deaths) x 11.8% = 168

2025 Dialysis Cost = (1,743 – 315 – 168) x 93% x $18,540 = $21,709,137

Continuing through 2033, the total 10-year dialysis cost for the 1,743 patients is $180.5 million. Using the same methodology for the years 2008 through 2025, the total disability cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $1 billion (see Figure B-3).

Figure B-3



B-4: Death Cost Calculation Method – Patients Not Transplanted

This study assumes the annual death cost for patients on dialysis as of 2024 is $135,000. For each year from 2008 through 2025, the total ten-year disability cost is computed as:

10-Year Death Cost = Number of Deaths x Annual Death Cost

2024 Example (Cost for 2024 through 2033):

The NKR-facilitated 1,743 LDKTs in 2024. Appendix A, Figure A-3, shows an 18.1% mortality rate for year 1 dialysis patients. Thus:

2024 Deaths = 1,743 x 18.1% = 315

2024 Death Cost = 315 x $135,000 = $42,590,205

This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1)

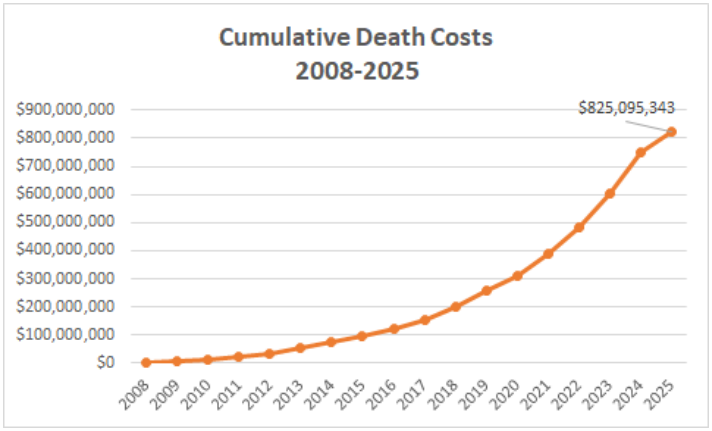
2025 Deaths = (1,743 – 2024 Deaths) x 11.8% = 168

2025 Death Cost = 168 x $139,050 = $23,422,556

Continuing through 2033, the total 10-year dialysis cost for the 1,743 patients (and 1,021 deaths) is $148 million.

Using the same methodology for the years 2008 through 2025, the total death cost (for 6,348 deaths) that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $826 million (see Figure B-4).

Figure B-4



Appendix – C

C-1: Transplant Medical and Surgical Cost Calculations

Based on the studies cited in this paper, the 2024 direct medical and surgical transplant cost is $160,000. Prior year costs are deflated at 3% per year. The transplant cost is calculated using the following equation:

10-Year Direct Transplant Cost = Number of Transplants x Transplant Cost

2024 Example (Cost for 2024 through 2033):

The NKR-facilitated 1,743 LDKTs in 2024. Even though the 2024 cost calculation extends 10-Years to 2033, there are no transplant costs beyond the initial 2024 costs.

2024 Transplant Cost = 1,743 x $160,000 = $278,880,000

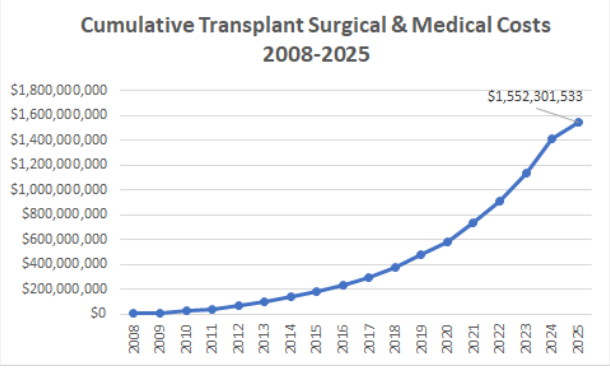
2023 Example (Cost for 2023 through 2032)

The NKR-facilitated 1,430 LDKTs in 2023. The cost of all of 2023 transplants will be allocated to 2023. This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1.) Thus, the direct transplant cost for 2023 is deflated by 3% giving a per-transplant cost of $155,200.

2023 Transplant Cost = 1,430 x $155,200 = $223,332,800

The same methodology is used for the years 2008 through 2025. The total direct transplant cost for 10,835 deaths) is $1.55 billion (see Figure C-1).

Figure C-1



C-2: Immunosuppressant Cost Calculations

Based on the studies cited in this paper, the 2024 immunosuppressant treatment cost is $25,000. The Medical Inflation rate is 3%. The post-transplant non-mortality death rate is 1% and the graft failure rate is 1.2% (see Appendix A, Figure A-1). The 10-year immunosuppressant cost for each year from 2008 through 2025 is calculated using:

10-Year Immunosuppressant Cost = (Number of Transplants – Non-Graft Failure Deaths – Graft Failures) x Annual Immunosuppressant Cost

<u>2024 Example (Cost for 2024 through 2033)</u>:

The NKR-facilitated 1,743 LDKTs in 2024. The number of Non-Graft Related Deaths in 2024 is:

2024 Non-Graft Related Deaths = # of Transplants x Post-Transplant Mortality Rate

= 1,743 x 1.0% = 17

2024 Graft Failures = # of Transplants x Graft Failure Rate

= 1,743 x 1.2% = 21

2024 Immunosuppressant Cost = (1,743 - 17 – 21) x $25,000 = $42,625,000

2025 Non-Graft Related Deaths = (1,743 – 17) x 1.0% = 17

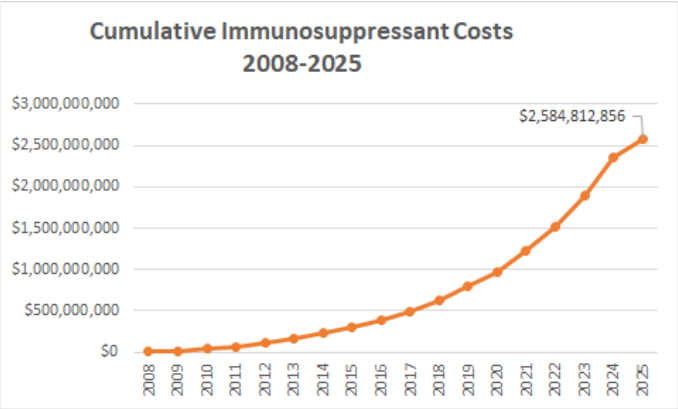
2025 Graft Failures = (1,743 – 17 -17 – 21) x 1.2% = 20

2025 Immunosuppressant Cost = (2024 Transplants – (2024 + 2025 Deaths) – (2024 + 2025 Graft Failures) x Annual Immunosuppressant Cost

2025 Immunosuppressant Cost = (1,743 – (17+17) – (21 + 20)) x $25,750 = $42,951,000

Continuing through 2033, the total 10-year immunosuppressant cost for the 1,743 patients is $464.3 million. Using the same methodology for the years 2008 through 2025, the total cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $2.6 billion (see Figure C-2).

Figure C-2



C-3: Post-Transplant Death Cost – Not Graft Related

Based on the post-transplant non-graft-related mortality rate of 1% and the 2024 death cost of $172,600 (see Appendix A, Figure A-1), the death cost equation is:

10-Year Non-Graft-Related Death Cost = Number of Non-Graft-Related Deaths x Death Cost

<u>2024 Example (Cost for 2024 through 2033)</u>:

The number of non-graft-related deaths in 2024 is:

2024 Deaths = 2024 Transplants x Mortality Rate = 1,743 x 1% = 17

2024 Non-Graft-Related Death Cost = 17 x $172,600 = $2,934,200

This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1).

2025 Deaths = (2024 Transplants – 2024 Deaths) x Mortality Rate

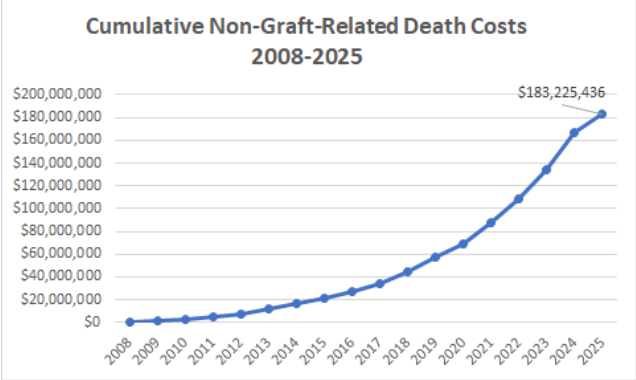
2025 Deaths = (1,743 – 17) x 1% = 17

2025 Non-Graft-Related Death Cost = 2025 Deaths x 2025 Death Cost

2025 Non-Graft-Related Death Cost = 17 x $177,778 = $3,022,226

Continuing through 2033, the total 10-year cost for the 1,743 patients is $32.7 million. Using the same methodology for the years 2008 through 2025, the total cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $183 million (see Figure C-3).

Figure C-3



C-4: Graft Failure Cost

Assuming a graft failure rate of 1.2% each year and a 2024 graft failure cost of $90,700, the total 10-year graft failure cost for the years 2008-2025 is calculated as follows:

10-Year Graft Failure Cost = # Graft Failures x Graft failure Cost

<u>2024 Example (Cost for 2024 through 2033)</u>:

2024 Graft Failures = 2024 Transplants x Graft Failure rate

2024 Graft Failures = 1,743 x 1.2% = 21

2024 Graft Failure Cost = Graft Failures x Graft Failure Cost

2024 Graft Failure Cost = 21 x $90,700 = 1,904,700

This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1).

2025 Graft Failures = (2024 Transplants - (2024 + 2025 Deaths) – 2024 Graft Failures) x Graft Failure Rate = (1,743 – (17 + 17) – 21) x 1.2% = 20

This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1).

2025 Graft Failure Cost = 20 x $93,421 = $1,868,420

Continuing through 2033, the total 10-year graft failure cost for the 1,743 patients is $19.4 million. Using the same methodology for the years 2008 through 2025, the total cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $108 million (see Figure C-4).

Figure C-4

C-5: Post-Transplant Death Cost – Graft-Failure Related

This study assumes that all patients who survive to year 3 following a graft failure will receive a retransplant. But patients who die following graft failure prior to receiving a retransplant incur death costs depending on whether they die 1-, 2- or 3-years post graft failure. Further, it is assumed that the death rate following graft failure is 9.4% in years 1,2 and 3. The equation for calculating death cost post-graft failure is:

Death Cost Post-Graft Failure = # Deaths Post-Graft Failure x Appropriate Death Cost Post-Graft Failure Cost

<u>2024 Example (Cost for 2024 through 2033)</u>:

2024 Deaths Post-Graft Failure =2024 Graft Failures x Year 1 Death Rate Post-Graft failure

2024 Death Post-Graft Failure = 21 x 9.4% = 2

2024 Death Cost Post-Graft Failure = 2 x $641,000 = $1,282,000

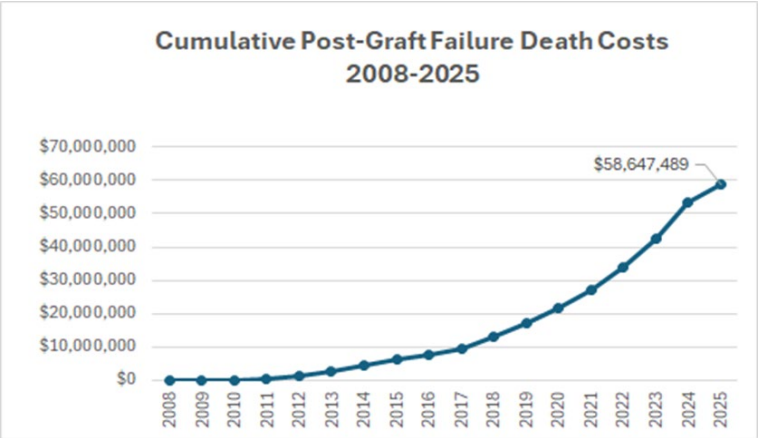
2025 Death Cost Post-Graft Failure = (2024 + 2025 Graft Failures – 2024 Post Graft failure Deaths) x

2025 Deaths Post-Graft Failure = (21 + 20 -2) X 9.4% = 4

2025 Death Cost Post-Graft Failure = 4 x $262,650 = $1,050,000

Continuing through 2033, the total 10-year death cost post-graft failure cost for the 1,743 patients is $10.6 million. Using the same methodology for the years 2008 through 2025, the total cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $82 million (see Figure C-5).

Figure C-5



C-6: Dialysis and Immunosuppressant Cost – Post-Graft Failure

All patients who experience graft failure will return to dialysis until they either die or receive a second transplant. Additionally, 78.5% of transplant recipients will stay on immunosuppressant medications until they die or receive a second transplant. The equation for post-graft failure dialysis and immunosuppressant costs is:

Post-Graft Failure Dialysis and Immunosuppressant Cost = ((Graft Failures – Deaths Post-Graft Failure) x Annual Dialysis Cost) + ((Graft Failures – Deaths Post-Graft Failure) x Annual Immunosuppressant Cost)

<u>2024 Example (Cost for 2024 through 2033)</u>:

2024 Cost = ((2024 Graft Failures – 2024 Post-Graft Deaths) x 2024 Dialysis Cost) + ((2024 Graft Failures – 2024 Post-Graft Deaths) x 2024 Immunosuppressant Cost)

2024 Cost = ((21 – 2) x $99,369) + ((21-2) x $25,000) = $2,260,886

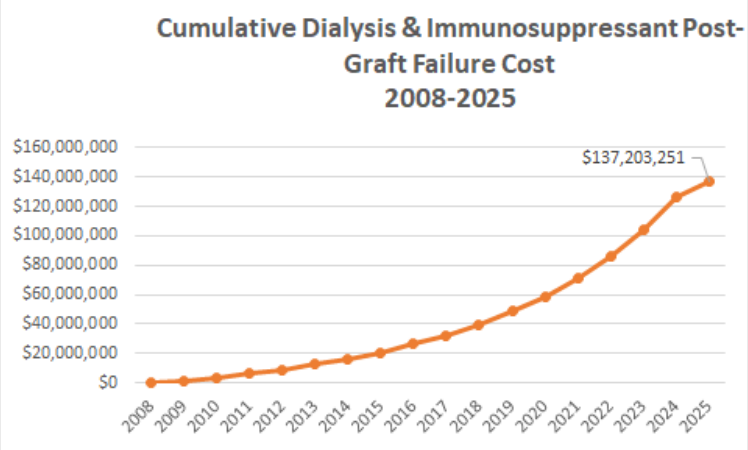
2025 Cost = ((2024 + 2025 Graft Failures – (2024 + 2025 Post Graft Failure Deaths)) x 2025 Dialysis Cost) + ((2024 + 2025 Graft Failures – 2024 + 2025 Post Graft Failure Deaths) x 2025 Immunosuppressant Cost)

This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1). See Appendix A, Figure A-2 for 2025 Dialysis Cost.

2025 Cost = (((21 + 20)– (2+4)) x $98,079) + (((21 + 20)– (2+4)) x $25,750) = $4,140,246

Continuing through 2033, the total 10-year dialysis and immunosuppressant post-graft failure cost for the 1,743 patients is $21.9 million. Using the same methodology for the years 2008 through 2025, the total cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is just under $138 million (see Figure C-6).

Figure C-6



C-7: Disability Cost – Post Graft Failure

Graft failure patients return to dialysis until they die or receive a second transplant. A study indicates that 93% of these patients receive disability payments from the U.S. Government until they go off dialysis. The post-graft failure disability cost, in 2024 dollars, is $18,000 per year. The equation for calculating post-graft failure disability cost is:

Disability Cost = (Graft Failures – Deaths Post-Graft Failure) x Proportion of Dialysis Patients on Disability x Annual Disability Cost

<u>2024 Example (Cost for 2024 through 2033)</u>:

2024 Disability Cost = (2024 Graft Failures – 2024 Deaths Post Graft Failure) x Proportion of Dialysis Patients on Disability x 2024 Disability Cost

2024 Disability Cost = (21 – 2) x 93% x $18,000 = $318,060

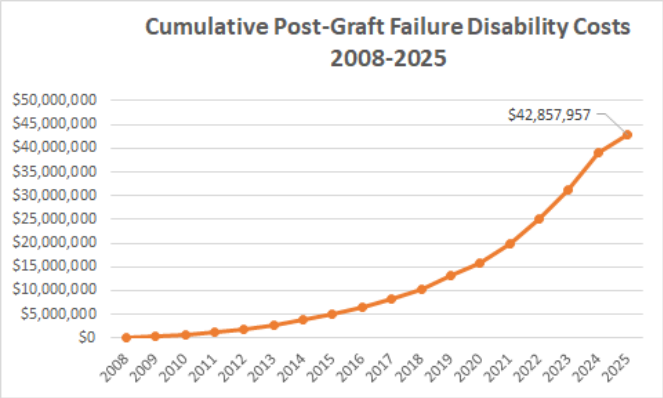
2025 Disability Cost = ((2024 + 2025 Graft Failures) – (2024 + 2025 Deaths Post-Graft Failure)) x Proportion of Dialysis Patients on Disability x 2025 Disability Cost

This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1).

2025 Disability Cost = ((21 + 20) – (2 + 4)) x 93% x $18,540 = $607,477

Continuing through 2033, the total 10-year disability cost for the 1,743 patients is $7.8 million. Using the same methodology for the years 2008 through 2025, the total cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $43 million (see Figure C-7).

Figure C-7



C-8: Retransplant Cost

All patients who survive three years after the graft failure are assumed to receive a retransplant. The retransplant cost is calculated using the following equation:

Retransplant Cost = Number of Graft Failures (from 3 years prior) – Total Number of Deaths (prior 3 years) x Retransplant Cost

<u>2024 Example (Cost for 2024 through 2033)</u>:

2024 Retransplant Cost = $0

2025 Retransplant Cost = $0

2026 Retransplant Cost = $0

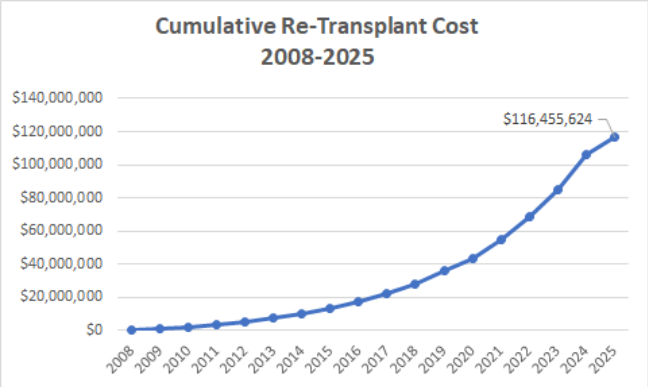
2027 Retransplant Cost = (2024 Graft Failures – (2024 + 2025 + 2026 Deaths)) x Retransplant Cost

The 2024 retransplant cost is $174,000 This study assumes a medical inflation rate of 3% (see Appendix A, Figure A-1). This gives a 2027 retransplant cost of $190,134.

2027 Retransplant Cost = (21 – (2 + 2 +1)) x $190,134 = $3,042,144

Continuing through 2033, the total 10-year retransplant cost for the 1,743 patients is $21 million. Using the same methodology for the years 2008 through 2025, the total cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $117 million (see Figure C-8).

Figure C-8



C-9: Immunosuppressant Treatment After Retransplant

Graft failure survivors are assumed to receive a transplant 3 years following the graft failure. After retransplant, the recipients go on immunosuppressant medications for at least the 10-year time horizon used in this study. The annual cost of immunosuppressant treatment in 2024 dollars is $25,000. The following equation is used to calculate the immunosuppressant costs:

Immunosuppressant Treatment Cost After Retransplant = Number of Retransplants x Immunosuppressant cost

<u>2024 Example (Cost for 2024 through 2033)</u>:

Because retransplants are assumed not to take place until three years following graft failure, the first immunosuppressant cost occurs in 2027.

2024 Immunosuppressant Cost = $0

2025 Immunosuppressant Cost = $0

2026 Immunosuppressant Cost = $0

Referring to Appendix C-7, the number of retransplants in 2027 is shown to be 16 . Also, the medical inflation rate is assumed to be 3%. Therefore, the annual immunosuppressant cost in 2027 is $27,318.

2027 Immunosuppressant Cost = 16 x $27,318 = 426,051

Continuing through 2033, the total 10-year immunosuppressant cost for the 1,743 patients is $12.5 million. Using the same methodology for the years 2008 through 2025, the

total cost that the U.S. Government would have paid had the NKR not facilitated the 10,835 transplants is $71 million (see Figure C-9).

Figure C-9