

OPPORTUNITY TO INCREASE DECEASED DONOR ORGAN DONATION AND TRANSPLANTATION 2021-2026

Summary findings



Bruce Hamory, MD
Minoo Javanmardian, PhD
Dan Shellenbarger

BACKGROUND & OBJECTIVES

In September 2020, Oliver Wyman conducted a study in partnership with Hogan Lovells, and its client, a work group of Organ Procurement Organizations (OPOs), to assess deceased donor organ donation and transplantation in the United States. The goal of the study was to evaluate historical data on deceased donor organ donation and transplantation, and then produce a data-driven model to estimate the potential for improvement in deceased donor organ recovery and subsequent organ transplantation at a national level in the next six years. This analysis, stratifying different segments of organ donors by age, then enables the quantification of impact that different shifts in performance of each component of the system can have (1) on organ recovery, and (2) on subsequent organ transplantation. While this assessment considered all organ donors, it focused primarily on kidney donation and transplantation given the prevalence and need in this area. Additionally, this study considered the interdependence of the system components involved in the process, and the manners in which they interact to drive transplantation rates. By stratifying these impacts, the report provides a summary of how performance improvement in components of the system results in performance of the system as a whole in increasing the number of patients transplanted.

SUMMARY CONCLUSION

In aggregate, this study found that it is possible to meaningfully accelerate the current rate of annual improvement in deceased donor kidney recovery and transplantation can be achieved through (i) sustained OPO performance improvement already underway and (ii) implementation of new system-wide initiatives to drive the increase in acceptance and transplantation by transplant programs of more kidneys recovered and offered by OPOs. Achieving these performance gains could move the number of deceased donor kidneys transplanted from the current 17,583 in 2020 to 28,310 in 2026, a 61 percent increase. The aggregated impact of these improvements above 2020 levels and in addition to the current annual growth rate would result in an additional 41,851 kidney transplants over six years.

The following report summarizes key findings and then provides commentary on the insights of the assessment and modeling effort.

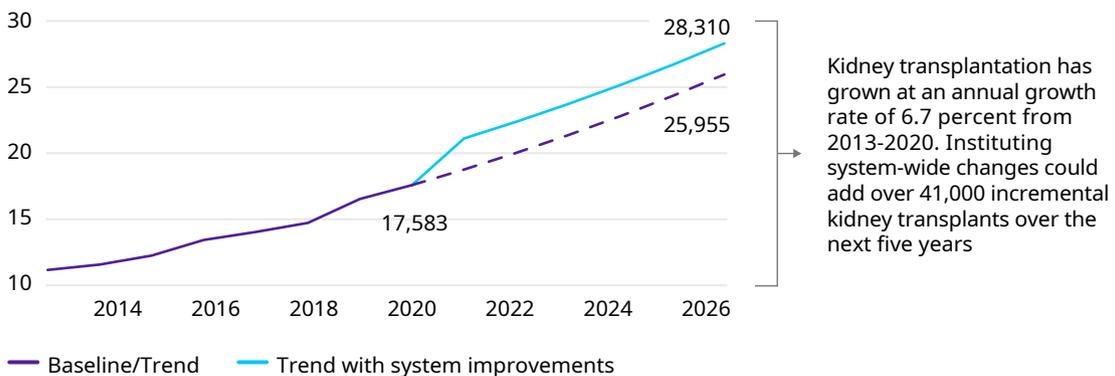
It is possible to meaningfully accelerate the current rate of annual improvement in deceased donor kidney recovery and transplantation. Achieving these performance gains could move the number of deceased donor kidneys transplanted from the current 17,583 in 2020 to 28,310 in 2026, a 61 percent increase.

KEY FINDINGS

Successful improvement efforts can significantly increase the number of deceased donor kidneys transplanted: Driven by successful strategies to increase the number of organ donors authorized and recovered each year, the number of deceased donor kidney transplants has grown by roughly 6.7 percent per year since 2013. Implementing the reforms recommended in this study would accelerate this annual growth rate by an additional 2,355 deceased donor kidney transplants each year and allow the United States to realize over 28,000 deceased donor kidney transplants a year by the end of 2026. These additional kidney transplants — brought about by performance improvements across donor recovery and transplant stakeholders — can meaningfully accelerate recent increases in kidney transplants. They do require focused systemwide policy, data transparency, clear accountabilities by all stakeholders, and aligned regulatory metrics for organ procurement organizations and transplant programs across the country.

Exhibit 1: Growth opportunity in deceased donor kidney transplantation

Data in thousands



Source: Organ Procurement & Transplant Network (OPTN) data; Oliver Wyman analysis

- OPOs must continue to improve:** Donor numbers and organ recovery rates have shown a dramatic, near 60 percent improvement over the past 15 years. Still, there is room to improve OPO authorization rates, and recovery of organs particularly from (1) older brain-dead donors and (2) donation after circulatory death (DCD) donors. To maintain significant growth in kidneys transplanted, OPOs must continue increasing the number of deceased donor recoveries which have driven the current growth in kidney transplant (since 2013, deceased donor recoveries have increased at a rate of 6.2 percent per year and the increase in kidney transplants has grown at 6.7 percent) per year.¹ This long-term growth trend depends on OPOs continually improving process components including: donor potential identification and expansion, donation authorization, effectiveness and efficiency of organ placement, and adoption of additional ex vivo preservation, among others. Pursuit of an expanded pool of DCD donors by OPOs must be complemented by improvements in acceptance and utilization of these organs by transplant centers.

¹ UNOS data 2015-2020, Oliver Wyman analysis.

- **Utilization of organs by transplant programs must also improve:** Increased donor and organ recovery is important but will only result in more patients transplanted if it is paired with increases in the utilization of available organs by transplant centers. More efficient offering processes that reduce the number of programs that turn down an offered organ for their candidate patient, in concert with changes in incentives and accountability metrics, can improve the rate at which recovered organs are ultimately transplanted into awaiting patients. Currently, 80 percent of kidneys recovered from donors are transplanted in patients — meaning that 20 percent of recovered kidneys offered by OPOs to transplant programs are turned down and are ultimately discarded,³ despite a large waitlist. There are considerations in utilizing kidneys from more medically complex donors that require appropriate clinical expertise at the transplant programs, and transparency with aligned patient expectations. Simply stated, not every available kidney is medically appropriate for every candidate patient. There is nonetheless significant opportunity to improve utilization of available kidneys as described in the recent consensus conference report from the National Kidney Foundation and elsewhere.² Impacting key decision points in the transplant acceptance and utilization processes could reasonably bring utilization to 84 percent or above, and this change alone would result in more than 1,074 additional kidney transplants per year.³

The donation and transplantation process includes multiple interdependent system components and stakeholders which must be taken into account and addressed if significant and accelerated growth is to be achieved:

- **Stakeholder accountability:** Organ donation and transplantation is a clinically and logistically complex process involving organ donors and their families, hospitals, organ procurement organizations, and organ transplant centers, among others. Organ recovery must happen in a compressed timeframe, requiring these stakeholder groups to work together effectively to maximize successful organ transplant outcomes.
- **Data collection:** While significant data is available, there are meaningful gaps in data collection that make it difficult to consistently appraise donor suitability, organ recovery and allocation, and the role of organ transplant center behaviors in the retrieval and use of deceased donor organs.

The number of deceased donor kidney transplants has grown by roughly 6.7 percent per year since 2013. Implementing the reforms recommended in this study would accelerate this annual growth rate by an additional 2,355 deceased donor kidney transplants each year.

² Cooper M., Formica R., Friedewald J., et.al., Report of National Kidney Foundation consensus conference to decrease kidney discards. *Clinical Transplantation*. 2019 Jan; 33(1): e13419.

³ 2019 STAR Data, Oliver Wyman analysis.

- **Human judgment:** The exercise of human judgment and variability in human decision-making plays a major role at key stages. Organ donation and transplantation processes are highly influenced by human decision making, including (1) individual decisions prior to death and family decisions at the time of death, (2) clinical actions of the hospital and decisions by the OPO at and near the time of death, (3) transplant programs' and patients' decisions when offered available organs, and (4) transplant surgeons' decisions to use (or not use) an organ when it arrives at their center. Additionally, marked variation in OPO donor recovery and transplant program utilization does exist across the country,⁴ and is meaningfully impacted by human decision-making

Supporting increased growth in transplantation and transplant center capacity requires viability of the transplant service and regulatory alignment on performance objectives: In order for transplant centers to continue to commit additional resources to support transplant program growth and increase access to life-saving organ transplantation, the transplant service must be financially viable and sustainable. The ability of a program to utilize medically complex or "marginal" organs — many of which are from expanded criteria (older, more complex) donors — depends on the availability of multiple support services and adequate reimbursement. Smaller and single-surgeon programs may not have adequate access to these resources. Regulatory measures established by the Organ Procurement Transplantation Network (OPTN) and Centers for Medicare & Medicaid Services (CMS) and reimbursement incentives driven by CMS and payors must be aligned with the goals of increasing utilization of organs from this pool of donors.

Continuing growth in recovery and transplantation requires improvement in all of the above: Given the complexity and interdependence of the process, a coordinated and comprehensive approach to system-wide improvement is needed. This modeling effort found that increasing donor authorization rates and encouraging the recovery of more donors across older age bands and more DCD donors could increase kidney donation by 1,774 kidneys per year. Further improving transplant centers' utilization of available kidneys recovered and offered by OPOs could increase total kidney transplantation by nearly 1,074 additional kidney transplants per year. However, these improvements are interdependent and cannot be brought about by any one stakeholder. They require engagement, alignment, and accountability by all components of the system.

If the kidney programs that are currently underperforming on the reported kidney transplant rate performed at the statistically expected level, all other factors being equal, there could be over 3,400 more kidney transplants performed each year.⁵

4 Brennan C., Husain S.A., King K.L., et.al., A donor utilization index to assess the utilization and discards of deceased donor kidneys perceived as high risk. *Clinical Journal of the American Society of Nephrology*. 2019; 14: 1634-1641.

5 SRTR Kidney Program observed to expected rates 2018-2020.

Exhibit 2: Levers to improve kidney transplantation

Since 2013 and driven by continual increases in the deceased organ donation, the number of kidney transplants has grown on average 6.7 percent per year. The adoption of the reform levers below could add an additional 2,355 kidney transplants per year to this upward trend

Organ recovery and transplantation lever	Current performance	Modeled performance	Incremental recovered donors	Incremental available kidneys	Incremental kidney transplants
Improved recovery of donors <66 years old meeting criteria	73%	75%	264	487	375
Such as via increased rates of authorization from donors through the donor registry and from family members who would otherwise opt not to donate					
Increased recovery of donors >66 years old meeting criteria	60%	64%	77	107	34
Such as via increased acceptance by transplant programs of older organs which would result in OPOs recovering organs from these potential donors					
Increased recovery of DCD donors meeting criteria	36%	55%	599	1,179	872
Such as via increased acceptance by transplant programs of donation after circulatory death (DCD) organs which would result in OPOs recovering organs from these potential donors					
Increased utilization by transplant programs	80%	84%	-	-	1,074
Such as via increased acceptance by transplant programs available kidneys					
Aggregate annual increase in kidney transplantation					2,355

Source: Oliver Wyman analysis

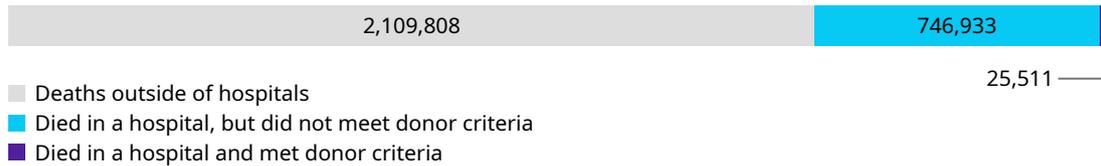
DETAILED FINDINGS

Organs can be recovered only from donors meeting very specific medical criteria and who die in the hospital on a ventilator. In general, criteria exclude people above age 75 and those with many types of chronic infections (or acute infections such as COVID-19), disseminated cancer, or specific organ dysfunctions dependent on the organ being transplanted.⁶ Beyond these clinical requirements, family intervention plays a key role — even when the decedent had previously registered as a donor — because the family can decide to terminate life support (turn off the respirator) before organ retrieval can occur. Net, of the roughly 2.8 million people who die each year in the US, potentially recoverable potential organ donors amount to less than one percent of the total.⁷

⁶ [Organ Procurement and Transplantation Network policy](#).

⁷ D. Goldberg, M.J. Kallan, L. Fu, et.al., Changing metrics of organ procurement organization performance in the United States, American Society of Transplantation. 2017; XX: 1-10.

Exhibit 3: Estimated deaths in the US (2019)



Source: Centers for Disease Control and Prevention (CDC) data, Oliver Wyman analysis

When a recoverable potential donor is identified, a number of requirements must be met quickly. For example, surgical recovery of organs with short transport times (heart and liver) depends on the ability to find an awaiting recipient before organ recovery takes place. Or, if the donor is a donor after circulatory death (DCD), the patient must die within a short time period (60 to 90 minutes) after removing supporting measures, which occurs in 57 percent of attempted DCD donor cases.^{8,9} The referring hospital must then have an operating room available at the time of pronouncing death for immediate recovery to ensure viability of the organs for transplantation. Further, complexities in the organ placement process that may extend the time required for successful placement may cause the family to terminate life support out of a desire for closure.

The process of matching an organ with a potential recipient is an iterative one involving the OPO, UNOS, and multiple transplant programs. In sequence, each transplant program reviews the donor’s clinical profile and assesses the likelihood of a successful transplant into the identified patient candidate appearing in priority order on the match-run list. This occurs organ-by-organ, donor-by-donor, OPO-by-OPO and transplant center-by-transplant center. Understanding the procedural complexities of potential donor and organ recovery, and of the subsequent placement to a transplant program, makes it abundantly clear that:

- Not every inpatient death is a ventilated and medically appropriate opportunity for organ recovery
- Not every recoverable donor or family will authorize donation
- Not every organ will be medically appropriate for recovery from every organ donor
- Not every recovered organ will be medically appropriate for transplant into an awaiting recipient

8 Suntharalingam G., Sharples L., Dudley C. et.al., Time to cardiac death after withdrawal of life-sustaining treatment in potential organ donors. *American Journal of Transplantation*. 2009; 9: 2157-2165.

9 Bradley J.A., Pettigrew G.J. an Watson C.J. Time to death after withdrawal of treatment in donation after circulatory death (DCD) donors. *Current opinion in organ transplant*. 2013, 18: 133-139.

Measures and payments impacting kidney transplants

Two important historic performance factors have effectively trained transplant programs' criteria on accepting and transplanting available kidneys offered by OPOs for transplantation.

Factor #1: Transplant programs' success has largely been measured based on risk-adjusted recipient kidney function at one-year post-transplant rather than an intent to transplant type model. Programs failing to meet established outcome success criteria were, until very recently, penalized by being put into a remediation program¹⁰ which could cost upwards of one million dollars per year. The concern over a possible severe negative implication influenced some smaller programs with a limited total volume of transplants to become much more reluctant to accept any but the most highly rated kidneys. For some programs, even a single failure could have resulted in a multi-year remediation program.

This misalignment worked against the regulatory pressures pushing OPOs to recover more kidneys from older and more medically complex donors.¹¹ While kidney transplants from more complex donors will likely have lesser overall outcomes,¹² transplanting these organs may still provide significant benefit to waiting patients. Recognizing this, both CMS and UNOS have revised their accountability metrics to reduce this burden on transplant programs. Nonetheless, the rates of non-utilization of kidneys continue to climb with increased discards. There is no system-wide metric or regulatory accountability for transplant programs' utilization of available kidneys for transplant.

Factor #2: Historically, transplant programs were paid on a Medicare severity diagnosis-related group (MS-DRG) basis for kidney transplants. This resulted in a single payment to the transplant center for the transplant procedure. While sufficient to cover the costs of the average transplantation event, it was not sufficient to cover the additional costs associated with transplanting a kidney that was likely to result in an extended recovery time and/or require costly post-transplant maintenance dialysis care for delayed graft function. CMS recently revised payment rules, allowing for higher reimbursement for complex kidney transplants that require additional dialysis (often the case when high KDPI kidneys are transplanted). However, it is unclear if the elimination of financial disincentives alone will change transplant program behavior.

These two factors have trained transplant programs to carefully consider which organs they accept for transplant. The implication has been that more than 4,400 (one in five) kidneys per year were not being implanted after they have been recovered from donors and offered by OPOs for transplantation.¹³

10 Bowring M.G., Massie A.B., Craig-Schapiro R. et.al., Kidney offer acceptance at programs undergoing a systems improvement agreement. *American Journal of Transplantation*. 2018; 18: 2182-2188.

11 Reese P.P., Harhay M.N., Abt P.L., et.al., New solutions to reduce discard of kidneys donated for transplantation. *Journal of the American Society of Nephrology*. 2016; 27: 973-980.

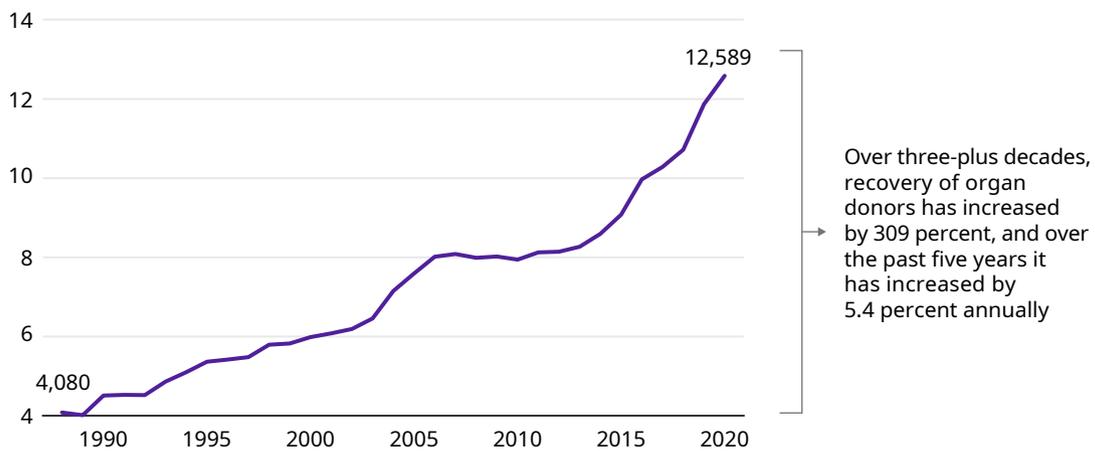
12 Bowring M.G., Massie A.B., Craig-Schapiro R. et.al., Kidney offer acceptance at programs undergoing a systems improvement agreement. *American Journal of Transplant*. 2018; 18: 2182-2188.

13 STAR Data (2019), OW analysis.

Despite this complexity, organ donation, recovery, and transplantation in the US has improved markedly over the past 30 years. Public call to action campaigns have vastly improved the number of registered donors over the past three decades, and the number of donors from whom organs are recovered has increased from 4,080 donors in 1988 to 12,589 donors in 2020.^{14,15} These improvements are against a backdrop where the number of annual deaths is more/less steady, and in-hospital deaths are in decline, as people seek alternative end of life care paths. This remains a vexing challenge, however, as the number of waiting patients has increased from roughly 20,000 in 1990 to more than 110,000 in 2019.^{16, 17}

Exhibit 4: Growth in deceased donor recovery

Data in thousands



Source: Organ Procurement & Transplant Network (OPTN)

Still, there is opportunity for improvement in donor recovery and transplantation. Through our modeling, we found:

- 2.8 million total deaths in 2019, of which an estimated 770,000 (27 percent) occurred in hospitals
- 37,000 of these in-hospital deaths could have met the basic criteria for evaluation of potential organ donation
- 25,000 of these deaths meeting more specific medical criteria would have been potentially recoverable inpatient deaths¹⁸

14 Organ Procurement and Transplantation Network. Donor types by year, 1988-2019 (Website).

15 Zhou S., Massie A.B., Holscher C.M., et al., Prospective validation of prediction model for kidney discard. *Transplantation* 2019; 103: 764-771.

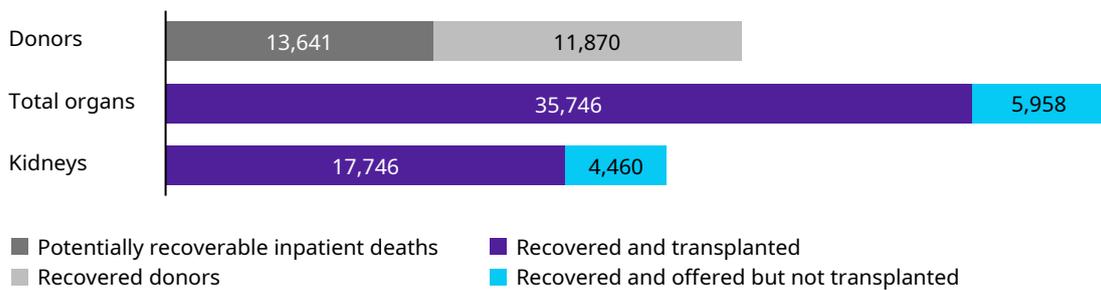
16 [Organ Procurement and Transplantation Network](#).

17 Reese P.P., Harhay M.D., Abt P.L., et al., New solutions to reduce discard of kidneys donated for transplantation. *Journal of American Society of Nephrology*. 2016; 27: 973-980.

18 D. Goldberg, M.J. Kallan, L. Fu, et al., Changing metrics of organ procurement organization performance in the United States, *American Society of Transplantation* 2017.

The central question is how to improve the rate of organ retrieval and organ utilization from a pool of 25,000 potentially recoverable inpatient deaths. This number has been cited as the upper bound of the possible pool of inpatient deaths from which organ donors may be identified.¹¹ Some of the limitations on this pool are non-impactable, such as medical factors that make the death inappropriate for donation for transplant. Expanding this pool relies on: (1) improving donor authorization rates, (2) increasing recovery of “expanded eligibility” donors (namely older and DCD donors), and (3) increasing transplantation of organs recovered and offered by OPOs. Each of these facets warrants greater attention.

Exhibit 5: Estimated Deaths in the US (2019)



Donor recovery limiters

- Donor, family opts not to donate (authorization)
- Transplant programs decline donor (e.g., age, health status)
- Hospital stops medical treatment prior to donor evaluation
- OPO rules out donor for clinical reasons
- Donor arrests or organ recovery attempt unsuccessful

Organ utilization limiters

- Recovered organs rejected by all transplant centers
- Recovered organs expire during offer process
- Organ repairs unsuccessful
- Change in transplant recipient status

Source: Center for Disease Control (CDC) data, Oliver Wyman analysis

Improving authorization rates: While 49 percent of the US adult population have registered as organ donors, there is substantial variation across the nation, ranging from a low of 37 percent to a high of 63 percent of adults.¹⁹ If an individual has not registered as a donor, OPOs succeed in gaining authorization from family/surrogates for roughly 65 percent of potential donors not previously registered.²⁰ The success rate is highest when trained and experienced OPO staff have a direct conversation with the family, supported by the attending physician or nursing staff in the ICU. Still, organ donation is not mandated in the US, and many individuals and families ultimately make the choice not to donate when the time comes. This respect for individual autonomy must be understood as part of the system design; despite this, the US has

¹⁹ 2019 end of year Donate Life America Registry Overview Report (ROR), Calculated Registration Rate (CRR) and Outlier report. Donate Life America.

²⁰ SRTR Exploration of OPO Metrics, May 14, 2015.

one of the highest rates of deceased donation in the world. Still, concerted public awareness efforts could likely further increase donation authorization and lead to additional donors and kidney transplants.

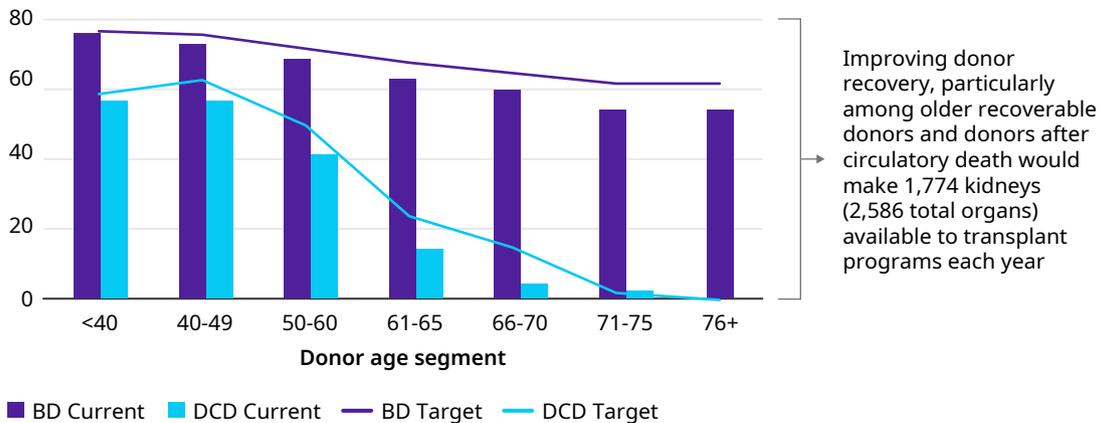
Recovering and using organs from greater numbers of older and medically complex donors:

The definition of an “acceptable donor” has expanded over time to include individuals up to age 75 (and even beyond in certain cases), as well as those with other health conditions (such as Hepatitis C). While this expansion increased the number of donors and organs recovered and offered by OPOs, it is also co-incident with an increase in the number of available organs offered by OPOs but refused by transplant programs.²¹ A study comparing kidney utilization rates in the US with France highlights the opportunity to increase kidney utilization in the US from older donors.²² Improving both the recovery of organs from donors in expanded categories, and transplant programs’ willingness to then implant them, is what will lead to a meaningful gain in the number of transplanted organs for the benefit of patients in end-stage organ failure.

Exhibit 6: Improving donor recovery across age and donor segments

Improving donor recovery by OPOs and utilization by transplant programs, particularly among older and more complex donor segments can greatly increase annual transplant volumes

Percentage of donors recovered



Source: United Network for Organ Sharing (UNOS) data, Oliver Wyman analysis

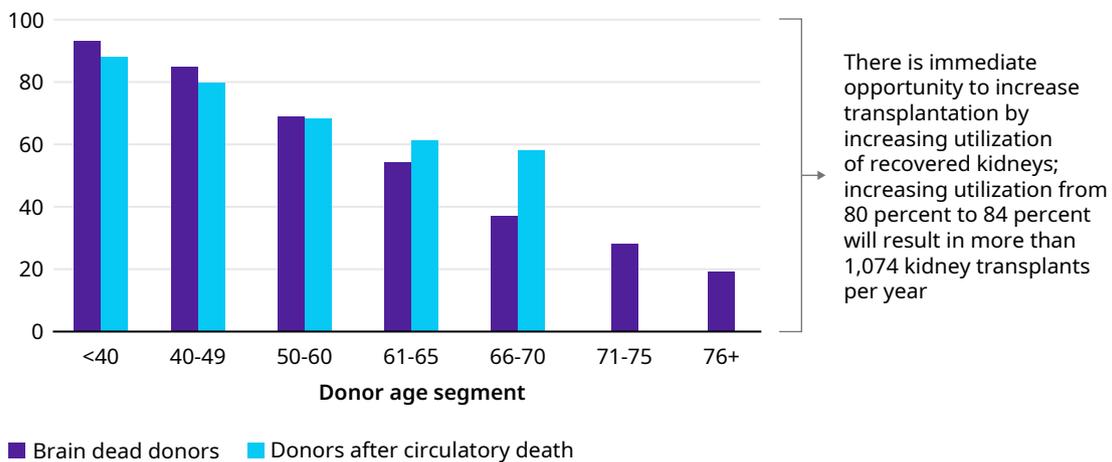
Improving authorization rates and recovery of organs from older and/or DCD donors could result in more than 900 incremental donors per year. Taken together with even modest improvement in utilization by transplant centers of organs from these donors could result in 2,586 additional organ transplants and 1,774 more kidney transplants on an annual basis. Realizing this result is dependent on improvements in each area by all stakeholders.

21 Zhou S., Massie A.B., Holscher C.M., et.al., Prospective validation of prediction model for kidney discard. *Transplantation* 2019; 103: 764-771.

22 Aubert O., Reese P.P., Audry B., et.al., Disparities in acceptance of deceased donor kidneys between the United States and France and estimated effects of increased US acceptance. *JAMA Internal Medicine*, October 2019 Volume 179, Number 10, 1365-1374.

Beyond donor recovery — transplanting more patients: While improving donor recovery can increase organ availability, it is vitally important to ensure the downstream transplant programs are prepared and willing to receive and transplant these organs. At present, only 80 percent of recovered kidneys are ultimately accepted and transplanted into waiting patients;²³ in other words, transplant programs decline 20 percent of recovered kidneys, despite large and growing need. The decision by a transplant center to accept an organ for transplant and then to implant it into a recipient is primarily a clinical one, but can be heavily influenced by operational, regulatory, and financial considerations, each of which warrants closer consideration.

Exhibit 7: Percentage of deceased donor kidneys transplanted¹



¹A combination of donor selection bias by OPOs due to current utilization practices of transplant programs combined with low numbers of DCD kidneys from donors over age 60 contributes to a higher percentage utilization on this graphic. There is a large opportunity to expand this pool of older donors and utilization of kidneys from donors in this category.

Source: Organ Procurement & Transplant Network (OPTN), Standard Transplant Analysis & Research (STAR) data; Oliver Wyman analysis

- **Operational:** Converting available organs into successful transplants requires sufficient resources and intent to maximize kidney offer acceptance — namely the capacity (surgical staff, anesthesia support, operating room availability) to cover weekends, vacations, and holidays so that organs can be routinely accepted and transplanted. Studies have shown a marked decrease in the likelihood of deceased donor kidneys being utilized when recovered on Fridays or Saturdays, independent of any other factors.²⁴ Likewise, transplant programs must maintain enough support staff to adequately evaluate, register, track, and maintain a larger list of potential recipients. Even with adequate clinical personnel in place, operating room capacity must be available when recovery and transplant opportunities present. This can be a meaningful issue, even at larger transplant programs.

²³ STAR Data (2019), Oliver Wyman analysis.

²⁴ C. King K.L., Hussain S.A., Cohen, D.J., and Mohan S. Deceased donor kidneys are harder to place on the weekend. *Clinical Journal of the American Society of Nephrology*. 2019; 904-906.

- Financial: As noted above, financial considerations do factor into the decision making on each offered organ. Some transplant programs with aggressive programs accept kidneys from “expanded donors,” but report that up to 30 percent of recipients must be dialyzed for a time to allow graft function to recover. In the past, this added expense was borne within the confines of a single MS-DRG payment and made it financially prohibitive for transplant centers to complete transplants of many expanded donors. Recent changes in Federal payment policy to dialysis centers may begin to address this problem but should be evaluated for impact on behavior changes to assess whether better professional education regarding this change or further reform is needed.
- Regulatory: Organ recovery and transplantation involve both the methodology for distributing organs following recovery and the evaluation of transplant program effectiveness.
 - Distribution: Federal policy establishes the process by which available organs are allocated to recipients through a transplant program(s). The current methodology offers an available organ to the transplant program with the highest priority waitlist patient that is a biological match for the organ. This transplant program then assesses the organ and either accepts or rejects that organ within 30 minutes. If it rejects the organ, the organ is then offered to the next highest priority patient until a match is made and accepted, each program having 30 minutes to evaluate and respond. If all transplant programs within the geographic boundary reject the organ, it is made available outside the geographic boundary.

The current system requires offering all types of available kidneys to listed candidates, even though many programs never accept a kidney from certain categories of older or complex donors. Although transplant programs can set “filters” with certain donor parameters that would eliminate organ offers to them outside of their “acceptable” bounds, programs have not utilized filters effectively. Further, each transplant program that passes on an available organ increases the perceived risk associated with that organ, thereby decreasing the likelihood of acceptance as more programs reject the organ. Kidney candidates who die while waiting for an organ actually receive a median of 16 organ offers that are declined by their transplant program.²⁵ Many of these organs are subsequently transplanted successfully into another patient.²⁶

- Evaluation of transplant program performance, and therefore the ability to maintain accreditation, is driven by the survival of a functional kidney post-transplant. As explained above, this is a significant factor in decisions by transplant directors when considering not only which organs to accept, but also which patients should receive an organ. Both factors affect organ function and survival and thus the future of a given transplant program. Further, there is no assessment of transplant programs’ utilization of available and offered organs, emblematic of the misalignment in incentives with OPOs.

25 S. Ali Husain, Kristen L. King, Stephen Pastan, Rachel E. Pazter, David J. Cohen, Jai Radhakrishnan, Sumit Mohan. Association between declined offers of deceased donor kidney allograft and outcomes in kidney transplant candidates. *JAMA Network Open*, 2019; 2 (8): e1910312 DOI: 10.1001/jamanetworkopen.2019.10312.

26 Huml A.M., Albert J.M., Thornton J.D. and Sehgal A.R. Outcomes of deceased donor kidney offers to patients at the top of the waiting list. *Clinical Journal of the American Society of Nephrology* 2017; 12: 1,311-1,320.

Organ recovery and transplantation is the ultimate race against the clock

The clock for transplant begins when the arteries supplying blood to the relevant organ(s) are cross-clamped to begin the process of recovery.

- Implantation in a recipient must be completed quickly — hearts must be transplanted within four hours; kidneys must be transplanted within 36 hours

Each of the donor's recoverable organs are offered to Transplant Programs, organ by organ, program by program, one by one

Each kidney transplant program has 30 minutes to reply to offered kidneys.

- A recipient must be identified, and the transplant program must decide to proceed
- Kidneys are offered to a mean of nine programs, with a range of five to 69 programs, and then offered to a median of seven patients per program; this can result in thousands of patient offers for a single organ

The current matching process consumes precious time offering organs to one transplant program at a time; this successive process likely increases the risk of discard.

- Each subsequent transplant program faces shorter and shorter intervals in which to successfully complete the transplant
- Programs become leery of organs that have been repeatedly rejected by other transplant programs

Source: Huml AM, Albert JM, Thornton JD and Sehgal AR. Outcomes of deceased donor kidney offers to patients at the top of the waiting list. *Clinical Journal of the American Society of Nephrology*. 2017; 17: 1,311-1,320

When analyzing the use of organs retrieved from donors, it is important to note that transplant programs currently decline roughly 14 percent of all available organs offered by OPOs and 20 percent of kidneys recovered and offered by OPOs. There are a number of clinical reasons cited for declining kidneys offered for transplant.²⁷ However, transplant programs should ensure their patients are fully informed about their approach to organ acceptance (and decline) and provide transparent patient communication regarding organ offers the transplant program declines on behalf of each patient. Additionally, transplant programs should be made aware of and benchmarked with the success rates that are achieved with declined organs transplanted by other programs. Improving utilization of currently available kidneys by even five percent would result in nearly 1,100 more kidney transplants each year.

27 Reese P.P., Harhay M.N., Abt P.L., et.al., New solutions to reduce discard of kidneys donated for transplantation. *Journal of the American Society of Nephrology*. 2016; 7: 973-980.

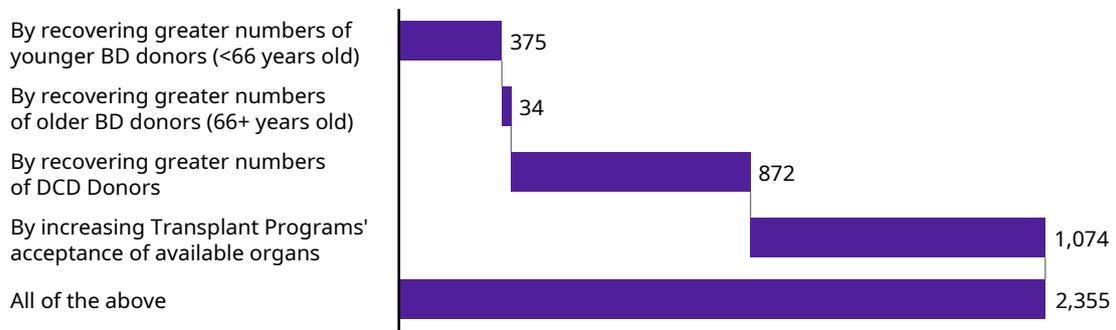
As a final observation, achieving the improvements described here requires that all parties — hospitals, OPOs, transplant programs, and payer and regulatory bodies — continue to work collaboratively with one another to effectively drive the common goal of system-wide performance improvement with the focused goal of benefiting patients. The improvements observed over the past 15 years are a clear indication that hospitals, OPOs, and transplant programs are already focused on effective process improvements, and that they can effectively work the levers impacting the ultimate goal of increased organ transplantation.

Yet, to achieve the gains noted here...

- Hospitals and OPOs must work together to effectively maintain the clinical opportunity for donation and engage families in increasing donor authorization
- OPOs and transplant centers need to openly collaborate in identifying and increasing pursuit and recovery of organs from donors that historically have not been recovered because they are older and medically complex
- Transplant centers must be accountable for utilizing organs that historically have been rejected out of risk aversion but would benefit patients who die waiting for transplantation

OPOs are, in effect, constrained by transplant centers’ utilization patterns, as this informs their pursuit (or not) of various potential donor profiles. For example, an OPO located in an area where transplant programs do not utilize organs from older DCD donors may not pursue potential donors in that category because the organs cannot be placed for transplant. Transparent alignment of performance measurement and expectations, tracking recoveries, and longer-term patient impact measures for organs from older and more complex donors will help to better standardize the application of the existing criteria, increase recovery rates, and save more lives.

Exhibit 8: Estimated resulting increase in kidney transplantation by lever



Source: Oliver Wyman analysis

IMPROVEMENT OPPORTUNITIES

The following improvement opportunities emanated from this research and analysis. While some of these impactable levers are within the control of one stakeholder, maximizing returns requires alignment and support of these changes across stakeholder organizations.

OPOs should focus on:

- Improving coordination and communication among OPOs and hospital ICU physicians and staff to maintain and maximize the clinical opportunity for a recoverable donor.
- Improving authorization rates through donor registration and effective family approach practices; this is especially important in diverse communities and in recovery of DCD donors.
- Increasing the pool of recoverable donors (older, DCD, medically complex) that are pursued in collaboration with increased offer acceptance performance by transplant programs (see below).
- Increasing placement of recovered organs through collaboration with transplant programs willing to utilize organs from complex donors including facilitating the use of innovations like donor intervention research protocols and ex vivo technologies to expand both the quantity and quality of available organs.

Transplant programs should consider:

- Specifying and making public their program-level kidney inclusion and exclusion criteria for accepting a patient for listing. This can assist potential recipients in selecting a transplant program.
- Specifying criteria for accepting organs of varying risk and characteristics or supporting tools (like organ offer filters) that will automate that process to increase efficient placement and utilization of organs from older or medically complex donors.
- Collaborating with OPOs in implementing clinical innovations like donor intervention research protocols and ex vivo technologies that will increase the transplant program's ability to accept and utilize organs.
- Developing a relationship with a peer transplant program willing to accept and transplant medically complex patients and organs.
- Specifying and expanding resource capabilities and willingness to accept and transplant organs on weekends and holidays.
- Utilizing the publicly reported performance metric that allows transplant programs to not only monitor rates of organ acceptance, rejection, and discard, but also to benchmark the rates at which rejected organs go on to a successful transplantation at other programs.

Payers and regulators should reevaluate transplant program success criteria and performance measures:

- Establishing transplant outcome performance metrics that exclude highest risk (medically complex and older) donors from the calculation.
- Hold transplant programs accountable to meet organ offer acceptance rates and expected transplant rates.

- Use of a methodology to rank and report performance to programs and surgeons that is aligned with the OPO performance metrics to best leverage systemwide improvement.
- Monitoring and evaluating performance relative to rates of organ offer acceptance and refusal rates by program and surgeon, and regularly report to each the success rate of those organs when subsequently transplanted by other programs.
- Increase transparency and monitoring candidate assessment, selection, and waitlist mortality when evaluating transplant program performance.
- Evaluating efficiencies in organ allocation policies, technology enhancements, use of predictive analytics in modeling organ allocation, and increased transparency on offer acceptance.²⁸
- Revising the organ allocation system to deprioritize or bypass transplant programs with a history of not accepting kidneys from certain donors (such as HCV positive and DCD). Provide public transparency of this data publicly to patients, listed candidates, and referring physicians.

Payers and regulators should consider payments and incentives:

- Supporting and expanding value-based payment methods for dialysis centers to reward referrals to transplant centers.
- Revising payments to transplant programs to reward use of medically complex organs and placement in medically complex patients.
- Revising MS-DRG-based payments to transplant centers to include support for resources needed to care for patients with delayed graft function post-transplant.
- Revising the assessment of organ and recipient risk to be positive numbers rather than negative scores. Indicating, where possible, the survival difference for potential recipients with and without transplant of a given organ. This can serve to reduce subjective surgeon bias.

CONCLUSION

There is opportunity to drive meaningful gains in organ recovery and transplantation through a coordinated and comprehensive approach to system-wide improvement. Increasing donor authorization rates and encouraging the recovery of more donors across older age bands and more DCD donors could increase kidney donation by 1,774 kidneys per year. Further, even modest improvements to transplant programs' utilization of available kidneys recovered and offered by OPOs could increase total kidney transplantation by nearly 1,074 additional kidney transplants per year. Realizing these improvements requires collaboration and coordination — this cannot be brought about by any single stakeholder. They require systemic changes brought about through engagement of and aligned accountability by all system components.

²⁸ Organ Procurement and Transplantation Network. Ad Hoc Systems Performance Committee report.

Oliver Wyman is a global leader in management consulting that combines deep industry knowledge with specialized expertise in strategy, operations, risk management, and organization transformation.

For more information, please contact the marketing department by phone at one of the following locations:

Americas
+1 212 541 8100

EMEA
+44 20 7333 8333

Asia Pacific
+65 6510 9700

AUTHORS

Bruce Hamory, MD

Partner
bruce.hamory@oliverwyman.com

Dan Shellenbarger

Partner
dan.shellenbarger@oliverwyman.com

Minoo Javanmardian, PhD

Partner
minoo.javanmardian@oliverwyman.com

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