

Advanced Chronic Kidney Disease (CKD), ESRD and Renal transplantation

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- Attending Nephrologist: Ellensburg Dialysis Center, Wapato Davita Dialysis, Lake Aspen Davita and Zillah Dialysis Center



07/29/2012

The reality of kidney transplantation

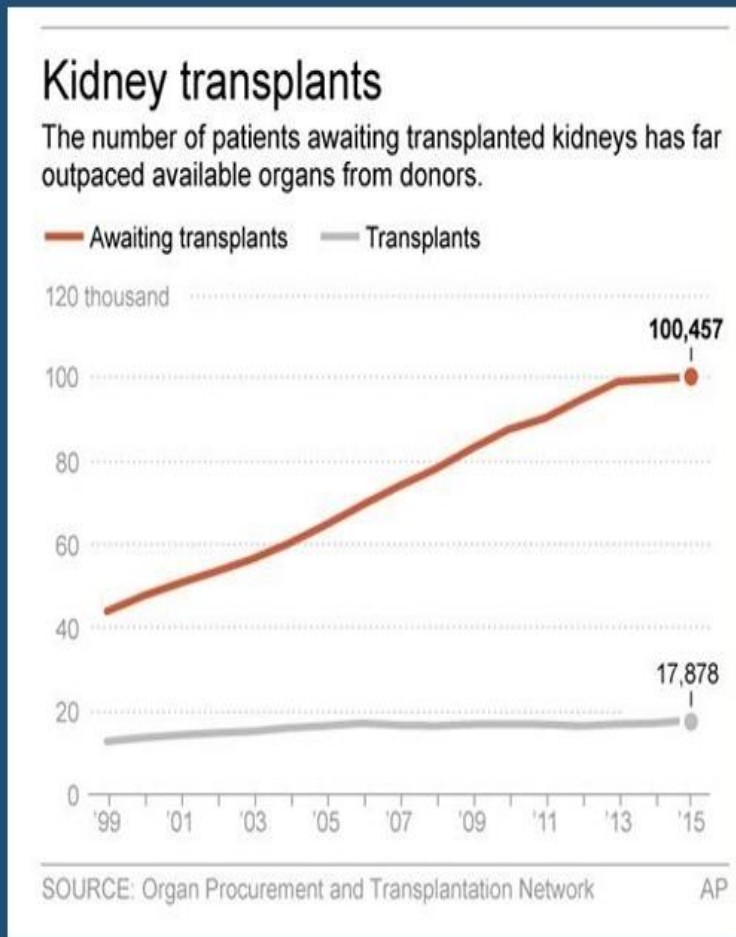
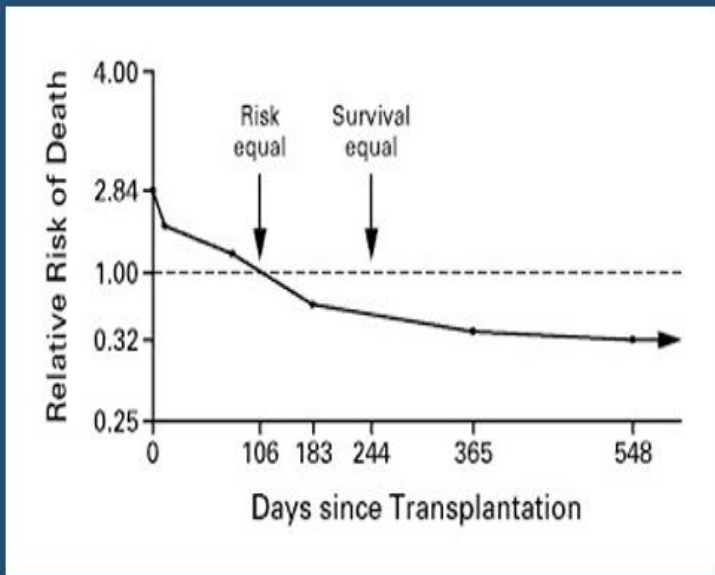
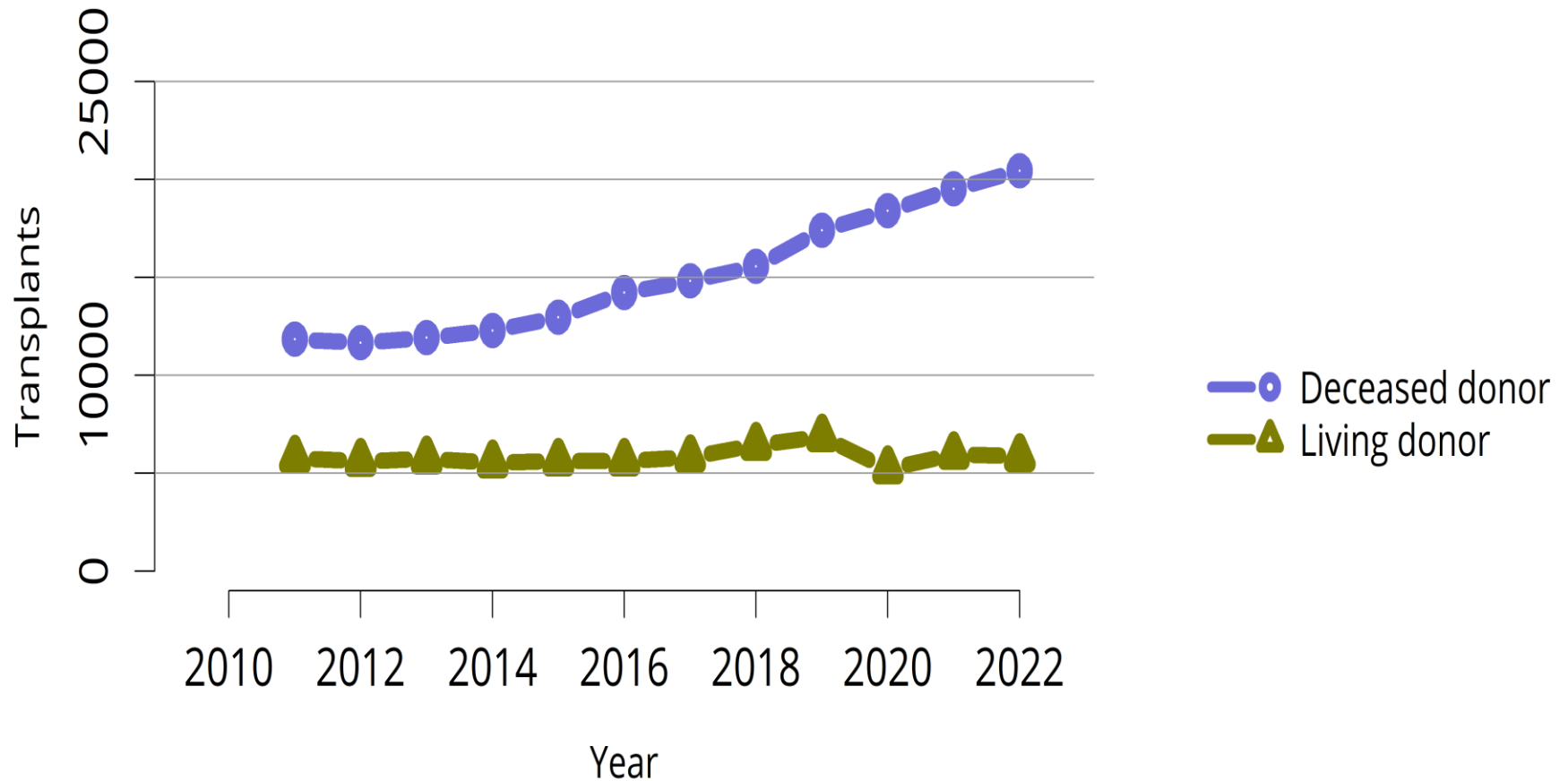


Figure KI 65: Total kidney transplants by donor type



BY THE NUMBERS: U.S. KIDNEY TRANSPLANTATION

THE NEED

129,590

On the waiting list at any time during 2023



45,459

Added to the waiting list in 2023



89,340

On the waiting list at end of 2023



1 person icon = approximately 5,000 people

Candidates listed at more than 1 center are counted only once

3,844

Died

576

Died within 60 days of being removed



18,423

Removed from list for reasons other than transplant

4,670

Too sick to undergo transplant

125
AVERAGE
ADDED
DAILY

11

Average died per day



74

Average died per week



320

Average died per month



THE SOLUTION

21,761

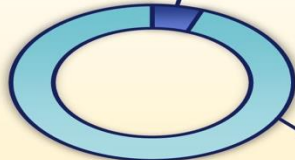
Total kidney donors in 2023

136

Kidneys transplanted per 100 donors



6,291
Living donors



15,470
Deceased donors

5,764

Circulatory-death donors



9,706
Brain-death donors

472
Living nondirected donors

3,518
Living directed unrelated donors



2,301
Living related donors

28,142

Total kidney transplants in 2023

21,853

Deceased donor transplants in 2023

6,289

Living donor transplants in 2023



1 kidney icon = approximately 500 kidneys. Orange = deceased donor. Peach = living donor.

THE SUCCESS

Objectives

- CKD classification
- CKD stage 4 management
- CKD and anemia
- CKD and starting Dialysis
- Renal transplant referral and expectations
- Preemptive renal transplant
- Pig Kidney transplant ??

Recent Data: USRDS

- In 2011, the number of patients receiving *ESRD treatment* reached **615,899** — a new high.
- The number of patients *starting ESRD therapy* (with dialysis or a preemptive kidney transplant) : **115,643**
- The *prevalent dialysis population* reached **430,273** on December 31
- The number of *kidney transplants reached* **17,671**, while the *prevalent transplant population* reached **185,626**

USRDS data

- The size of the prevalent dialysis population increased 3.2 percent in 2011, reaching 430,273. The size of the transplant population rose 3.7 percent, to 185,626 patients
- The number of new dialysis patients fell 1.9 percent in 2011, to reach 110,580 patients

Cost: USRDS data

- With Medicare spending for ESRD at \$34.4 billion, and non-Medicare spending at \$14.9 billion, *total ESRD costs in 2011 reached \$49.3 billion.*
- Medicare costs per person per year were more than \$75,000 overall, ranging from *\$32,922 for transplant patients* to *\$87,945 for those receiving hemodialysis therapy*

Definition of CKD, KDIGO 2012 Guideline

- *CKD is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health.*
- Diagnostic thresholds for glomerular filtration rate (GFR) of less than 60 mL/min per 1.73 m² and an albumin–creatinine ratio (ACR) of 30 mg/g or greater were retained.

- GFR <60 mL/min/1.73 m² indicates a loss of 50% or more of the adult level of normal kidney function²
 - Normal GFR rates in young adults are 120 to 130 mL/min/1.73 m², and often decline with age³
 - Once the GFR drops below 60 mL/min/1.73 m², complications of CKD become more prevalent
- Diabetes is the reason 30% to 40% of patients progress to the need for dialysis

Workup for CKD

- CBC, Renal panel
- UA
- Estimation of proteinuria: Spot urine pr/cr
- *24 hrs urine usually not needed*
- Serology eg ANA, ANCA, AntiGBM antibody
- UPEP/SPEP
- Renal Ultrasound: renal cysts, PKD
- PTH etc
- ? Kidney biopsy: for unexplained/occult CKD

Stages of CKD and Prevalence in Adults

- Stage 1: GFR more than 90, 3.6 million in US
- Stage 2: GFR 60-89, 6.5 million in US
- Stage 3, GFR 30-59, 15.5 million in US
- Stage 4: GFR 15-29, 0.7 million in US
- Stage 5: GFR less than 15 or on Dialysis, 0.5 million in US

Causes of severe CKD stage 4 and 5, in %

- Diabetes mellitus 44.9
- Type 1 3.9
- Type 2 41.0
- Hypertension 27.2
- Glomerulonephritis 8.2
- Chronic interstitial nephritis or obstruction 3.6
- Hereditary or cystic disease 3.1
- Secondary glomerulonephritis or vasculitis 2.1
- Neoplasms or plasma-cell dyscrasias 2.1
- Miscellaneous conditions‡ 4.6
- Uncertain or unrecorded cause 5.2

Metabolic

- Metabolic Acidosis
- Hyperkalemia
- Hyponatremia
- Hypocalcemia
- Hyperphosphatemia
- Hyperuricemia

Management of uremia

- RENAL DIET: Fluid balance
 - monitor input/output
 - monitor daily weight
 - fluid restriction
 - weight loss for edema pts
 - Loop diuretics

Management

- Electrolytes
- Acid-base balance
 - Treat/prevent hyperkalemia
 - Avoid hyponatremia
 - Keep HCO_3^- around 20, use bicarb tabs or Bicitra liquid
 - Treat low Ca^{2+} only if symptomatic

Nutrition

- **Management of diabetes and CKD should include nutritional intervention. Dietary modifications may reduce progression of CKD.**
- Protein Restriction:
- 0.8 gm/kg/day, usual guideline
 - 0.5 -0.6 Gm /Kg /day, very hard to practice
 - US has avg high protein diet, hence “regular protein diet’
- Maintain calories
- PD and HD pts, at 1.2 gm/kg/day
- Malnutrition very common in advanced CKD and HD pts

Referral for Nephrology

- CKD stage 4 (DIALYSIS CLASS)
- CKD stage 3 for some pts, if diagnosis is unclear or pt preference
- AV Fistula needed for eGFR around 20: for possible HD pts
- Renal transplant workup started at GFR 20-25 or ckd stage 4, ? Pre-emptive transplant before dialysis
- Anemia management with Procrit/Aranesp etc needed in many pts in CKD stage 4 and some in late CKD stage 3

Earlier referral to a nephrologist may be indicated if:

- ✗ the diagnosis of diabetic nephropathy is in doubt, ? Vasculitis or ACUTE GN
- ✗ nephrotic syndrome or unexplained hematuria occurs
- ✗ a sudden worsening of renal function occurs
- ✗ blood pressure is difficult to control
- ✗ hyperkalemia arises
- ✗ renal artery stenosis is suspected

Drugs

- Review all meds, eg Antibiotics dosing
- Adjust for changes in GFR, eg use Loop diuretics after GFR around 35
- Phosphate binders
- Dialysis MVI
- ACEI/ARB in advanced CKD
- SGLT 2 meds in ckd stage 2,3,?4 as renal protective
- GLP1 agonist meds as renal protective, in ckd stage 2,3,4,5 with DM or Obesity and used in ESRD pts

Renal Replacement Therapy-Dialysis

- Expensive
- 85-90 % of pt on Hemodialysis ICHD, rest PD or HHD
- PD first Program: last 5-10 yrs or so
- More push for PD and HHD pts now
- Transplant Waiting list usually 2-3 yrs

Background-Starting Dialysis

- Renal-replacement therapy for patients with *end-stage renal disease* was introduced approximately *50 years ago*, yet the optimal timing for the initiation of dialysis is still debated.

In *recent years* there has been a *trend toward initiating dialysis at a relatively high estimated glomerular filtration rate (GFR)*, based on the assumption that starting dialysis early may avert the many medical and social problems associated with advanced uremia.

Dialysis : Modes for Renal replacement therapy

- Semipermeable membrane
 - Hemodialysis
 - Peritoneal Dialysis
 - CAPD vs Cyclor
- diffusion
 - Osmotic movement of solutes
- convection
 - fluid removal

Dialysis

- Less than 2% of patients with chronic kidney disease ultimately require renal replacement therapy.
- In part, this low rate is explained by the increased risk of death from cardiovascular causes before progression to end-stage renal disease can occur.
- Expensive
- 85-90 % of pt on Hemodialysis, rest PD
- Transplant Waiting list usually 2-3 yrs

Hemodialysis machine

Hemodialyzer
(where filtering
takes place)

Unfiltered
blood flows
to dialyzer

Filtered blood
flows back to
body



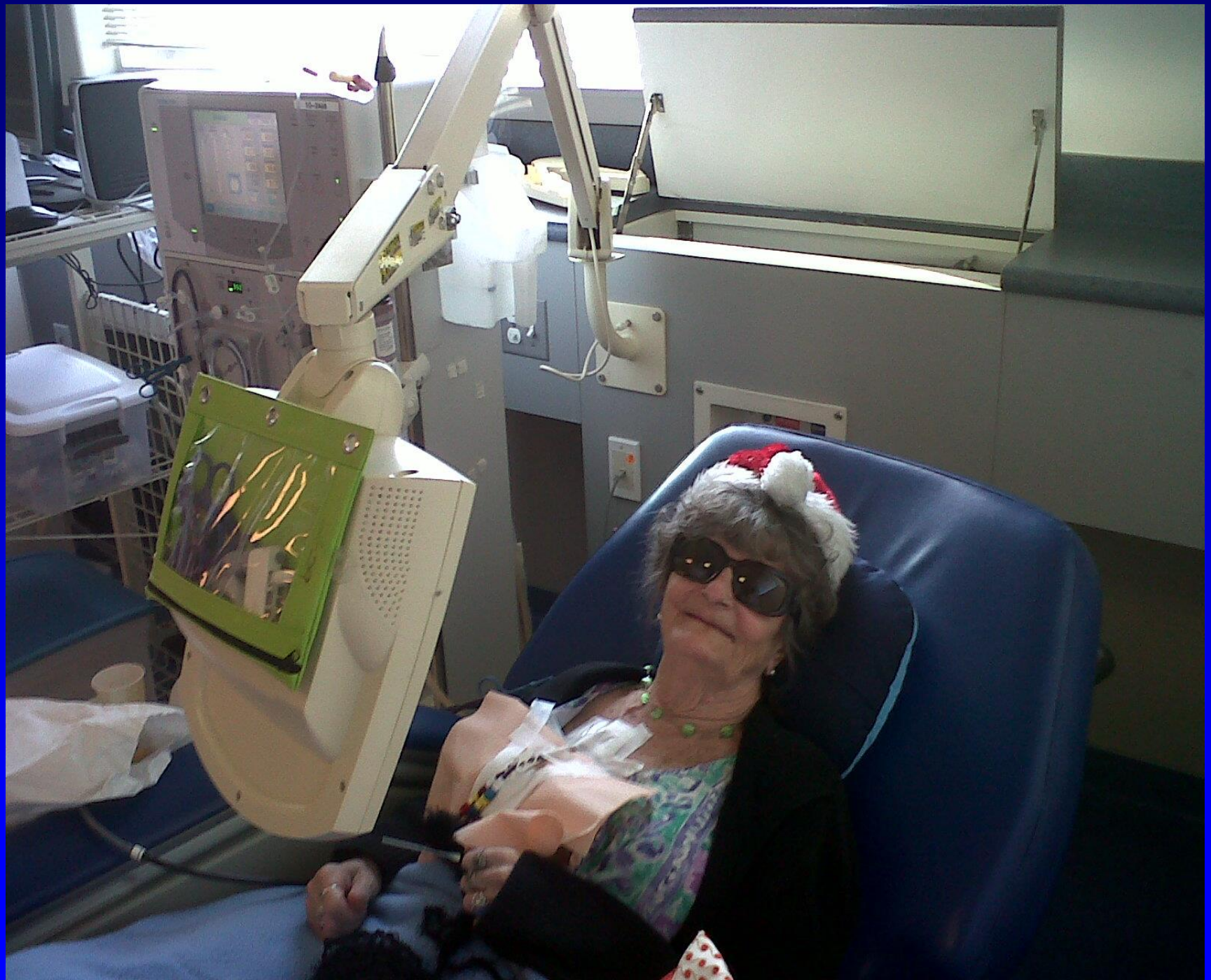
Outpt HD center



Yakima Davita







Dialysis techs



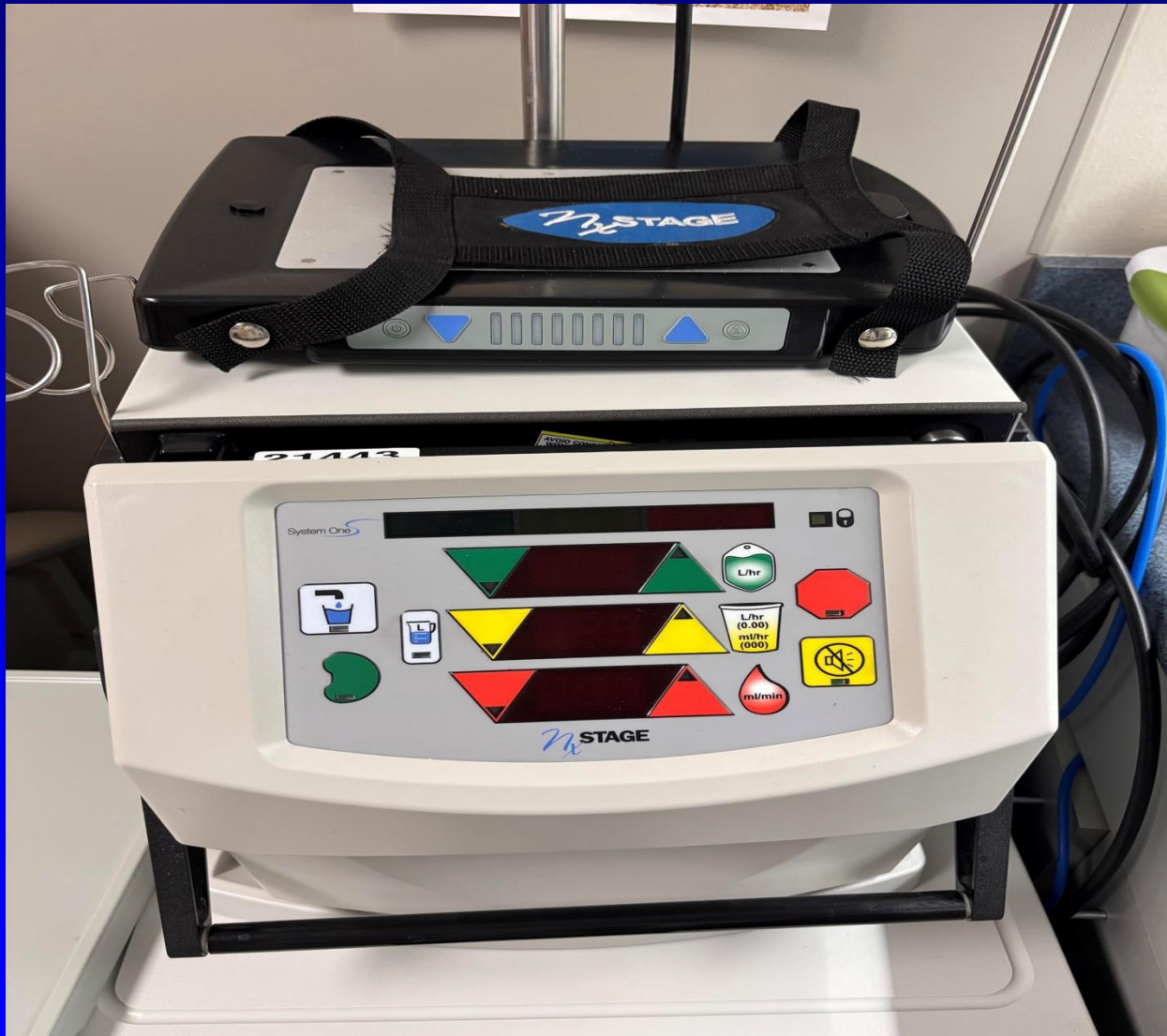
HD machine Eng./Yak Davita



Home Dialysis Option

- *Peritoneal dialysis*: at Lake Aspen Davita, Wapato Davita, Ellensburg Davita and Davita Union Gap
- Automated with cyclor now: PD while sleeping
- *Home Hemodialysis: HHD*
- Home 4-6 days/nights per wk hemodialysis

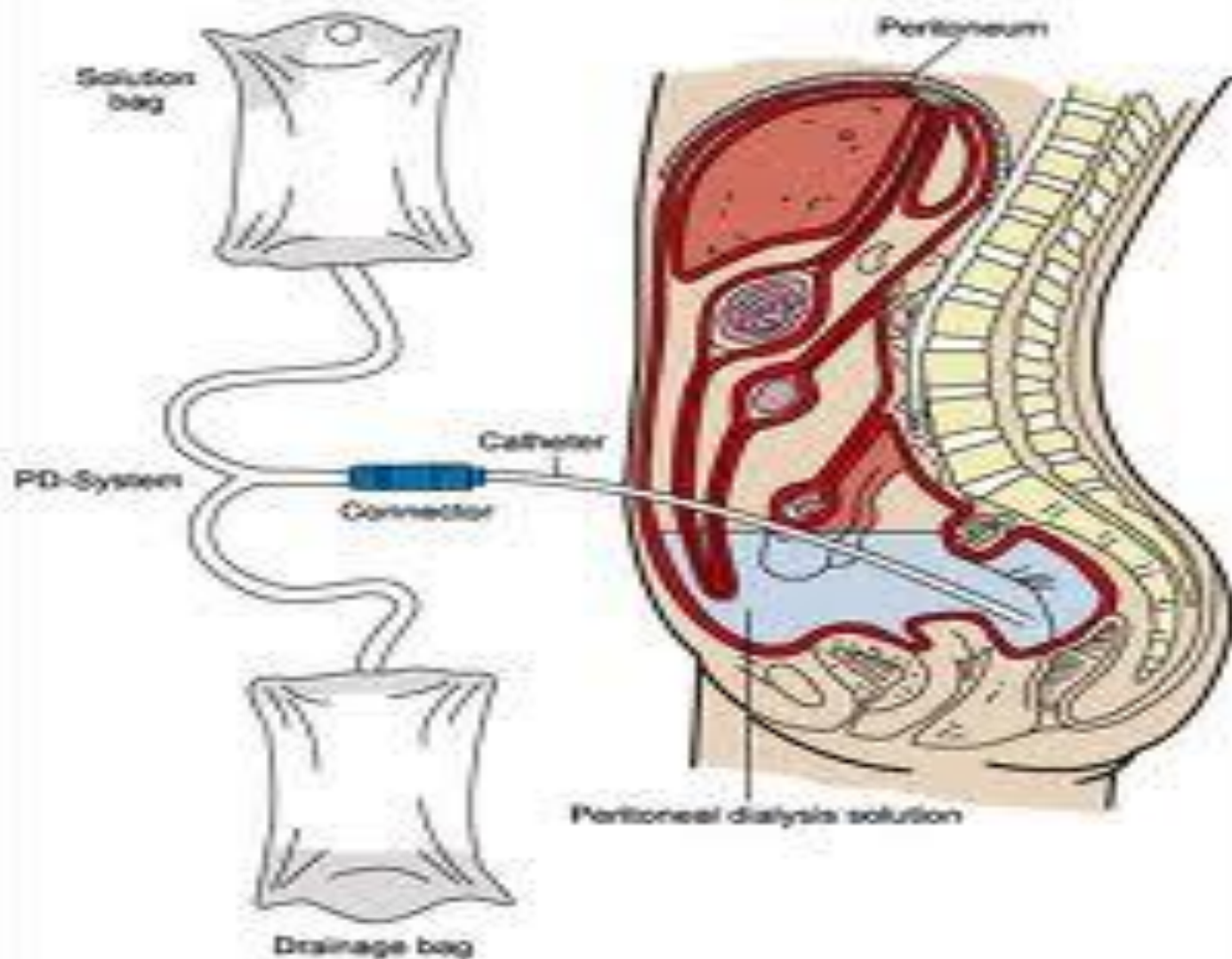




Peritoneal dialysis : PD

- Pt gets Medicare from the start
- Advantages: Pt at Home, Slow daily dialysis, around 8 to 10 hrs per day
- Pt selection very important: Contraindications: eg Nursing home pts, Vision problems, adhesions, space at home with aseptic precautions
- Complications of PD
- Pt survival of PD and HD is equivalent
- PD saves money to Medicare as compared to HD

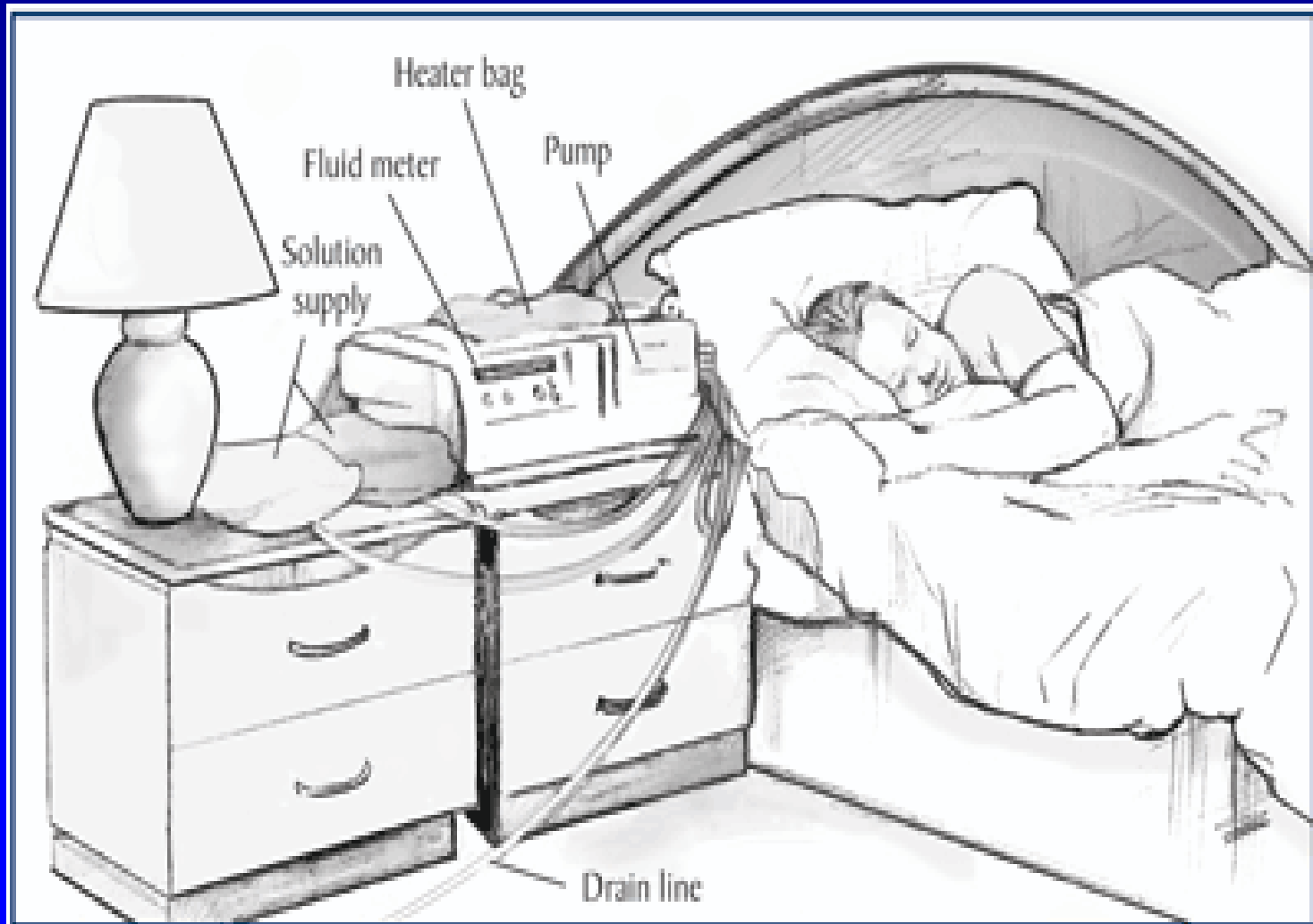
Principle of Peritoneal Dialysis







PD with Cycler: Dialysis while asleep





Unique Considerations which increase Mortality in Dialysis pts

- *Annual mortality in ESRD; 15 to 20 %, v high, equal to many types of cancers*
- *Clearance/compliance*
- *High fluid gain*
- *Hyperphosphatemia*
- *CVC use(Vs AVF) in HD pts*

Dialysis after 75

- Prognosis is poor, New paper from Mayo Clinic finds that half of elderly patients who start dialysis after age 75 will die within one year. The findings presented at the American Society of Nephrology's Kidney Week 2013 in Atlanta.
- Option of hospice
- Lots of Pts feel : not given Option education(In Center HD/Home HD/PD/Renal transplant/Hospice)
- Palliative Nephrology:
<http://www.youtube.com/watch?v=ufMajZCWM-Δ>, Nice review, Mayo clinic :Dialysis above age of 75 yrs,

Renal Transplant

- History: First renal transplant in 1954
- Renal transplant: best mode of renal replacement therapy and also saves money as compared to pt being on HD/PD
- Survival: improved after Cyclosporine use
- Now some steroid free and cyclosporine/tacrolimus free pts
- UNOS
- SRTR

Figure KI 36: Overall kidney transplants

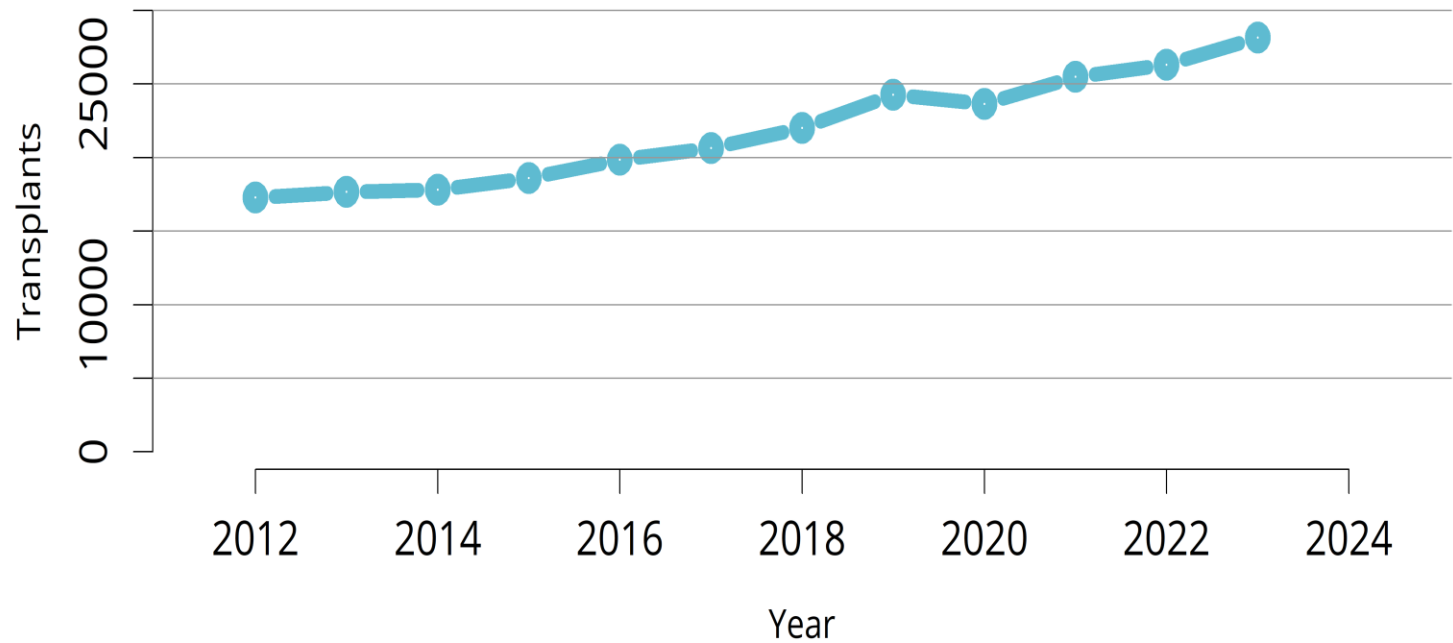


Figure KI 38: Adult kidney transplants by donor type

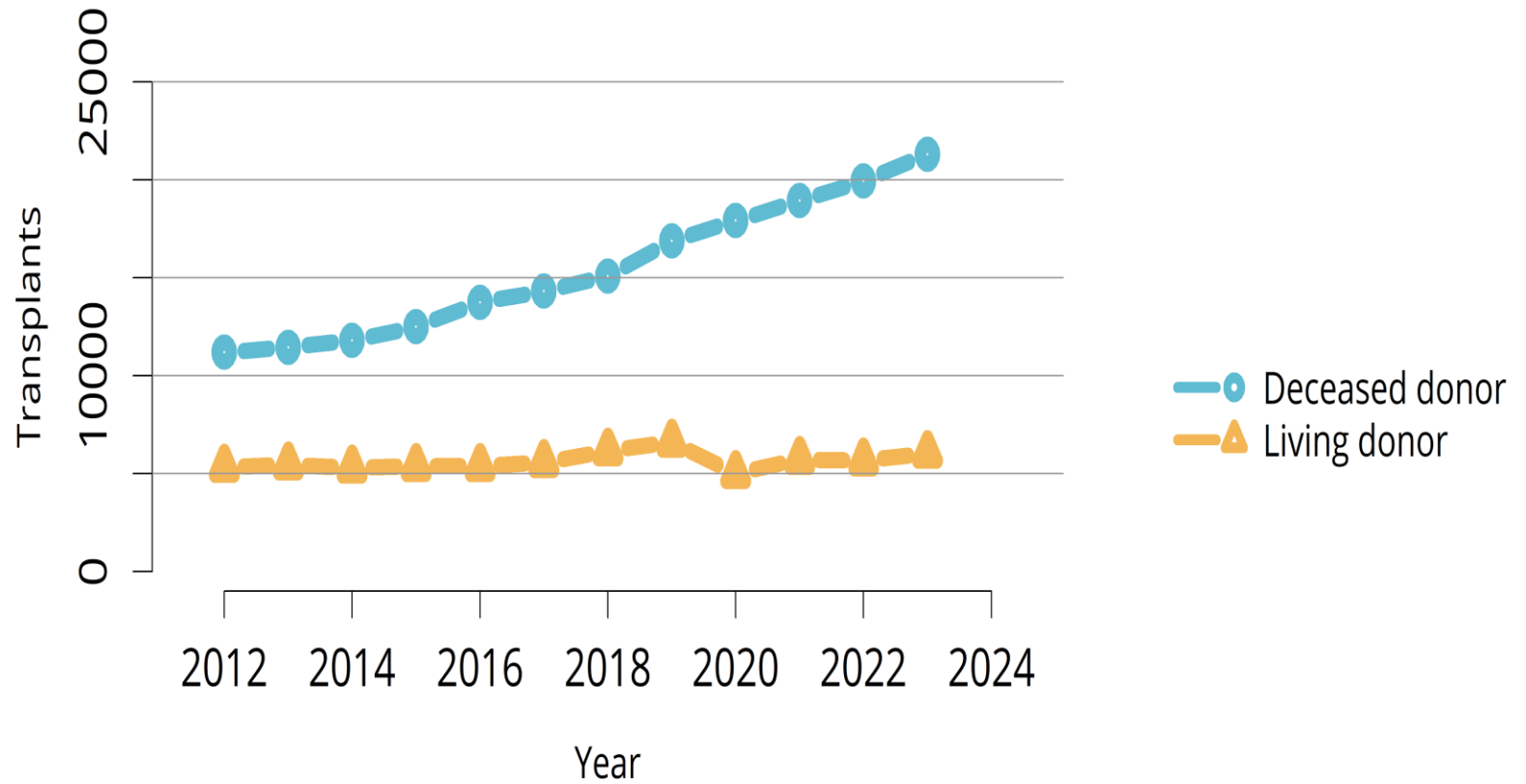


Figure KI 39: Adult kidney transplants by age

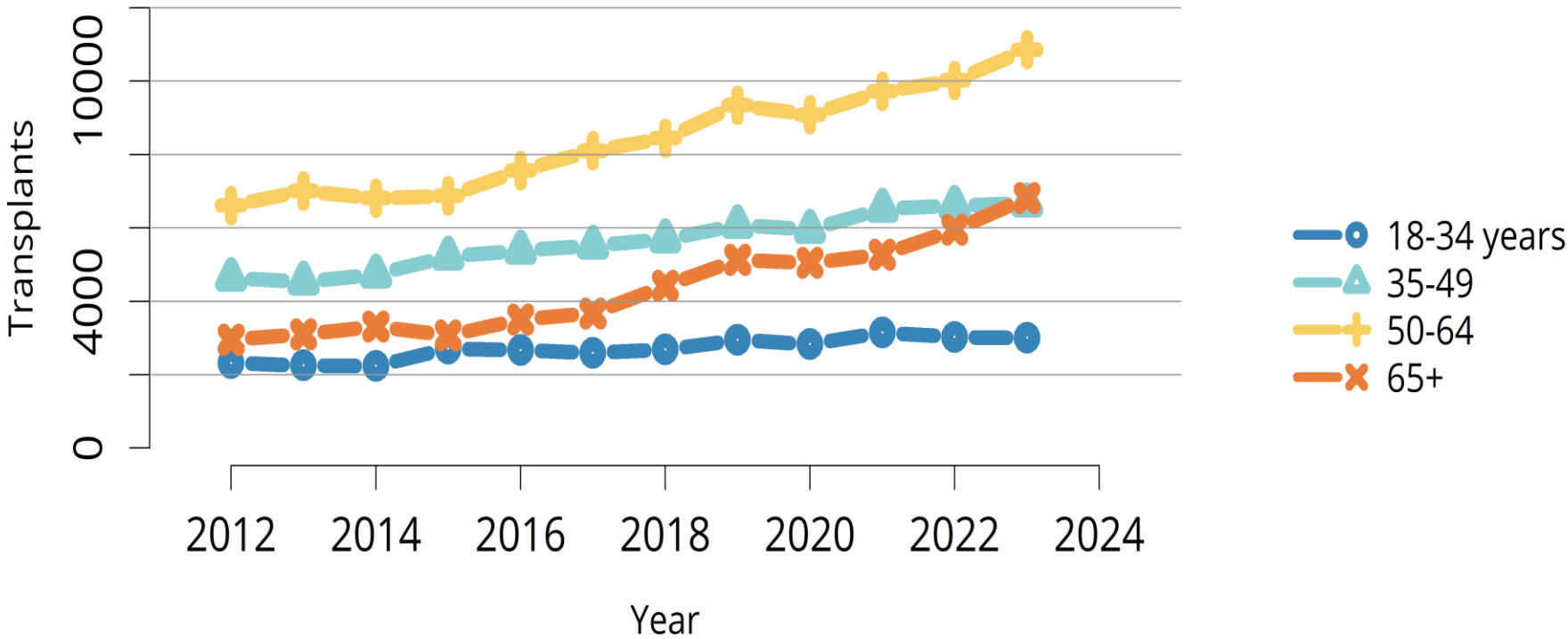


Figure KI 42: Adult kidney transplants by diagnosis

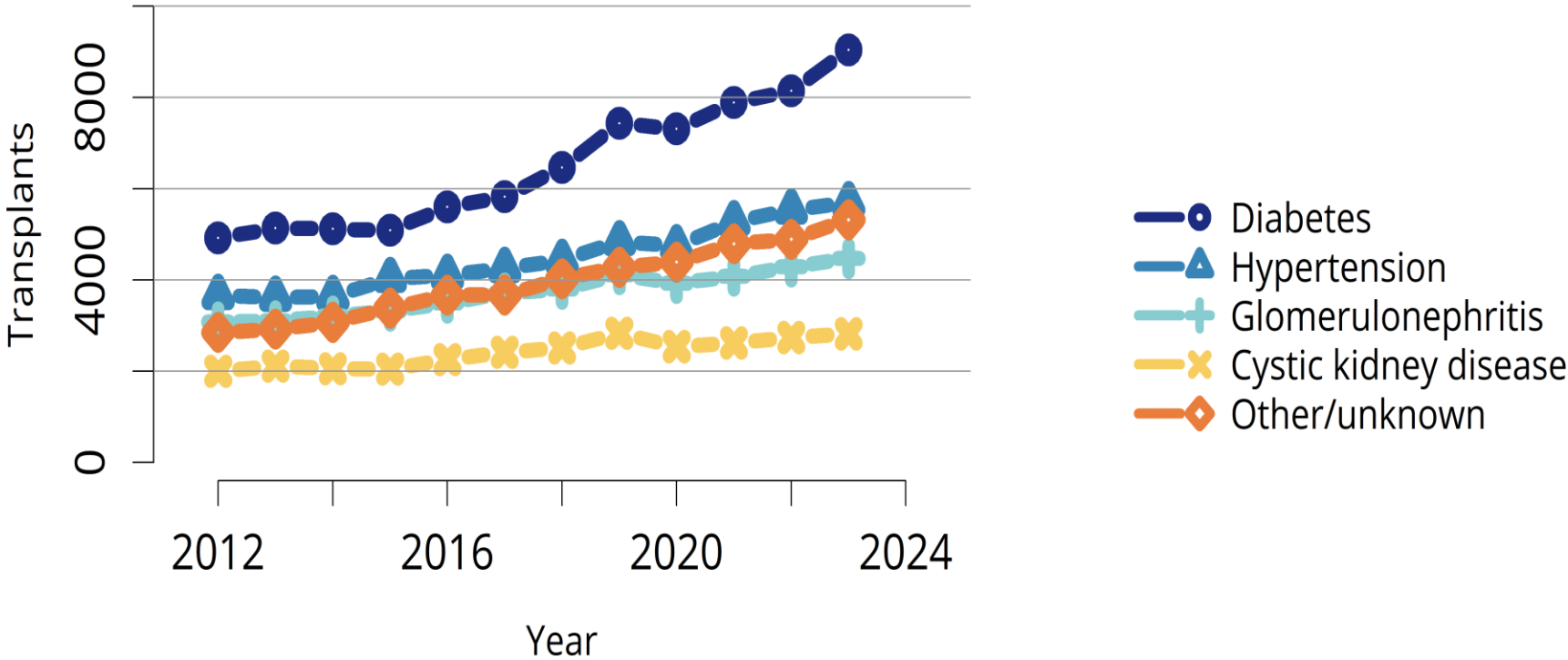


Figure KI 87: Cause of death among deceased kidney donors

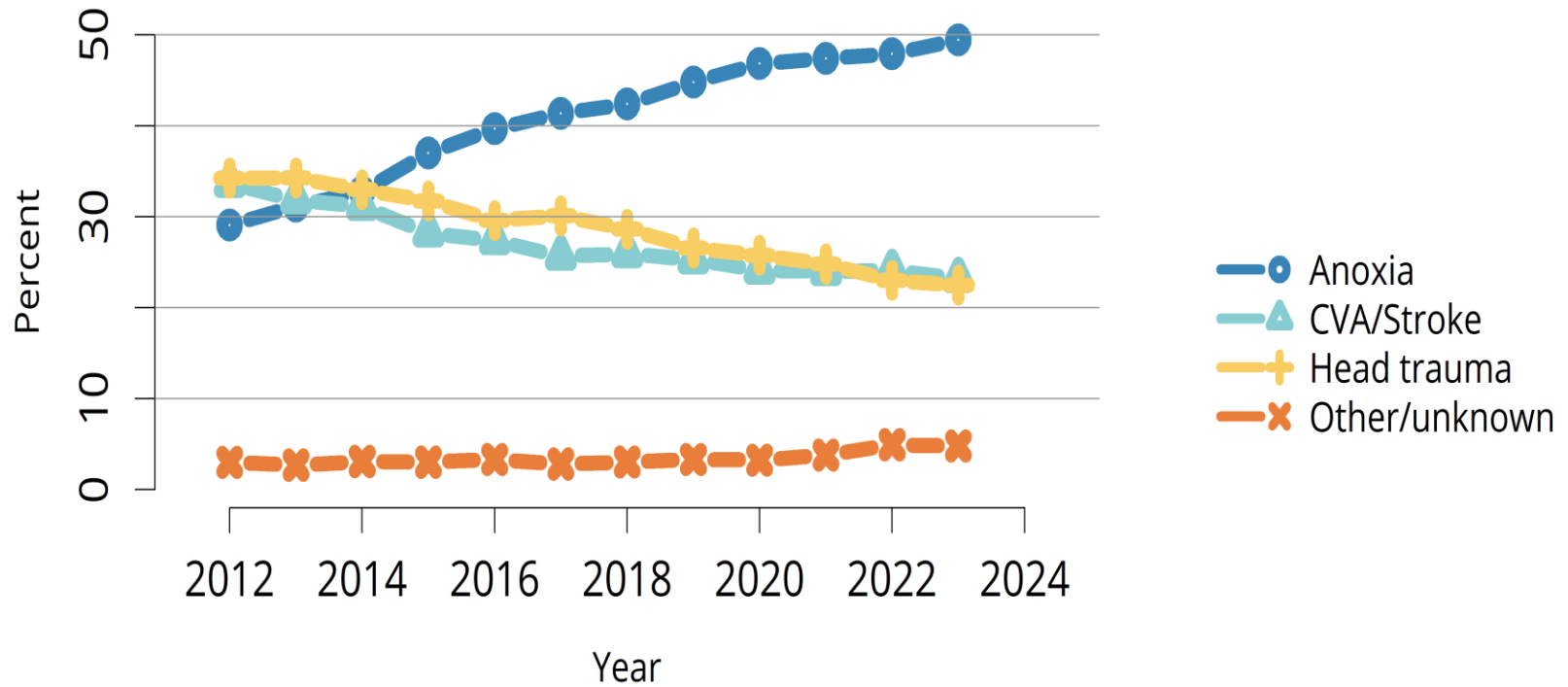


Figure KI 103: Living kidney donors by age

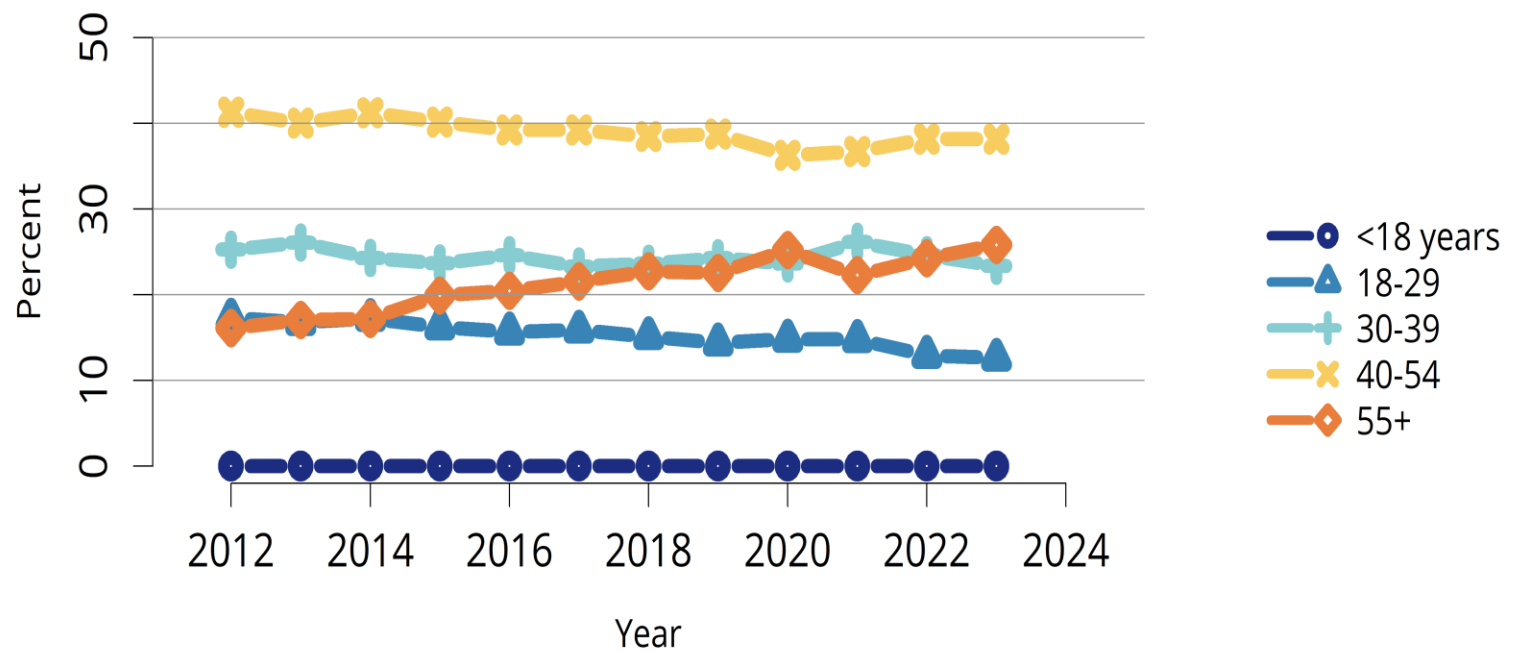
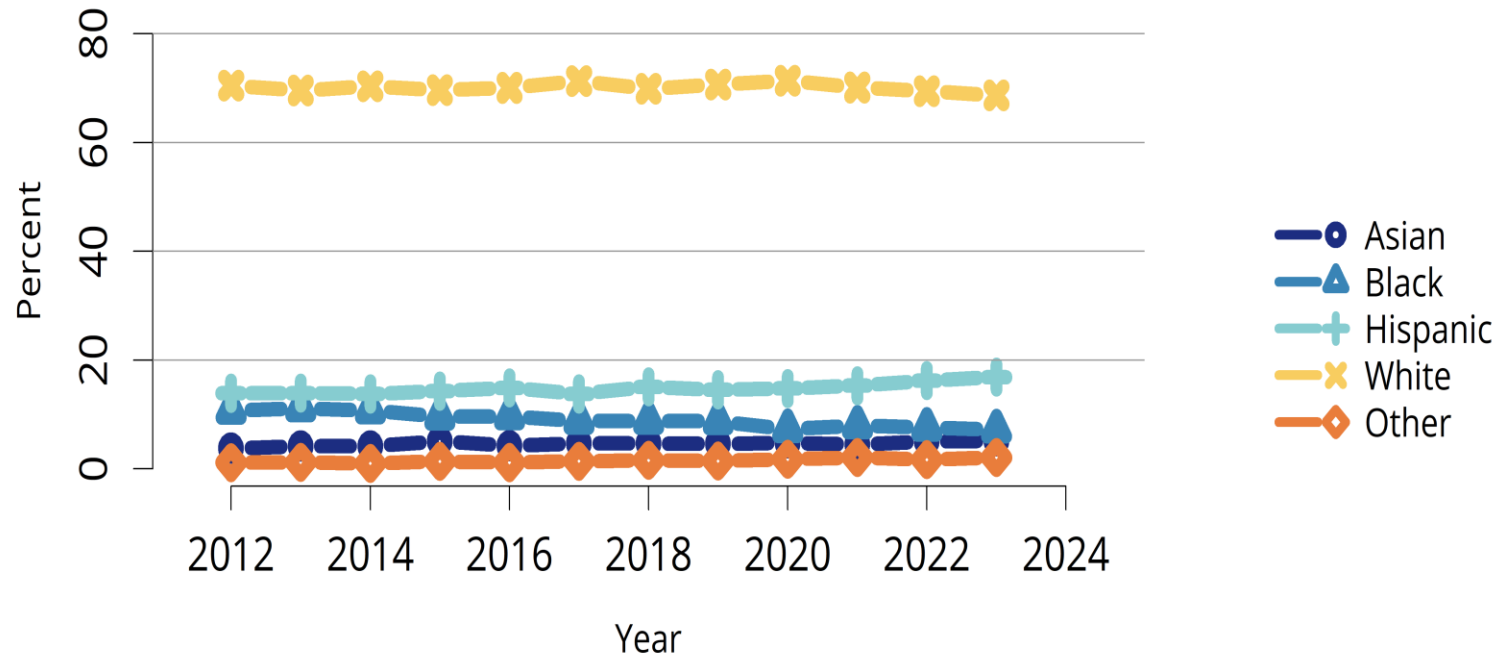


Figure KI 105: Living kidney donors by race and ethnicity



Renal transplant

- INDUCTION vs CHRONIC REGIMEN
- Most common 3 drugs: Chronic,
- *Steroids eg Prednisone at 5 mg qdaily*
- *Calcineurin Inhibitor eg Tacrolimus(Prograf) 2 to 3 mg PO BID or Cyclosporine*
- *MMF(Cellcept) 500 mg BID PO or Azathioprine(Imuran)*

Figure KI 45: Induction agent use in adult kidney transplant recipients

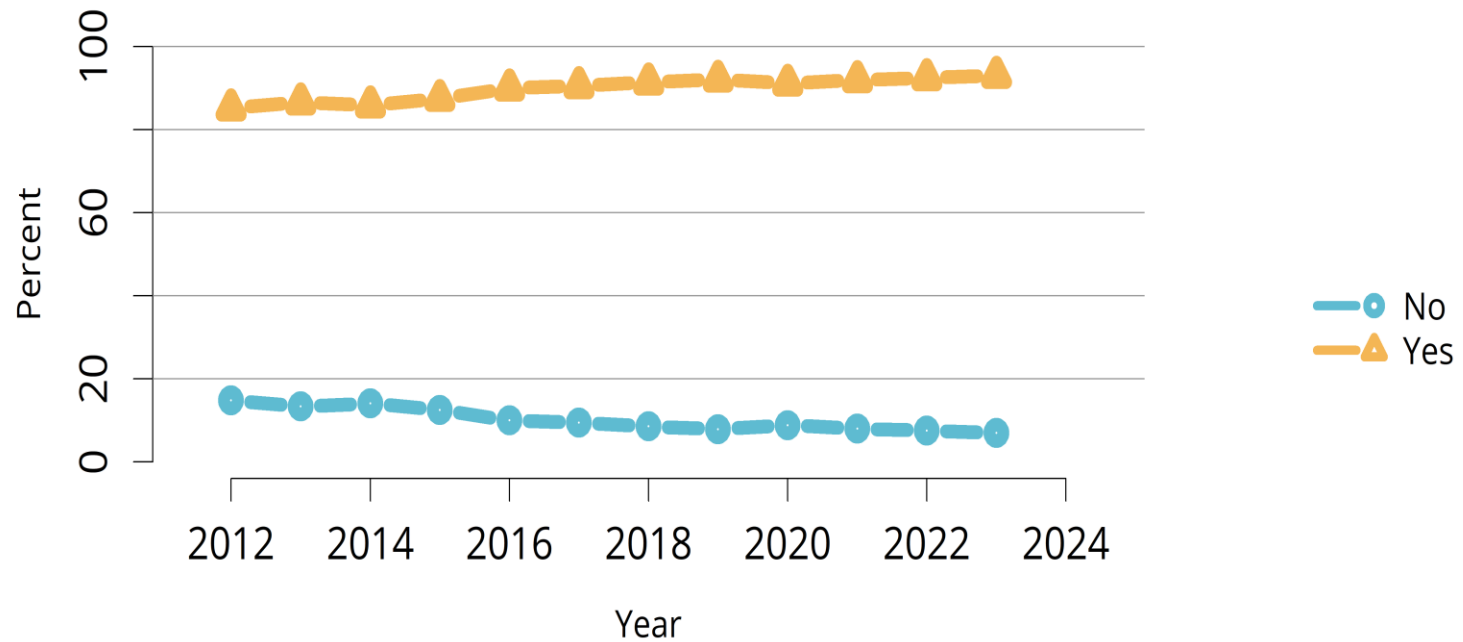


Figure KI 47: Immunosuppression regimen use in adult kidney transplant recipients

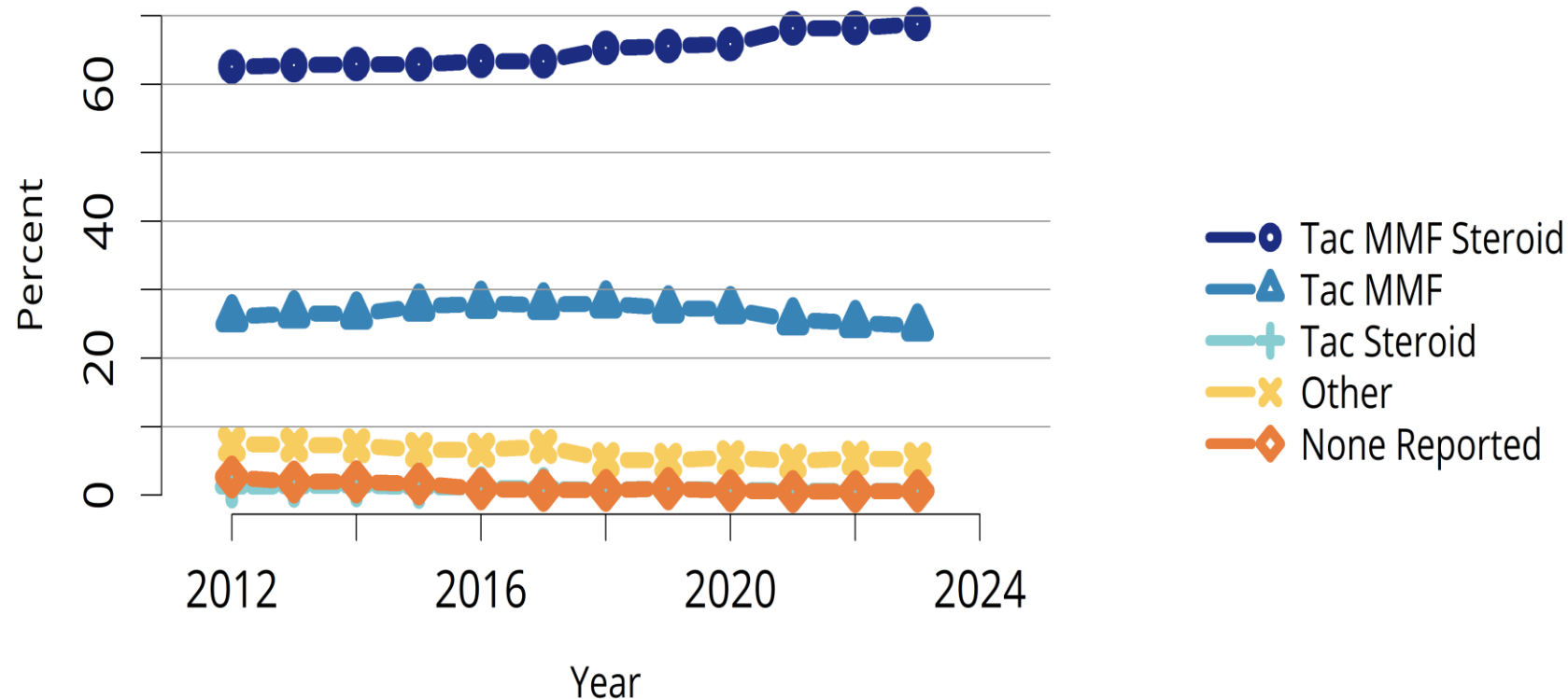
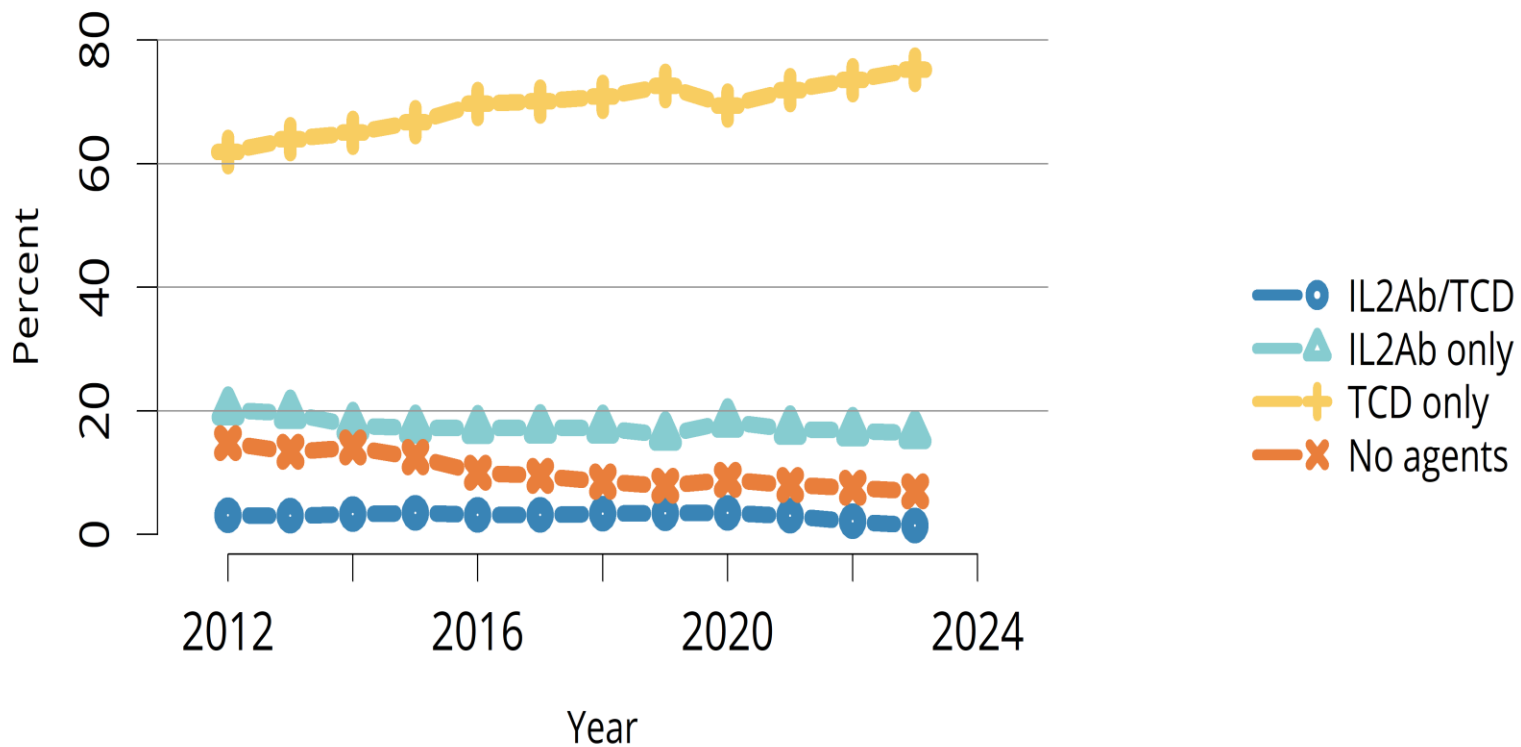
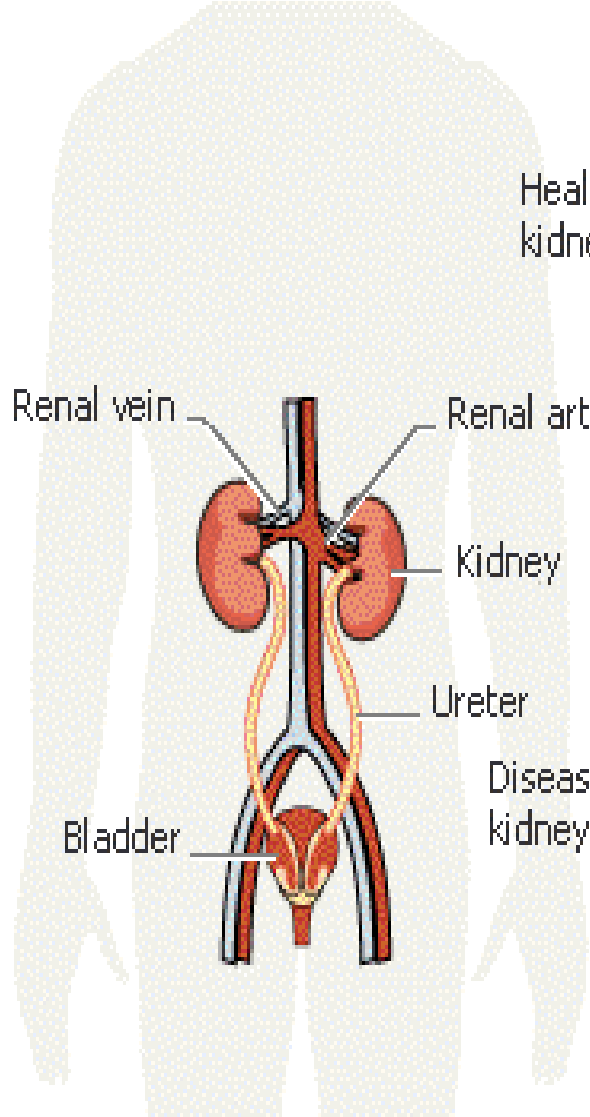


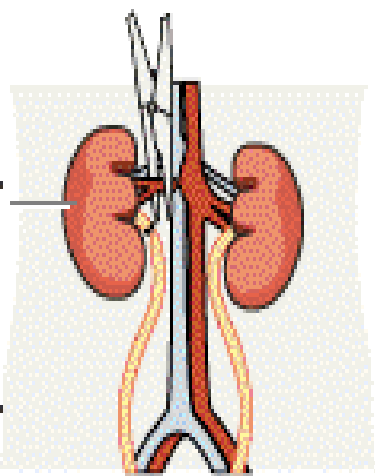
Figure KI 46: Type of induction agent use in adult kidney transplant recipients



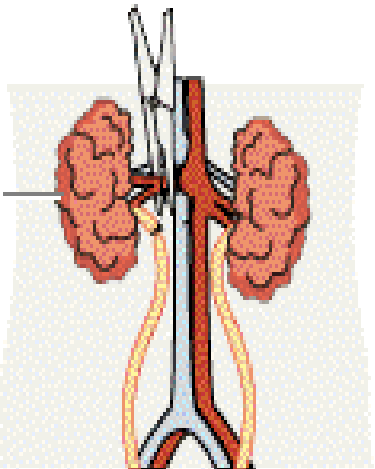
- **Figure KI 46: Type of induction agent use in adult kidney transplant recipients.** Immunosuppression at transplant reported to the OPTN. IL2Ab, interleukin-2 receptor antibody; TCD, T-cell depleting.



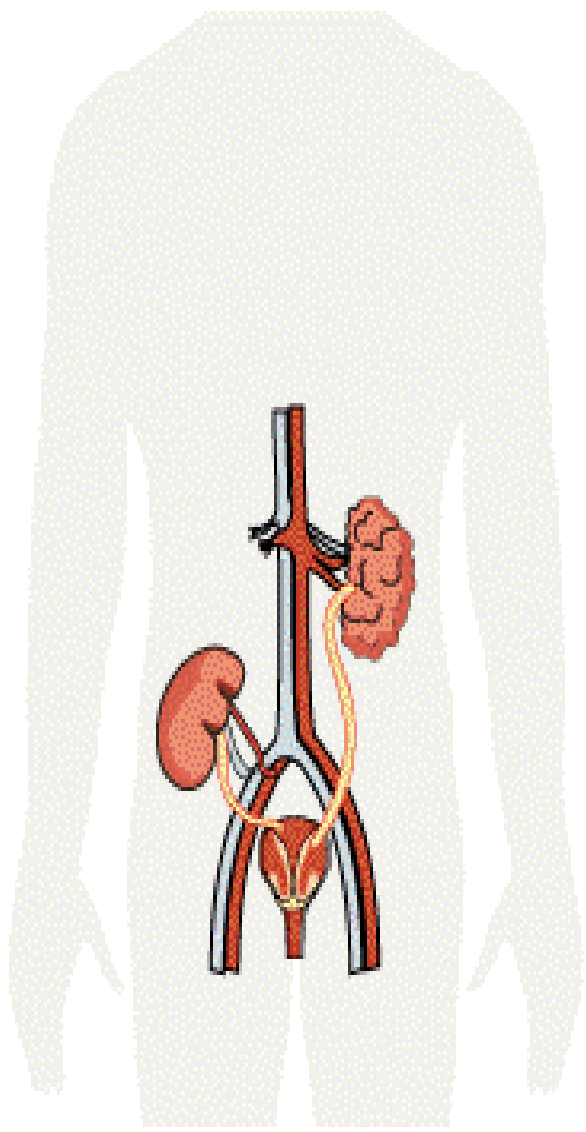
Healthy kidney



Diseased kidney



3.



- Best mode of :
- *Renal Replacement Therapy*
- Native kidneys: not usually removed

SRTR Background

- Supports the ongoing evaluation of the scientific and clinical status of solid organ transplantation, including kidney, heart, liver, lung, pancreas, and intestine transplants
- Publishes and analyzes data on all solid organ transplants and donations in the United States
- Receives oversight and funding from the Health Resources and Services Administration (HRSA), a division of the U.S. Department of Health and Human Services
- Coordinated by the Arbor Research Collaborative for Health together with the University of Michigan, Ann Arbor, MI, USA
- For more information, visit www.ustransplant.org

Kidney Transplantation at a Glance

2024 Kidney Transplantation



15,935

of deceased donors that donated a kidney.



31,565

of kidneys recovered from deceased donors for transplant.



2,117

of living kidney donors who were related to their recipient.



3,814

of living kidney donors who were unrelated to their recipient.



455

of Non-Directed (Altruistic) kidney donors.



1,355

of living kidney donors participating in paired donation.



92,340

of people awaiting a kidney transplant (as of 2.04.2025).



48,780

of people added to the kidney waiting list.



18,064

with diabetes as their primary cause of kidney failure (the most common reason).



22,074

of kidney transplants from a deceased donor.



6,418

of kidneys transplanted from a living donor.



28,492

of kidney transplants performed in 2024.

Transplanted within 2 years of listing, by blood type*



26%

O



37%

A



27%

B



51%

AB

Survival**



85%

Adult 3-year survival with a functioning deceased-donor transplant.



92%

Pediatric 3-year survival with a functioning deceased-donor transplant.



93%

Adult 3-year survival with a functioning living donor transplant.



95%

Pediatric 3-year survival with a functioning living donor transplant.

*Current blood type data is for patients listed between 7.1.2018 - 6.30.2021
**Transplanted 1.1.2019 - 3.12.2020 and 6.13.2020 - 6.30.2021

Sources

<https://open.transplant.hrsa.gov/data/view-data-reports/national-data/>
SRTR Program-Specific Reports, January 2025 (www.srtr.org), Tables B9, C9D, C9L, C14D, C14L

SRTR January 2025 Standard Analysis File (SAF)

Created by

2024 Kidney Transplantation



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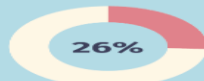
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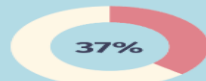
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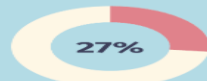
Transplanted within 2 years of listing, by blood type*



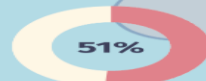
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SRTR January 2025 Standard Analysis File (SAF)

KI 1.8 Kidney transplant waiting list

activity among adult patients

	2009	2010	2011
Patients at start of year	74,572	79,365	83,879
Patients added during year	28,645	29,216	28,131
Patients removed during year	23,820	24,662	25,463
Patients at end of year	79,397	83,919	86,547
Removal reason			
Deceased donor transplant	9,713	9,980	10,399
Living donor transplant	5,170	5,235	4,922
Tx (type not specified)	54	89	81
Patient died	5,181	5,172	5,139
Patient refused transplant	271	318	406
Improved, tx not needed	131	101	135
Too sick to transplant	1,358	1,467	1,903
Changed to kid.-pan. list	165	191	194
Other	1,777	2,109	2,284

Our options: Transplant centers

- University of WA, Seattle
- Virginia Mason, Seattle
- Swedish, Seattle
- Spokane, Sacred Heart Hospital

- I usually send to University of WA, or VMC Seattle for Yakima area pts and Spokane for Sunnyside pts or Pt/Insurance Preference

Kidney transplant process

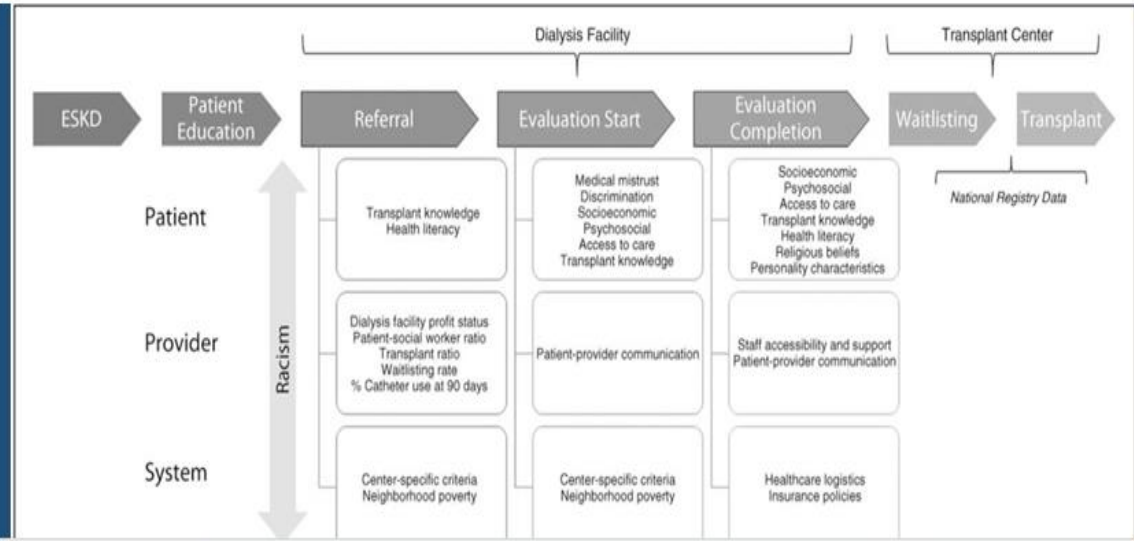
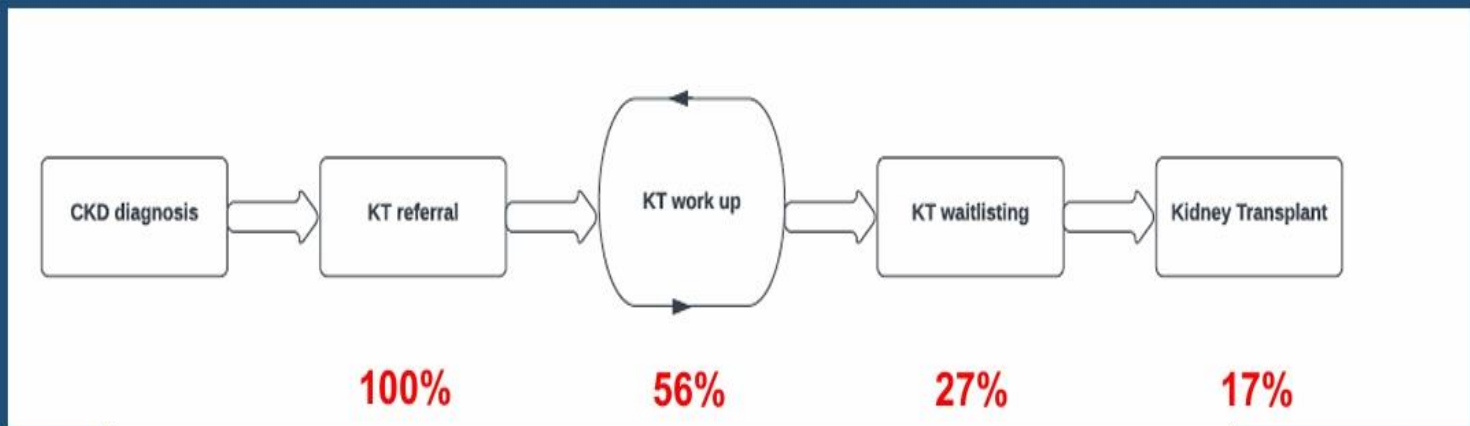
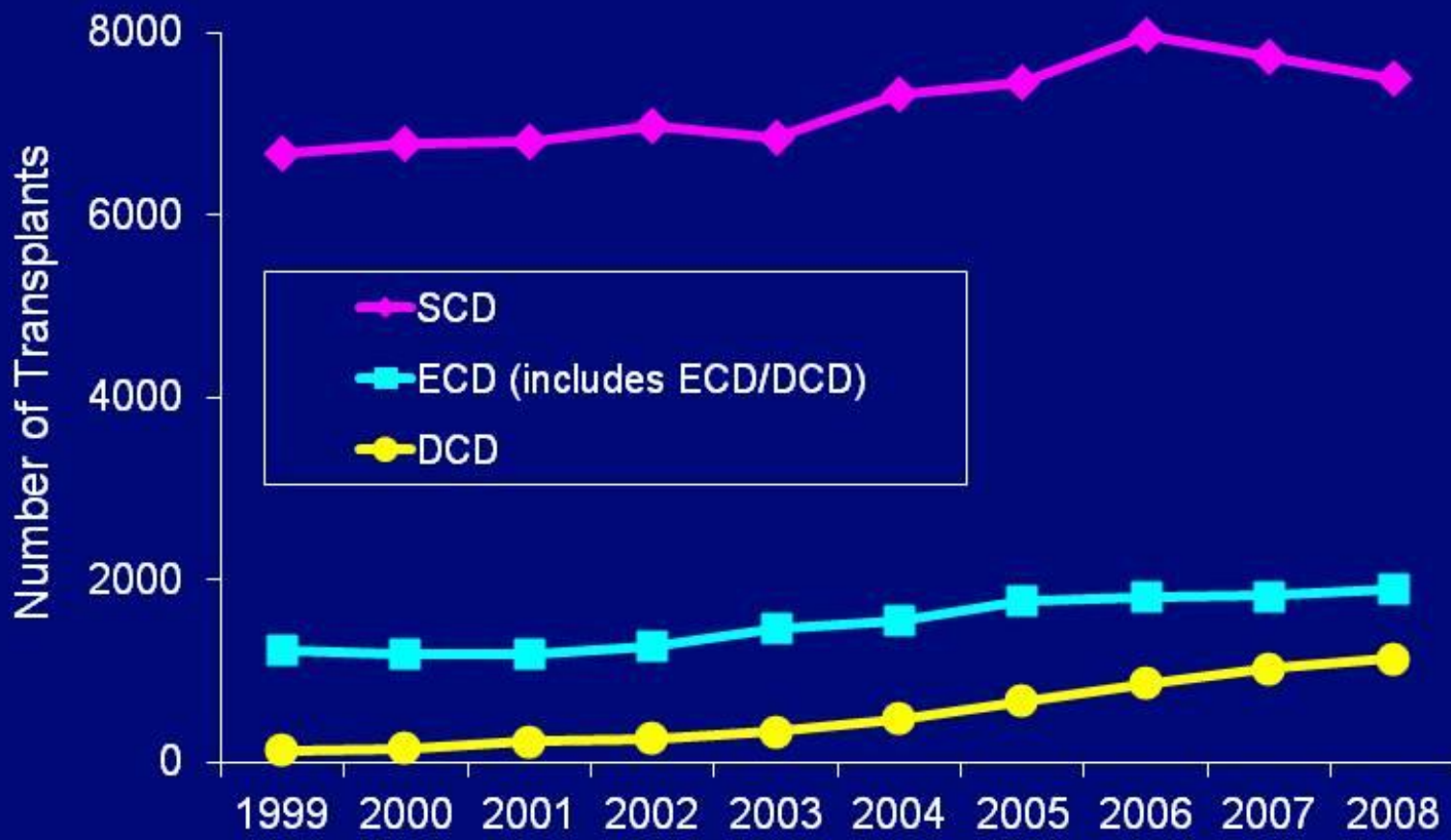


Figure III-4. SCD, ECD, and DCD Kidney Transplants, 1999-2008



HRSA Collaboratives began in April 2003



Source: 2009 OPTN/SRTR Annual Report, Table 5.4

Figure III-6. Unadjusted 1-Year (2006-2007), 5-Year (2002-2007), and 10-Year (1997-2007) Kidney Recipient Survival, by Donor Type

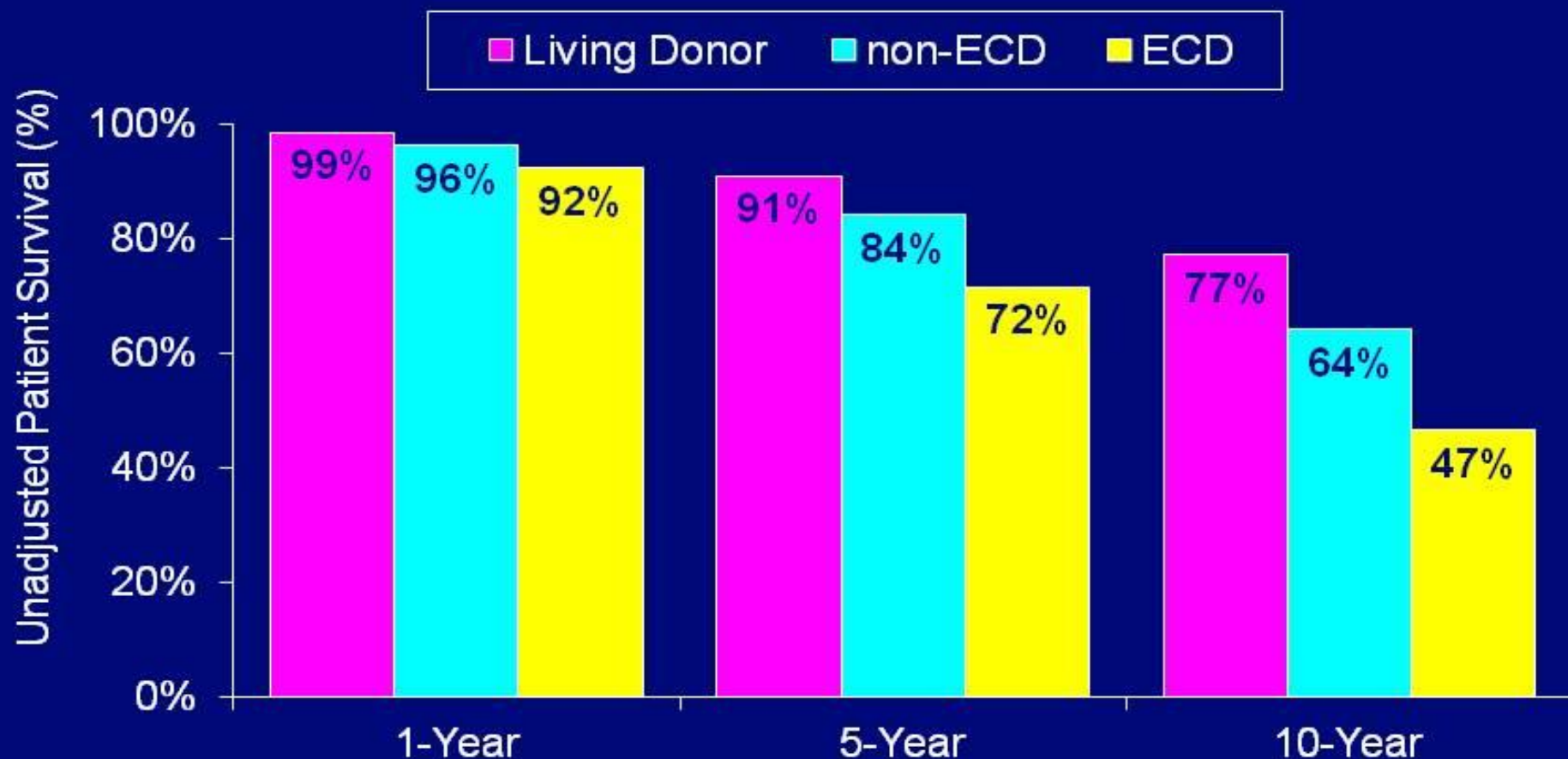
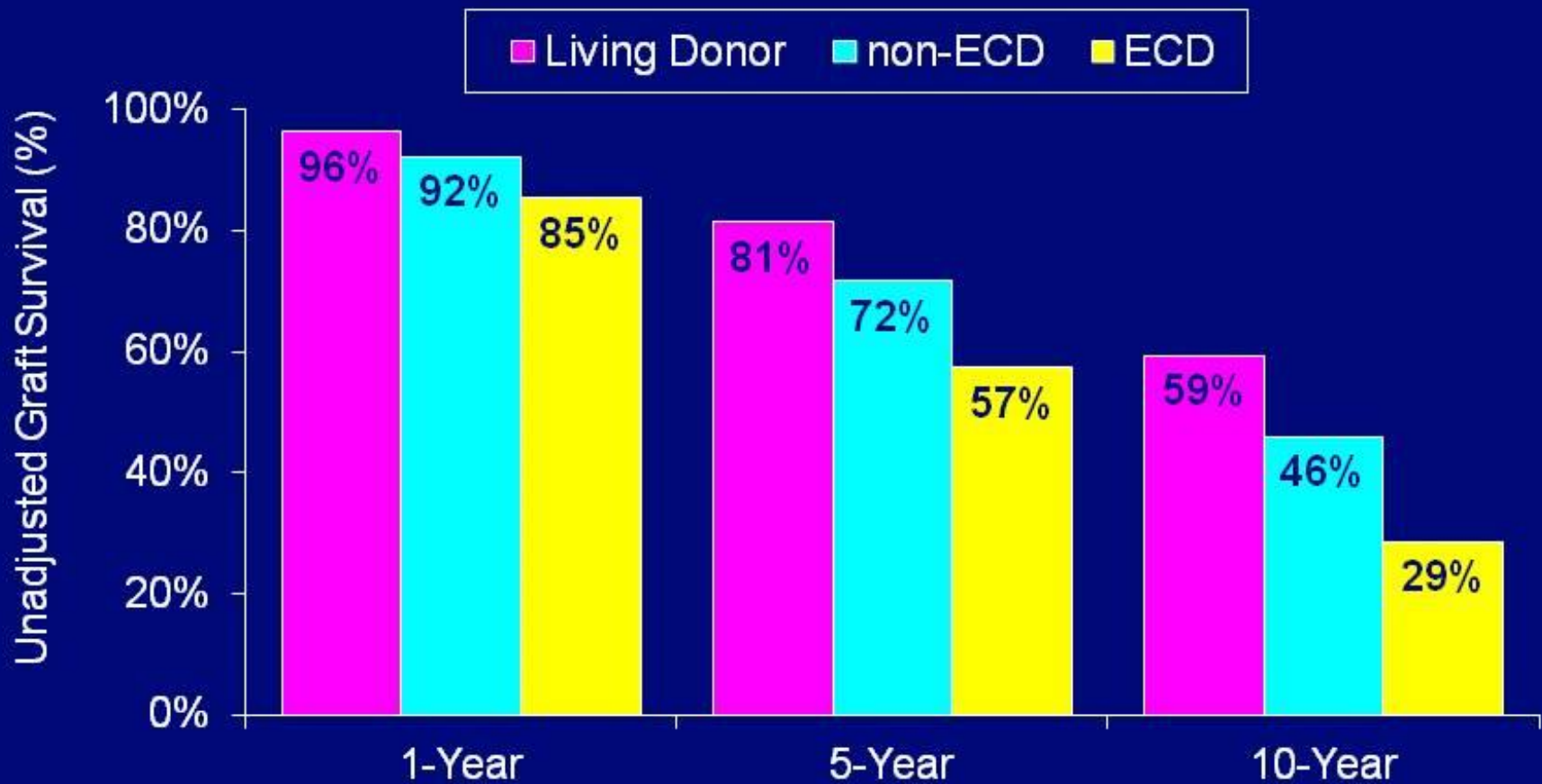


Figure III-7. Unadjusted 1-Year (2006-2007), 5-Year (2002-2007), and 10-Year (1997-2007) Kidney Graft Survival*, by Donor Type



*Death is included as an event.

SRTR

Source: 2009 OPTN/SRTR Annual Report, Tables 5.10a, b, d.

Figure KI 64: Graft survival among adult living donor kidney transplant recipients, 2016-2018, by diagnosis

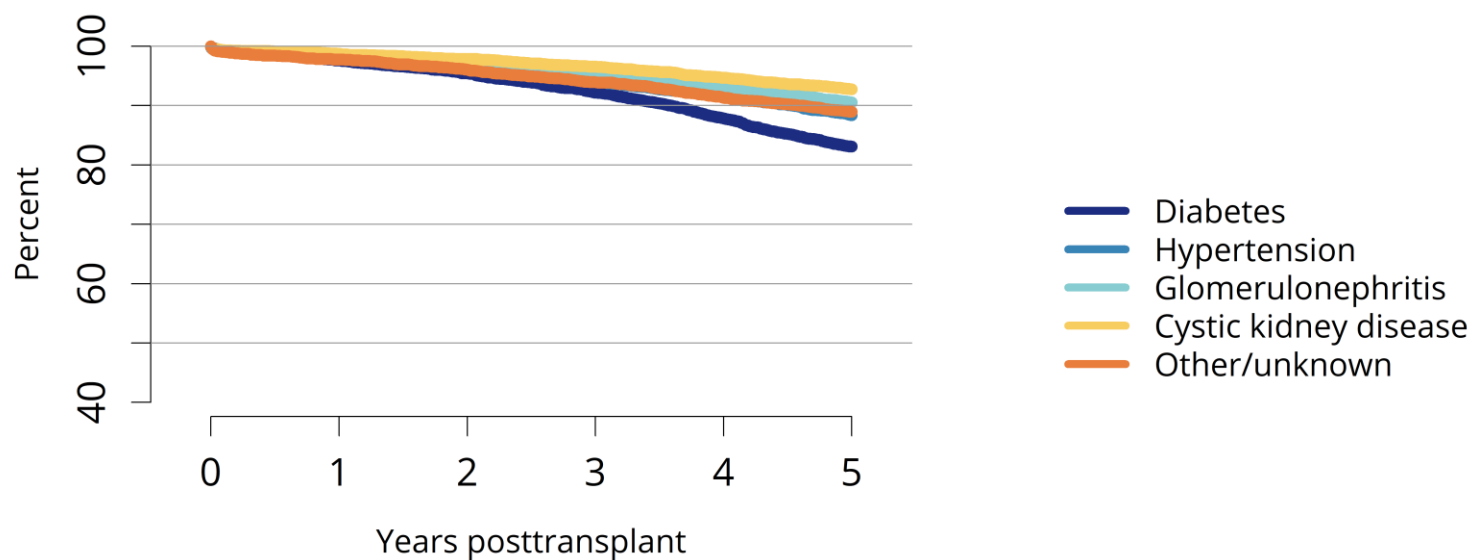


Figure III-8. Unadjusted Median Time to Transplant by OPO (listed from July 1, 2002 – December 31, 2007) for Kidney

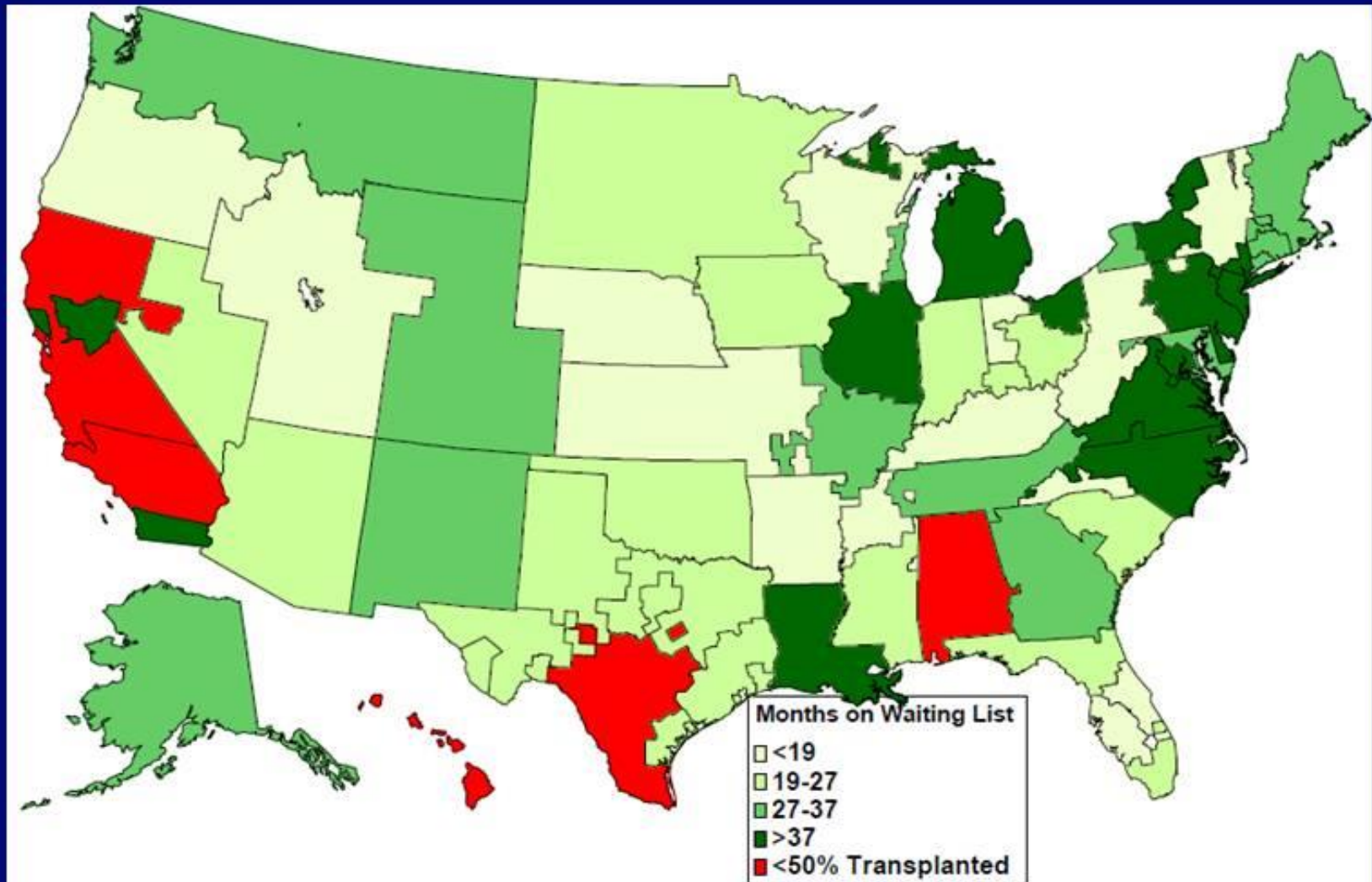
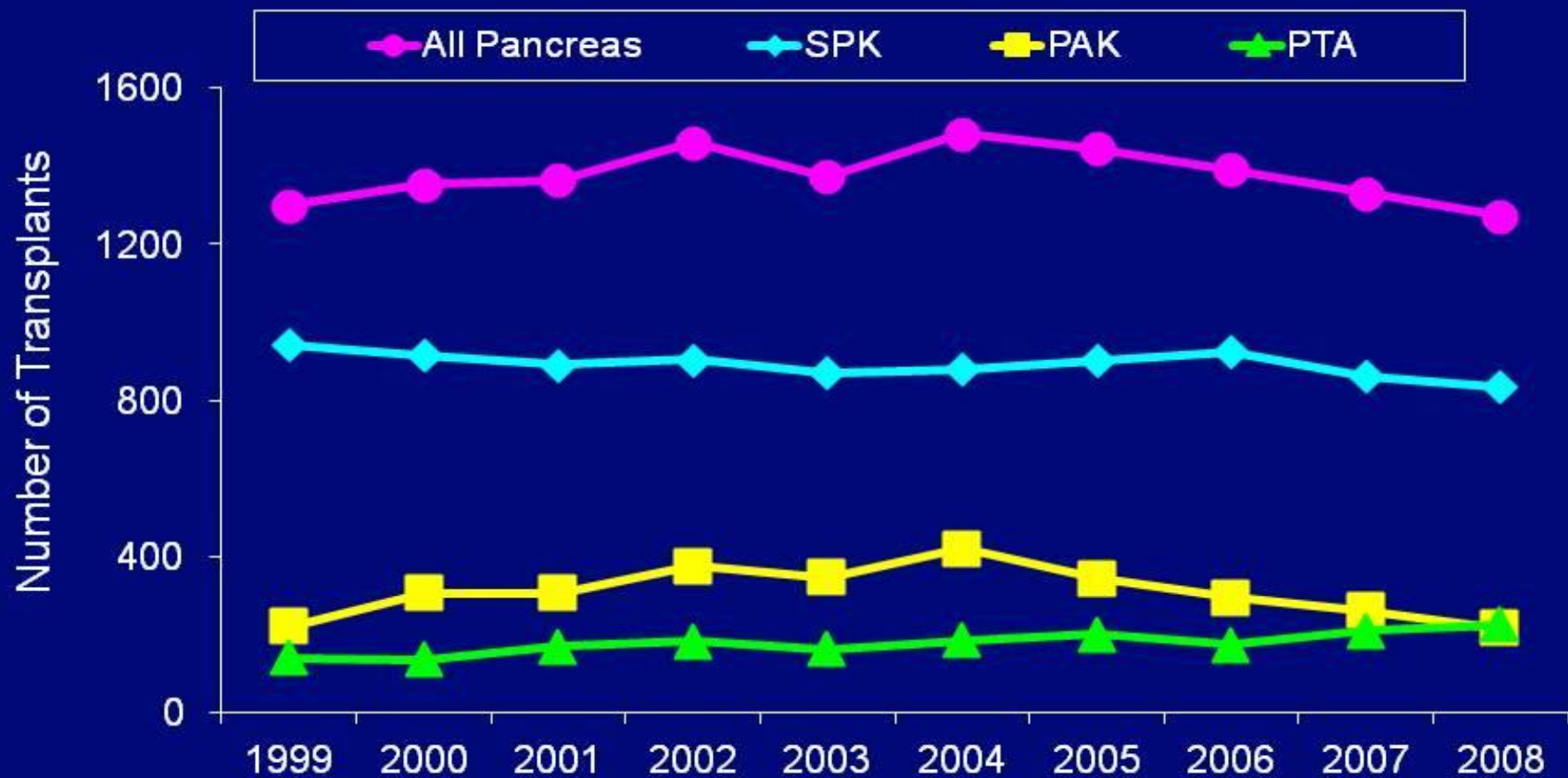
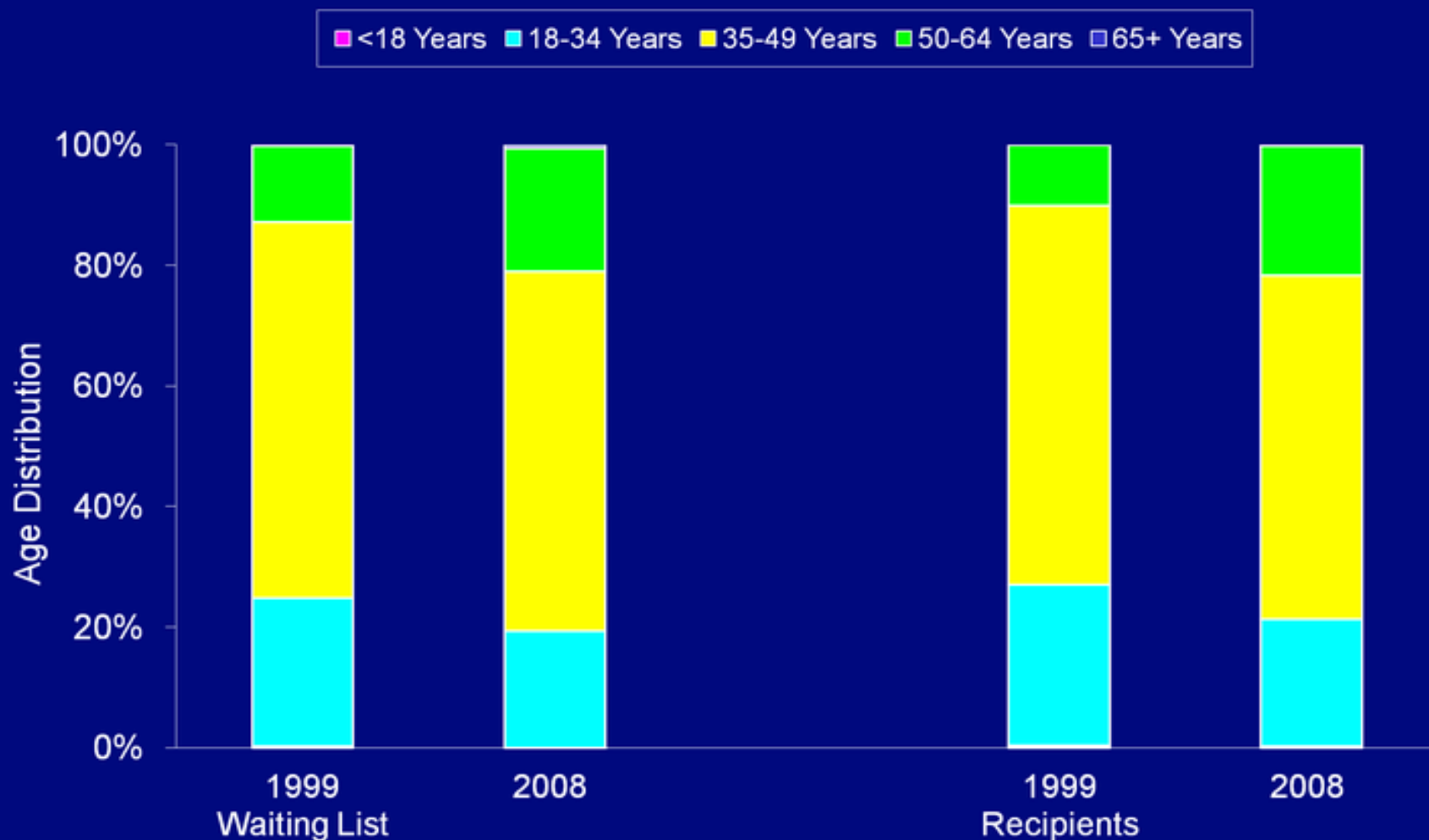


Figure III-10. Pancreas Transplants, by Transplant Type, 1999-2008



Simultaneous Pancreas-Kidney (SPK) Transplantation at a Glance

Figure I-11. Age Distribution of Recipients and Active Waiting List



For SPK transplantation, patients over age 50 years made up greater fractions of both candidates and recipients in 2007 than in 1998. At the same time, smaller proportions of candidates and recipients were in the 18-34 year age group. (Since recipients were mostly type 1 diabetics, the ages below 18 and above 65 years were virtually unrepresented.)

Figure III-26. Trends in Procedure Type, 1999-2008



Figure KI 88: Overall percent of kidneys recovered for transplant and not transplanted

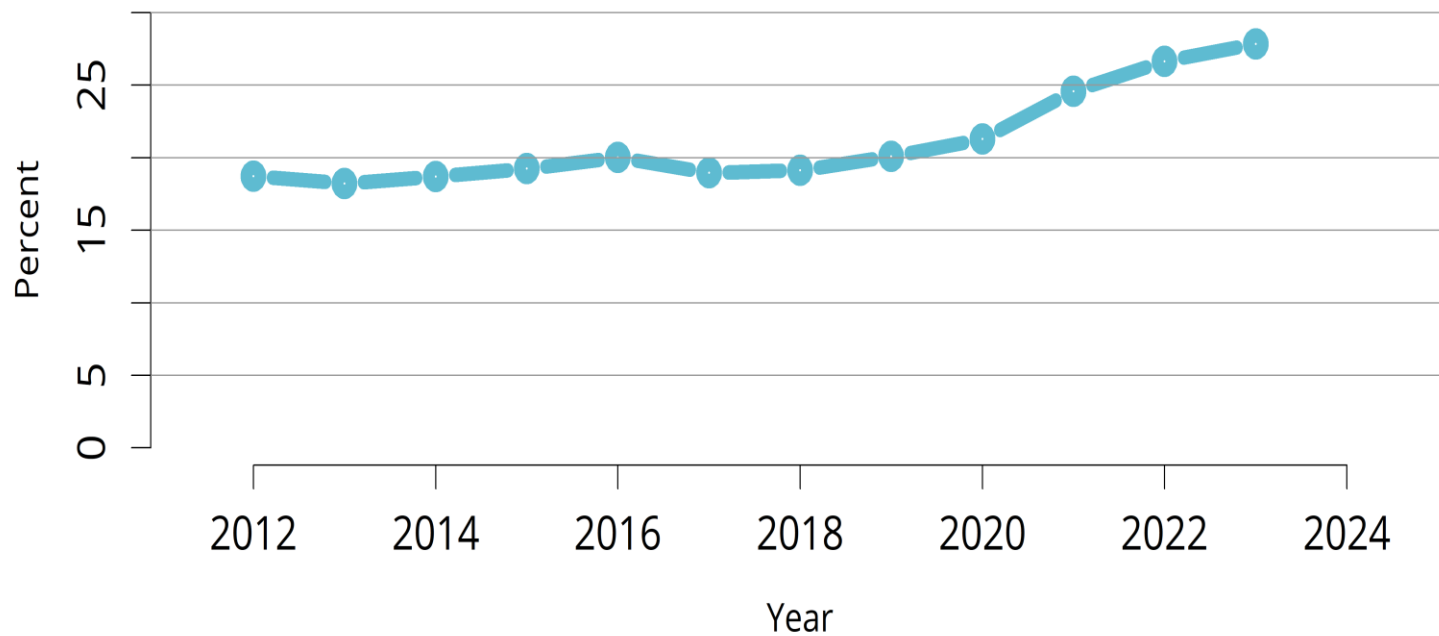


Table I-1. Change in Number of Transplanted Organs, 2007-2008

Transplanted Organs	2007	2008	Percent Change
Total	27,586	27,281	-1.1%
Deceased donor	21,279	21,065	-1.0%
Living donor	6,307	6,216	-1.4%
Kidney	16,120	16,067	-0.3%
Deceased donor	10,082	10,101	0.2%
Living donor	6,038	5,966	-1.2%
Pancreas	1,215	1,161	-4.4%
PTA	108	122	13.0%
PAK	259	214	-17.4%
Kidney-pancreas	848	825	-2.7%
Liver	5,890	5,817	-1.2%
Deceased donor	5,629	5,568	-1.1%
Living donor	261	249	-4.6%
Intestine (deceased donor)	57	69	21.1%
Heart (deceased donor)	2,143	2,085	-2.7%
Lung	1,461	1,473	0.8%
Deceased donor	1,458	1,473	1.0%
Living donor	3	-	n/a
Heart-lung	31	26	-16.1%

Table I-2. Change in Number of Recovered Organs, 2007-2008

Recovered Organs	2007	2008	Percent Change
Total	28405	27958	-1.57%
Kidney	14381	14274	-0.74%
Pancreas-all	1,932	1,830	-5.28%
Liver	7,025	6,832	-2.75%
Intestine	205	197	-3.90%
Heart	2,287	2,226	-2.67%
Lung	2,575	2,599	0.93%

Table I-4. Unadjusted 1- and 5-Year Patient Survival by Organ

Organ Transplanted	1-Year Survival (Txp 2006-2007)	5-Year Survival (Txp 2002-2007)
Kidney		
Deceased donor	95.6%	81.9%
Living donor	98.5%	91.0%
Pancreas alone	97.8%	88.7%
Pancreas after kidney	97.0%	84.5%
Kidney-pancreas	95.7%	87.2%
Liver		
Deceased donor	88.4%	73.8%
Living donor	91.0%	79.0%
Intestine	89.3%	57.9%
Heart	88.3%	74.9%
Lung	83.3%	54.4%
Heart-lung	80.6%	44.9%
Kidney-liver	87.4%	71.4%
Kidney-heart	95.8%	77.6%
Liver-intestine	63.3%	58.0%

Table I-5. Unadjusted 1- and 5-Year Graft Survival by Organ

Organ Transplanted	1-Year Survival (Txp 2006-2007)	5-Year Survival (Txp 2002-2007)
Kidney		
Deceased donor	91.0%	69.3%
Living donor	96.3%	81.4%
Pancreas alone	75.5%	51.5%
Pancreas after kidney	80.0%	53.4%
Kidney-pancreas (kidney)	92.5%	78.6%
Kidney-pancreas (pancreas)	84.8%	73.4%
Liver		
Deceased donor	84.3%	68.4%
Living donor	86.0%	72.9%
Intestine	78.9%	39.6%
Heart	87.9%	73.7%
Lung	81.6%	51.5%
Heart-lung	80.5%	43.1%
Kidney-liver (kidney)	83.0%	64.4%
Kidney-liver (liver)	83.7%	66.0%
Kidney-heart (heart)	92.6%	76.0%
Kidney-heart (kidney)	88.2%	72.0%
Liver-intestine (intestine)	58.7%	53.0%
Liver-intestine (liver)	58.7%	53.4%

Types of donors

- ECD
- Live related vs unrelated

Figure KI 107: BMI among living kidney donors

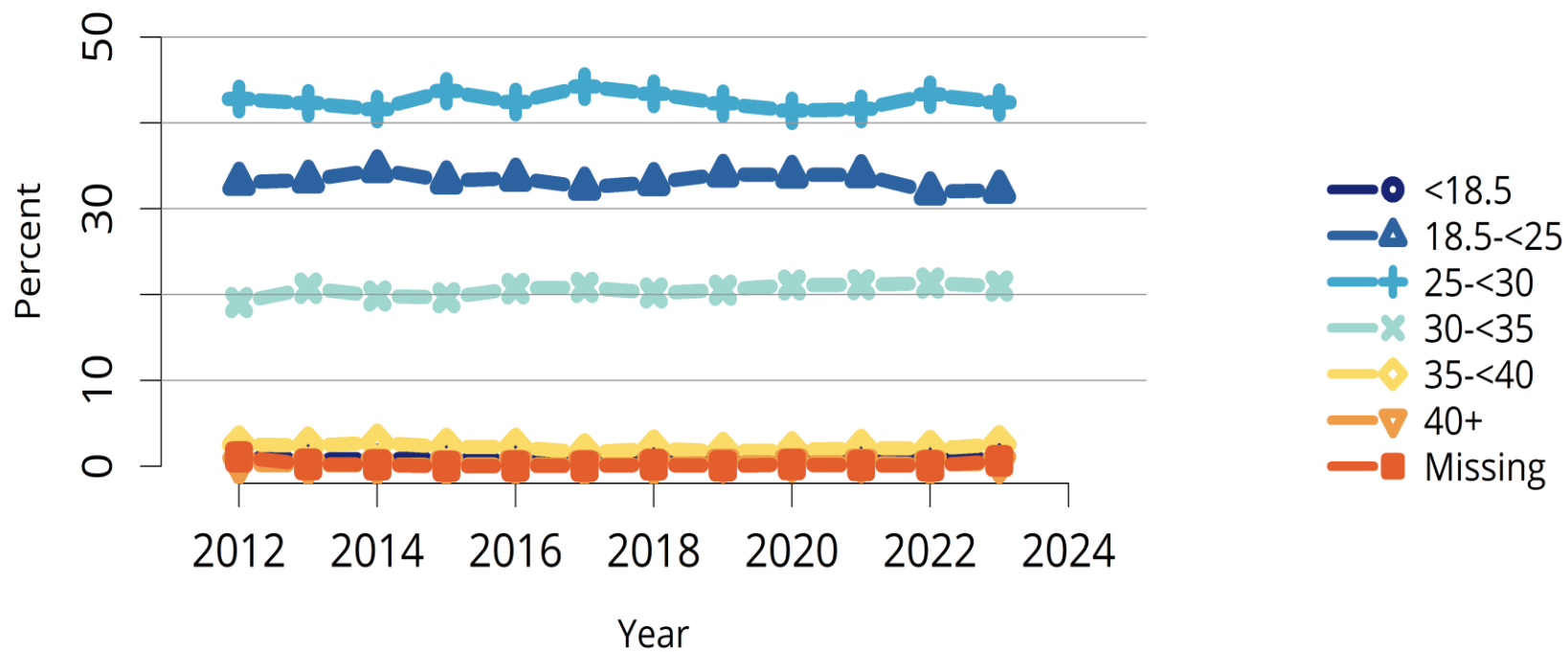


Figure KI 52: Delayed graft function among adult kidney transplant recipients

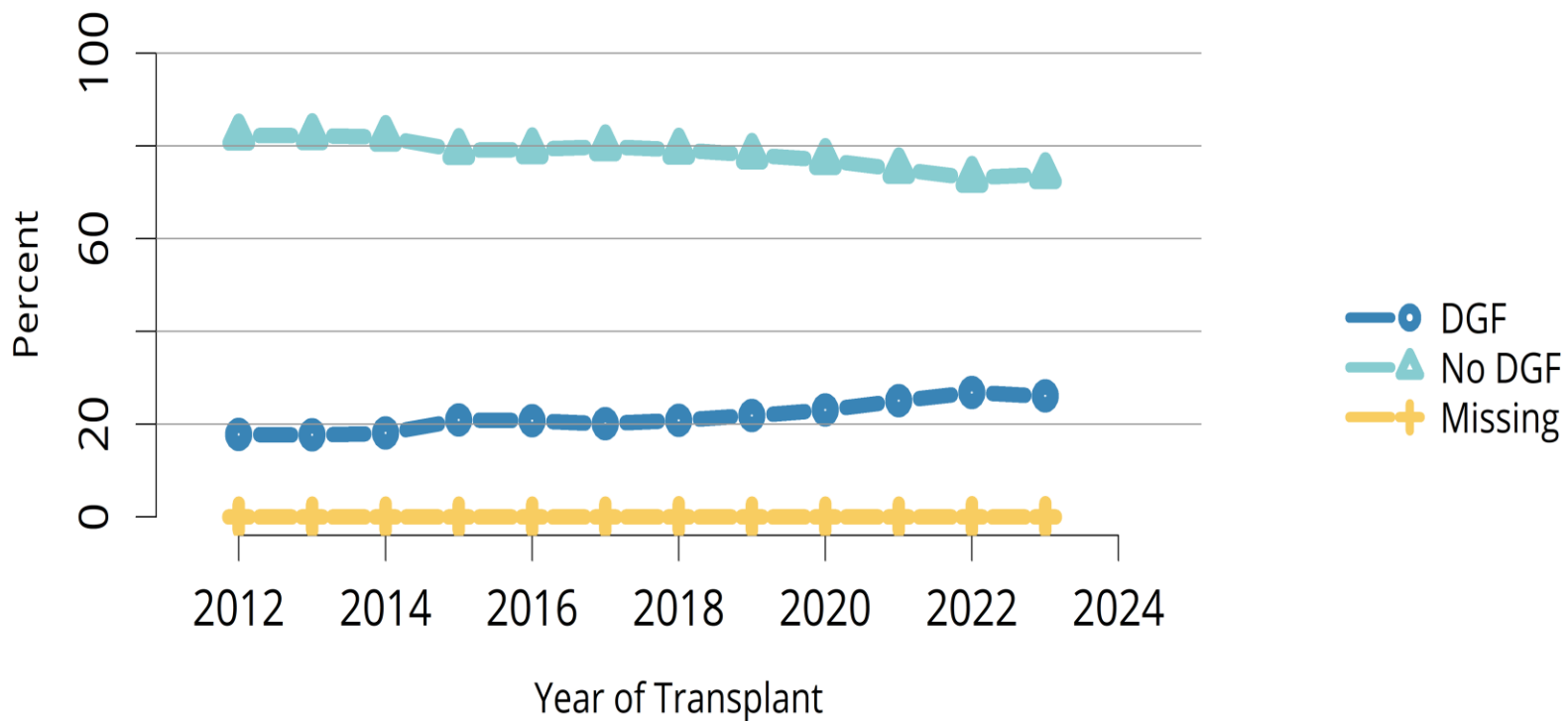
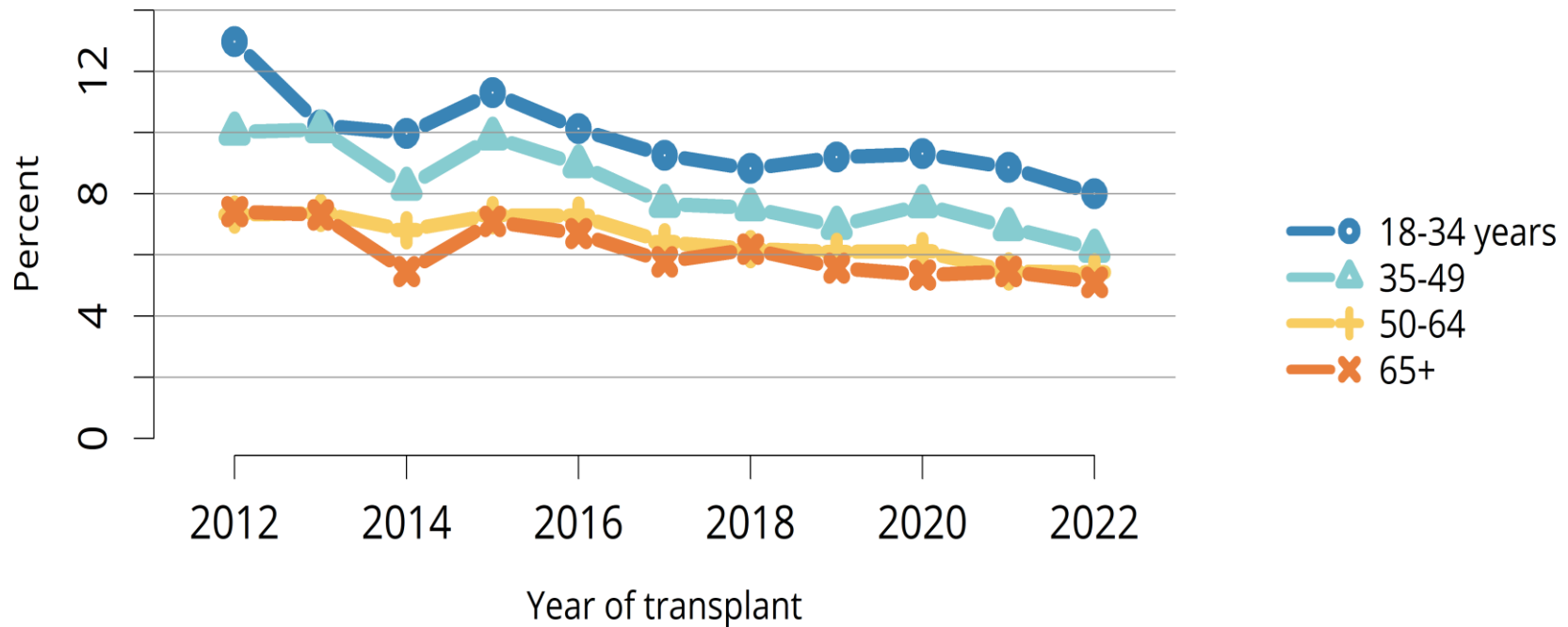


Figure KI 67: Incidence of acute rejection by 1 year posttransplant among adult kidney transplant recipients by age



Complications

- Early VS Late
- Infections
- Tumors
- Early surgery related
- *Side effects of transplant medicines*

Contraindications

- Pt unable to undergo surgery
- Pt compliance issues
- Active infection
- Morbid Obesity
- Smoking
- HIV issue

HIV issue

- Original Article
- **Outcomes of Kidney Transplantation in HIV-Infected Recipients**
- [NEJM: November 18, 2010](#)

Preemptive renal transplant

- Pt can get listed for GFR less than 20
- Some pts can Renal transplant before they go on Dialysis, if suitable family member is available

Preemptive **Kidney transplant**

- Recent Yakima Pt got coverage in local /Seattle papers(our clinic Pt)
- <http://www.yakimaherald.com/news/latestlocalnews/1686770-8/kidney-transplant-helps-mother-daughter-strengthen-their-bond>
- Her surgery was the UW's 6,000th successful transplant since the program began in the late 1960s.
- 70-year-old grandmother underwent kidney transplant surgery at the University of Washington Medical Center. Her daughter, was the donor

Vaccines for Renal Tx recipients: safety

- Inactive vs Live
- Inactive is ok, eg Flu shot, Pneumovax
- Live is avoided/contraindicated, eg Flu mist, Varicella, Shingles, MMR, Yellow fever

Kidney-Pancreas transplant or KP in short

- *Indications:*
- *A pt with DM type 1 from the age of 8*
- *Starts Dialysis at the age of 30*
- *Undergoes KP transplant: now no insulin needed or Dialysis: modern medicine miracle*

Peds Tx data

Figure KI 109: All pediatric candidates on the kidney transplant waiting list

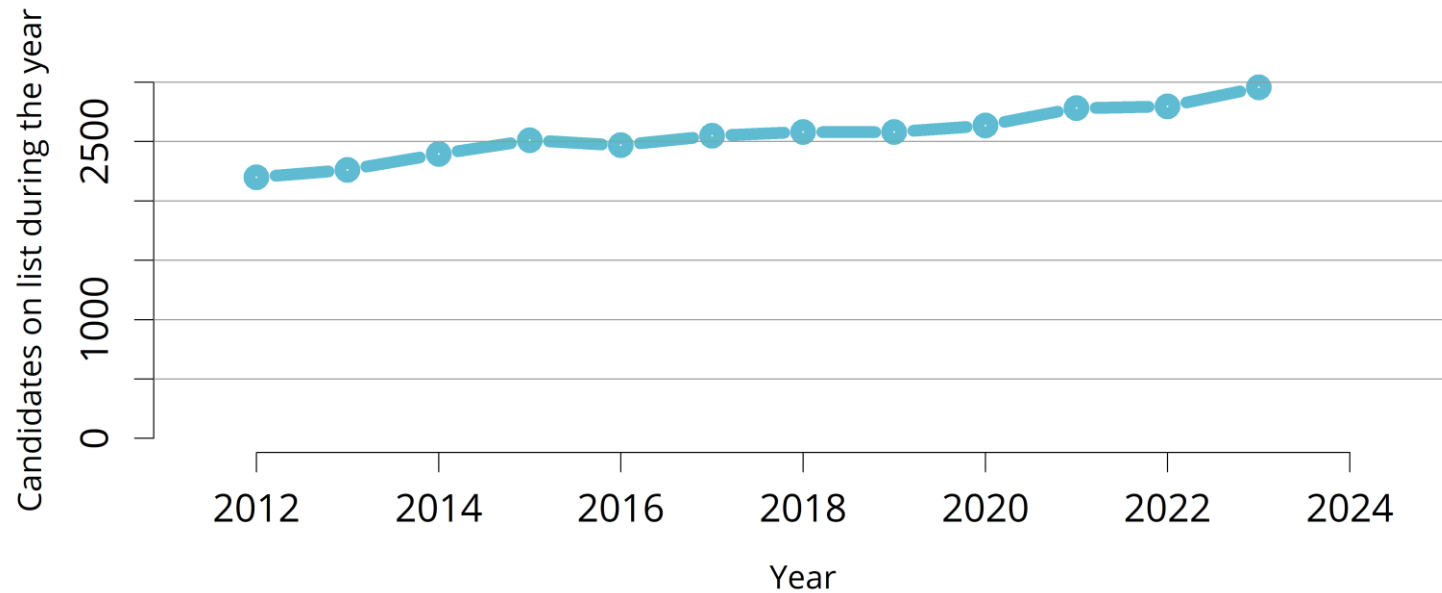


Figure KI 110: Distribution of pediatric candidates waiting for kidney transplant by age

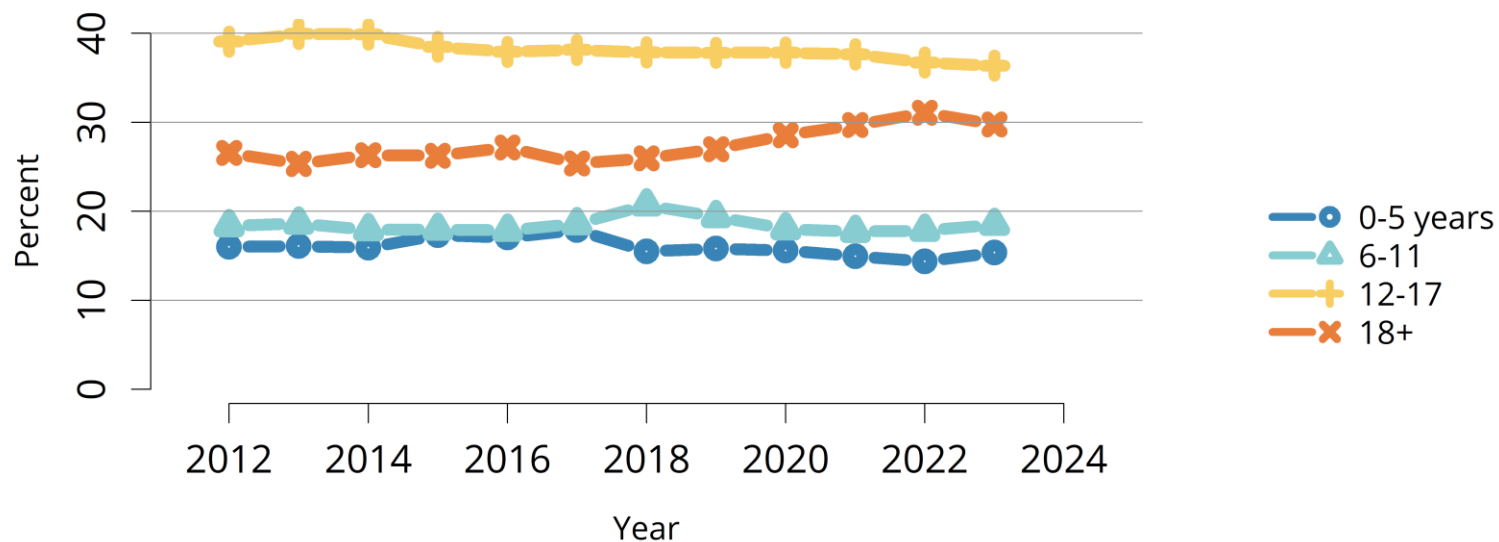


Figure KI 112: Distribution of pediatric candidates waiting for kidney transplant by diagnosis

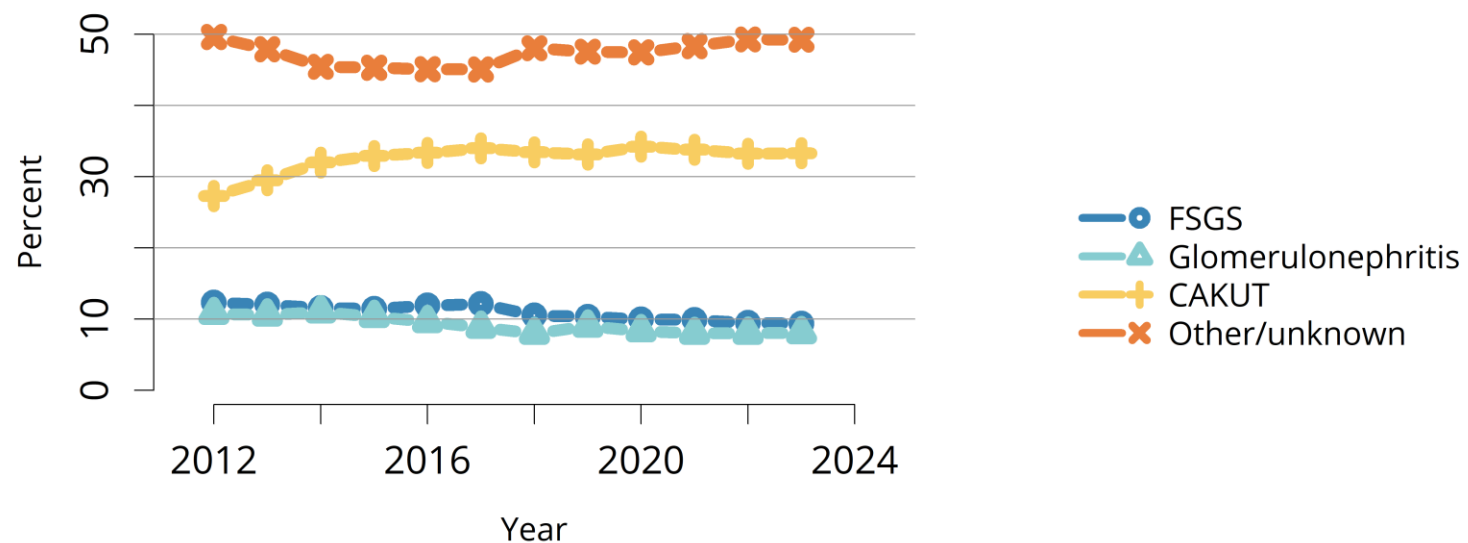


Figure KI 114: Distribution of pediatric candidates waiting for kidney transplant by waiting time

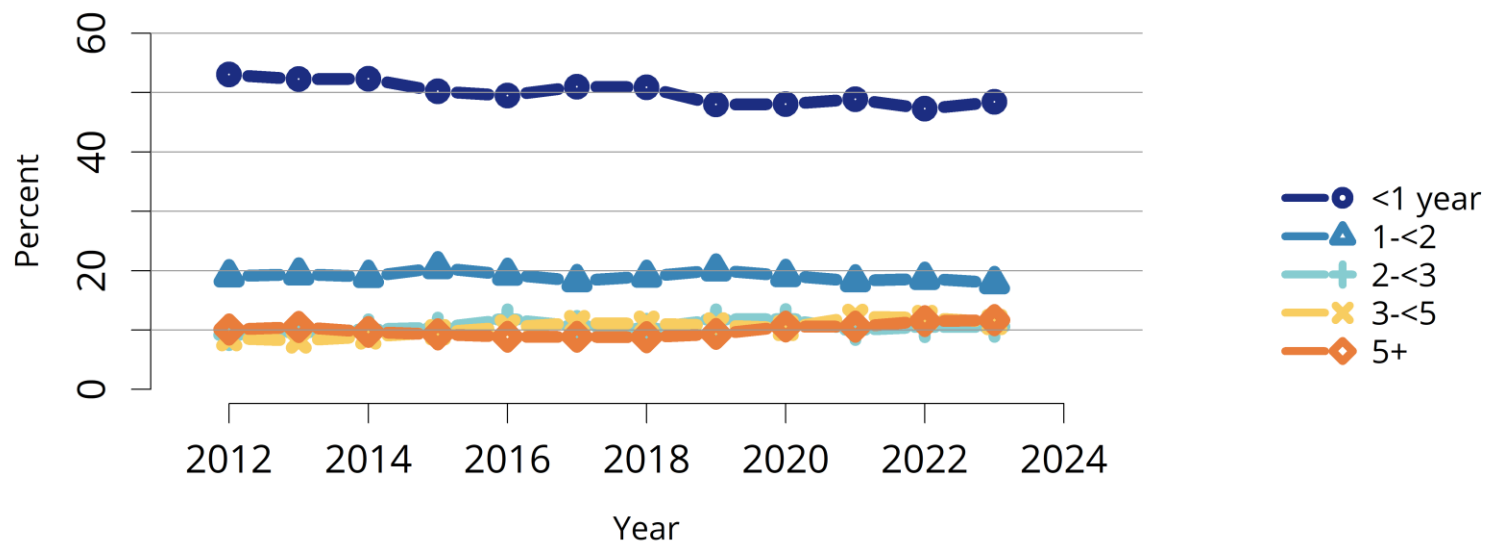


Figure KI 129: Overall pediatric kidney transplants

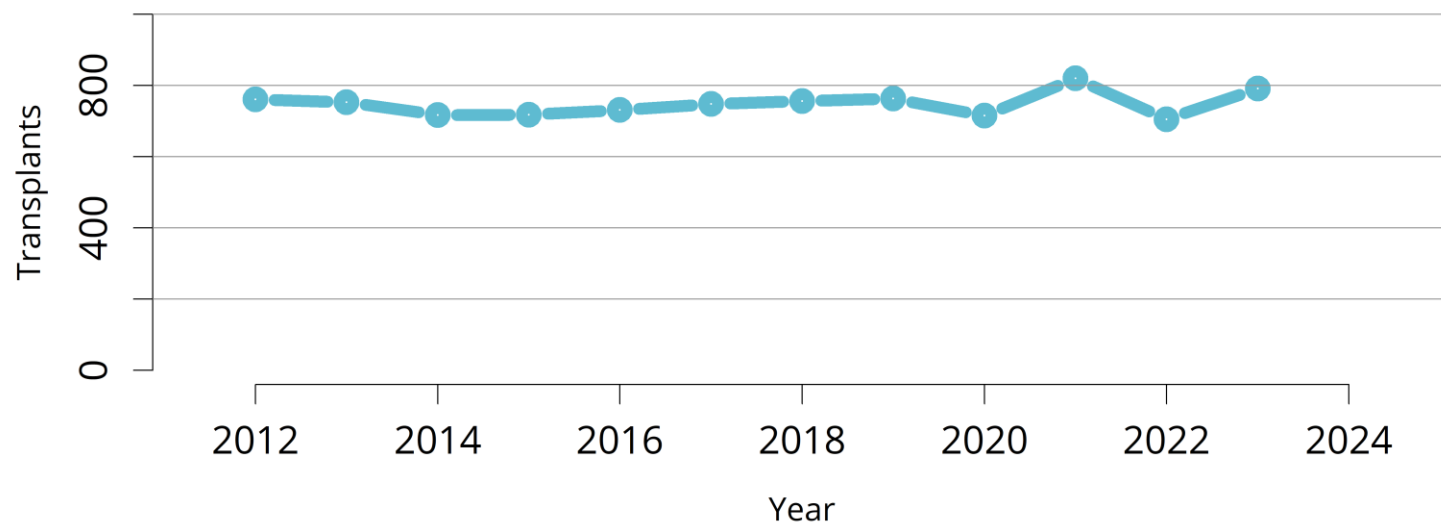
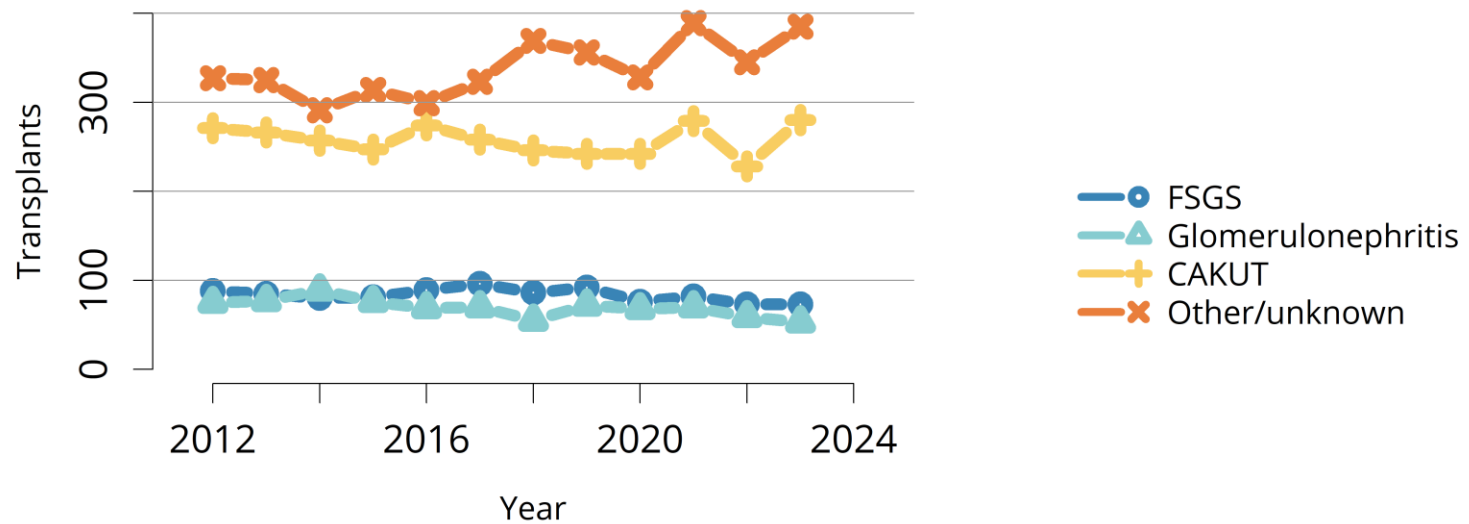


Figure KI 132: Pediatric kidney transplants by diagnosis



- **Figure KI 132: Pediatric kidney transplants by diagnosis.** All pediatric kidney transplant recipients, including retransplant, and multiorgan recipients. Diagnosis categories follow North American Pediatric Renal Trials and Collaborative Studies recommendations. Active and inactive candidates are included. CAKUT, congenital anomalies of the kidney and urinary tract; FSGS, focal segmental glomerulosclerosis.

Porcine Kidney Tx

- **BRIEF REPORT**
- **Xenotransplantation of a Porcine Kidney for End-Stage Kidney Disease**
- **Published February 7, 2025**
- **N Engl J Med 2025;392:1933-1940**

- Xenotransplantation offers a potential solution to the organ shortage crisis.
- A 62-year-old hemodialysis-dependent man with long-standing diabetes, advanced vasculopathy, and marked dialysis-access challenges received a gene-edited porcine kidney with 69 genomic edits, including deletion of three glycan antigens, inactivation of porcine endogenous retroviruses, and insertion of seven human transgenes.
- The xenograft functioned immediately. The patient's creatinine levels decreased promptly and progressively, and dialysis was no longer needed

- After a T-cell–mediated rejection episode on day 8, intensified immunosuppression reversed rejection. Despite sustained kidney function, the patient died from unexpected, sudden cardiac causes on day 52; autopsy revealed severe coronary artery disease and ventricular scarring without evident xenograft rejection. (Funded by Massachusetts General Hospital and eGenesis.)

Pig Kidney Transplant?

Kidney360 6: 150–151, January, 2025

- Would You Consider *Accepting a Pig Kidney Transplant?*
- Recent Breakthroughs in Organ Transplantation: A Historic Milestone, **The First Successful Transplant On March 21, 2024**, a remarkable achievement marked a turning point in medical history.
- The world's first successful transplant of a genetically edited pig kidney was performed on a 62-year-old man suffering from end stage kidney disease by an innovative team at Harvard

- **Proven Functionality and Promising Trials:** Before this monumental event, researchers at **New York University's** Langone Health proved that a genetically engineered pig kidney functioned exceptionally well for 32 days in a brain-dead human recipient. This success paves the way for further exploration into the viability of pig kidneys as a life-saving solution for those in dire need.

- Safety Concerns :
- Genetic Modification Pigs are often changed genetically to reduce the risk of organ rejection and improve compatibility with human recipients, thereby addressing immune response concerns.
- Regulatory Oversight: A thorough regulatory framework is essential to ensure the safety and efficacy of xenotransplantation practices

- Infectious Disease Risks
- Long-Term Outcomes
- Ethical and Psychological Factors

- This landmark procedure highlights human ingenuity and ignites hope for countless individuals waiting for organ transplants.
- The future of organ transplantation is bright, and we must embrace this opportunity



RESEARCH, INNOVATION, PRESS RELEASES

FEBRUARY 25, 2025

Pig Kidney Recipient Returns Home After Transplant Breakthrough at NYU Langone Health



Towana Looney, wearing black and in the center, cheers with the care team at NYU Langone. Her “recovery from a long history of kidney failure and dialysis treatment has been nothing short of remarkable,” said Dr. Robert Montgomery, who led the procedure.

CREDIT: NYU LANGONE STAFF



Useful reference/review

- Harrison Latest Edition, well covered
- Cecil, Latest Edition, well covered too
- Clinical Practice: *NEJM, Stage IV Chronic Kidney Disease*. Hanna Abboud, M.D., and William L. Henrich, M.D., *Jan 7, 2010*
- *Hemodialysis*, Jonathan Himmelfarb, M.D., and T. Alp Ikizler, M.D. N Engl J Med 2010; 363:1833-1845 *November 4, 2010*
- USRDS, UNOS and SRTR website for latest data
- Slides adapted from various resources

Thanks



Questions