

The New Kidney Allocation System (KAS): The First Six Months

Prepared for
OPTN Kidney Transplantation Committee
September, 2015

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Background

- KAS implemented Dec 4, 2014
- Key goals:
 - Make better use of available kidneys
 - Increase transplant opportunities for difficult-to-match patients (increased equity)
 - Increase fairness by awarding waiting time points based on dialysis start date
 - Have minimal impact on most candidates

Background

- Performance tracked monthly through June (“out of the gate” reports)

<http://optn.transplant.hrsa.gov>

FEATURED REPORTS

[KAS Monitoring Report - June 2015](#)
(PDF - 569 KB)

[KAS Monitoring Report - May 2015](#)
(PDF - 754 KB)

[KAS Monitoring Report - April 2015](#)
(PDF - 748 KB)

[KAS Monitoring Report - March 2015](#)
(PDF - 2.5 MB)

[KAS Monitoring Report - February 2015](#) ▶
(PDF - 422 KB)

[KAS "Out of the Gate" Monitoring Report - January 2015](#) ▶
(PDF - 392 KB)

- Comprehensive, 6-month analysis requested by the kidney committee
 - Pre-KAS period: June 1, 2013 – December 3, 2014 (18 months)
 - Post-KAS period: December 4, 2014 – May 31, 2015 (6 months)

Background

Final Report

OPTN KAS Implementation Subcommittee of the Kidney Transplantation Committee Descriptive Data Request

Six-Month Evaluation of the New, National Kidney Allocation System (KAS)

Prepared for:
KAS Implementation Subcommittee
Committee Meeting
September 24, 2014

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BACKGROUND/PURPOSE2

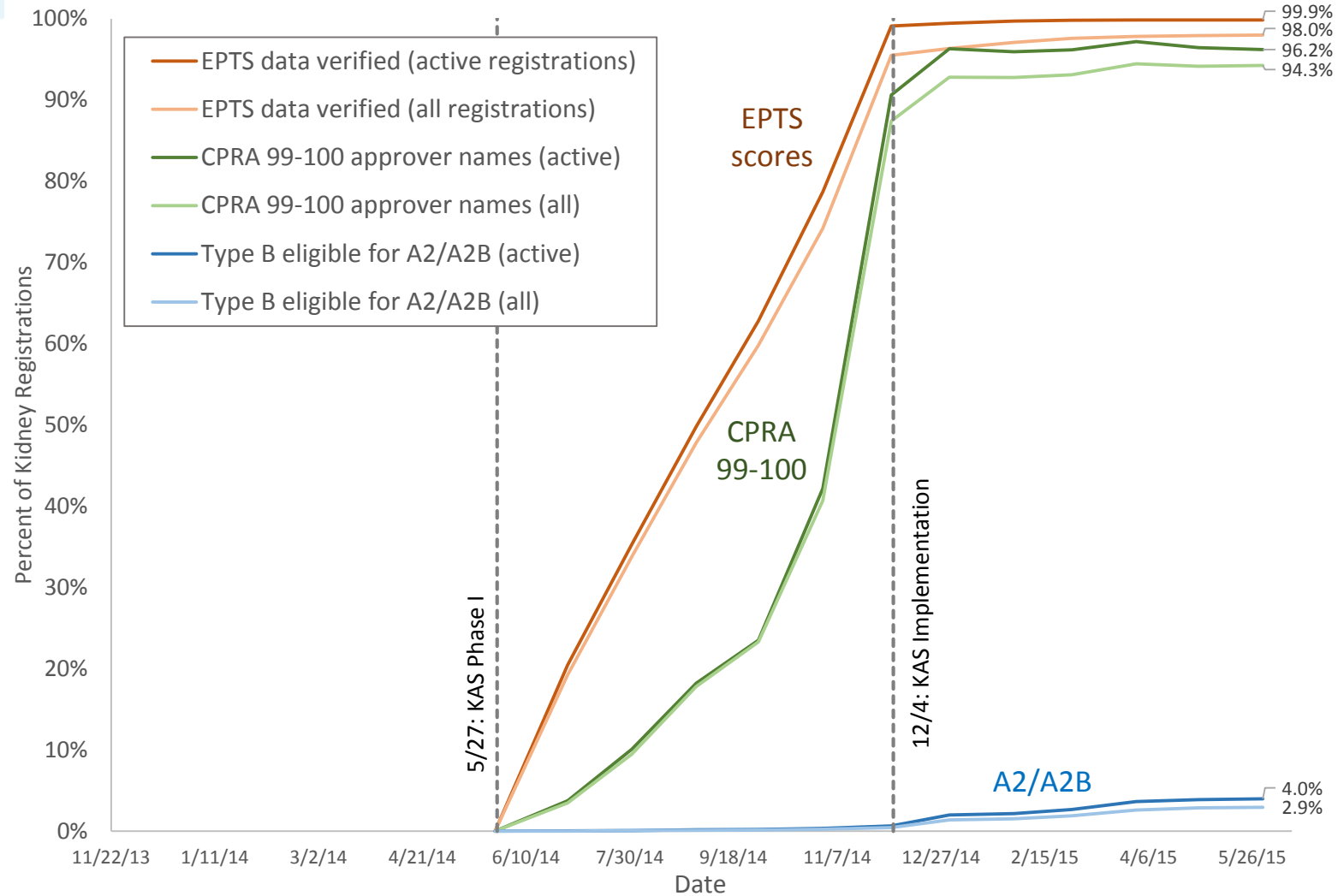
EXECUTIVE SUMMARY2

- Full 6-month report available upon request.



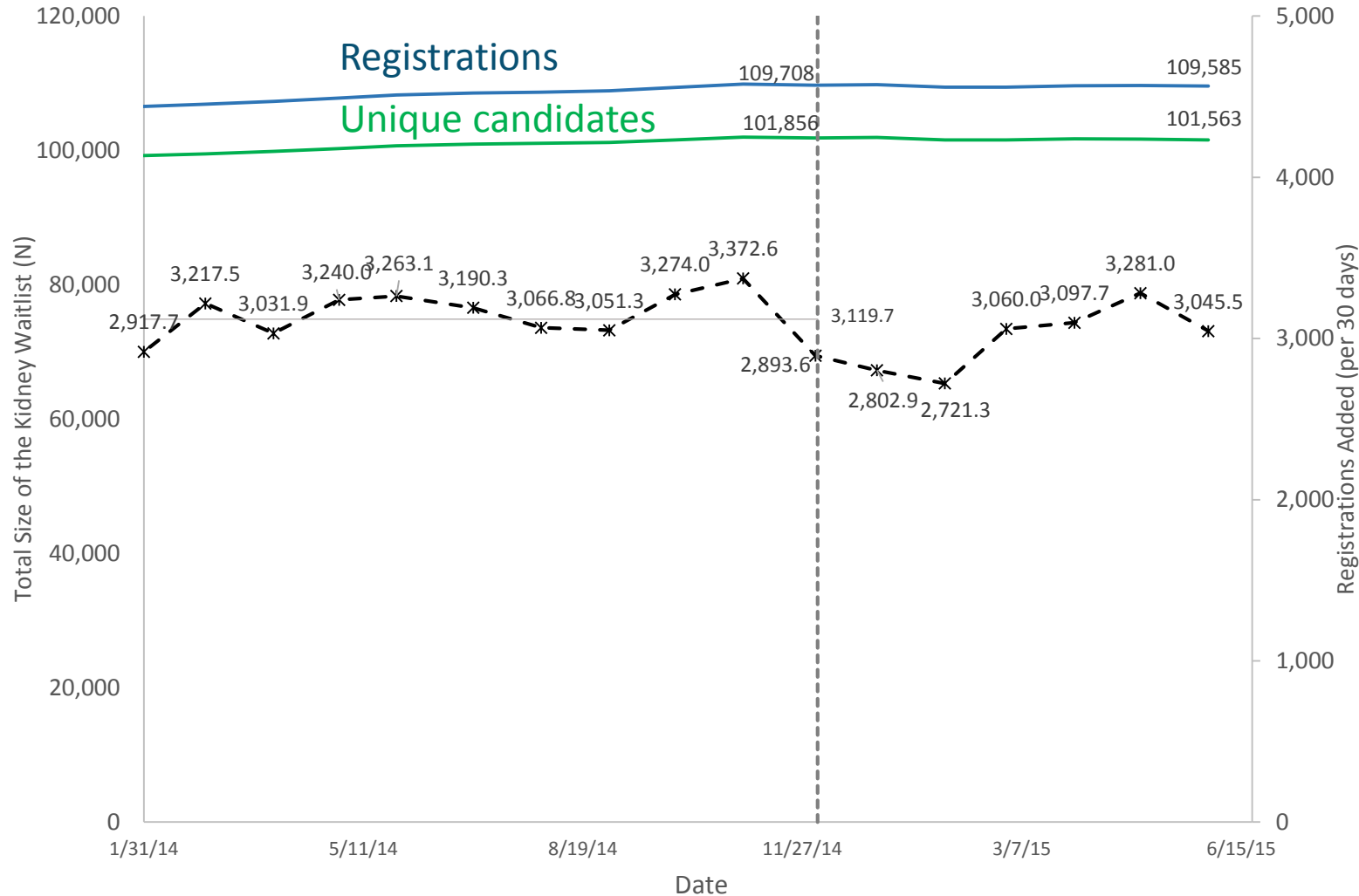
Kidney waiting list trends

Trends in KAS readiness



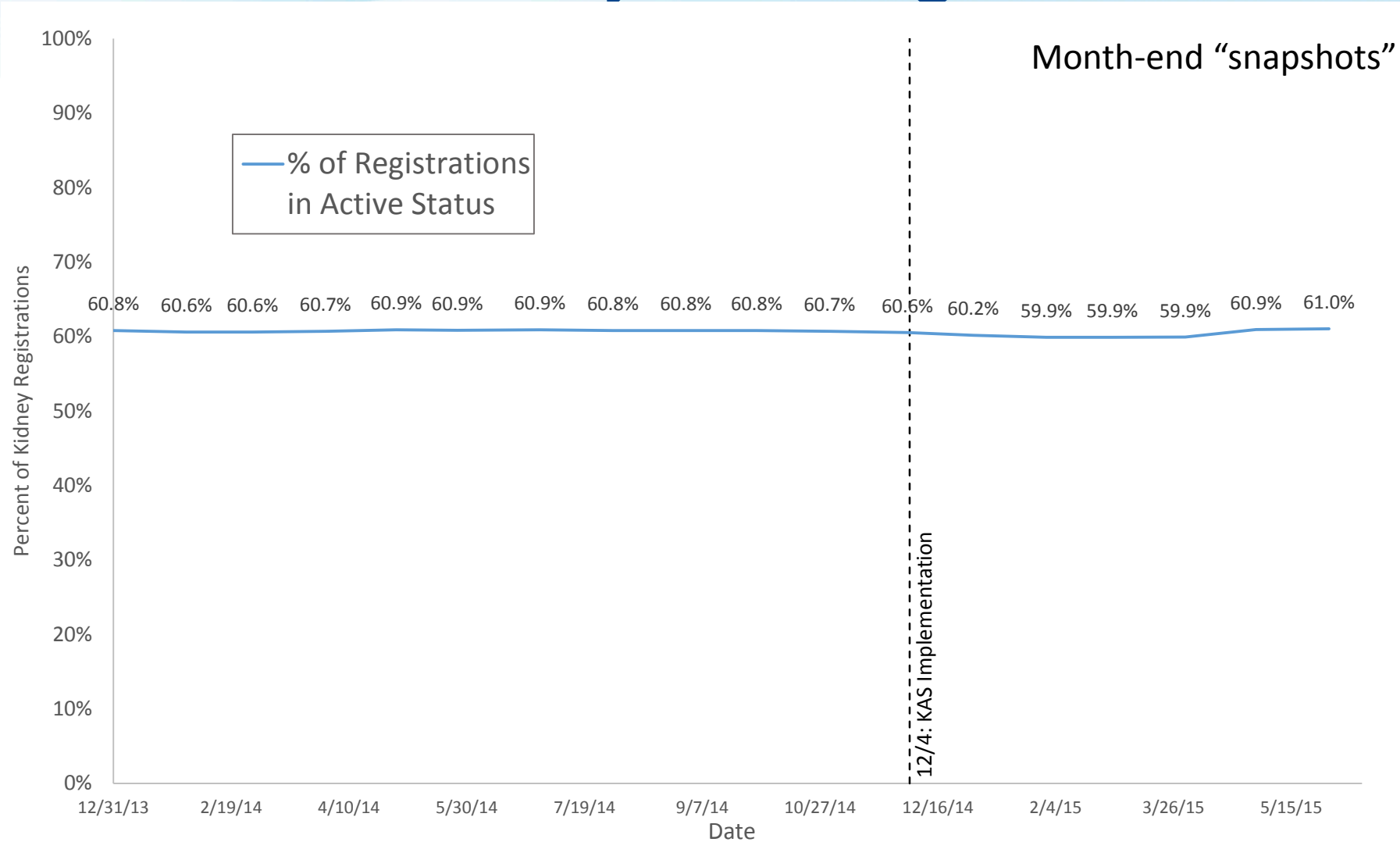
- Prior to KAS implementation, centers had entered data to calculate EPTS scores for nearly all patients and had entered signatures verifying unacceptable antigens for over 90% of CPRA 99-100% patients.

Trends in the kidney waiting list



- The size of the kidney waiting list has plateaued after KAS.
- New registrations decreased by 4.2%.

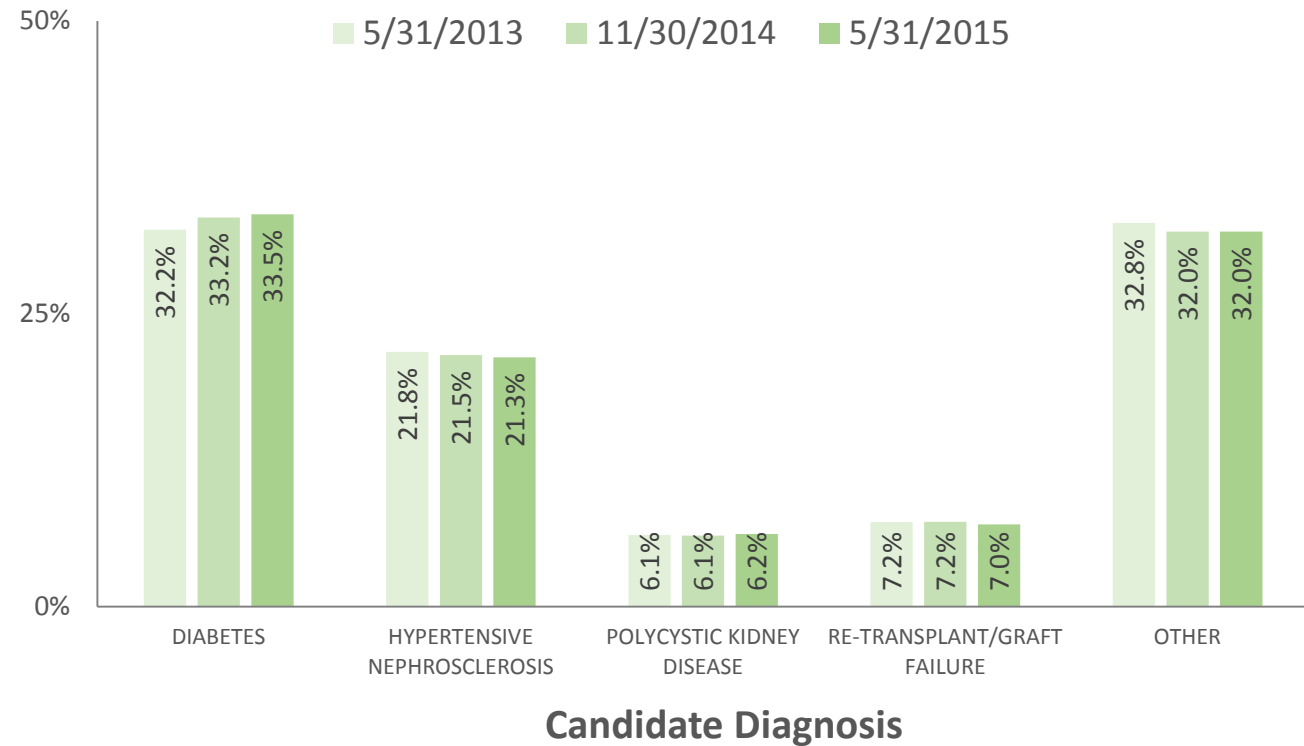
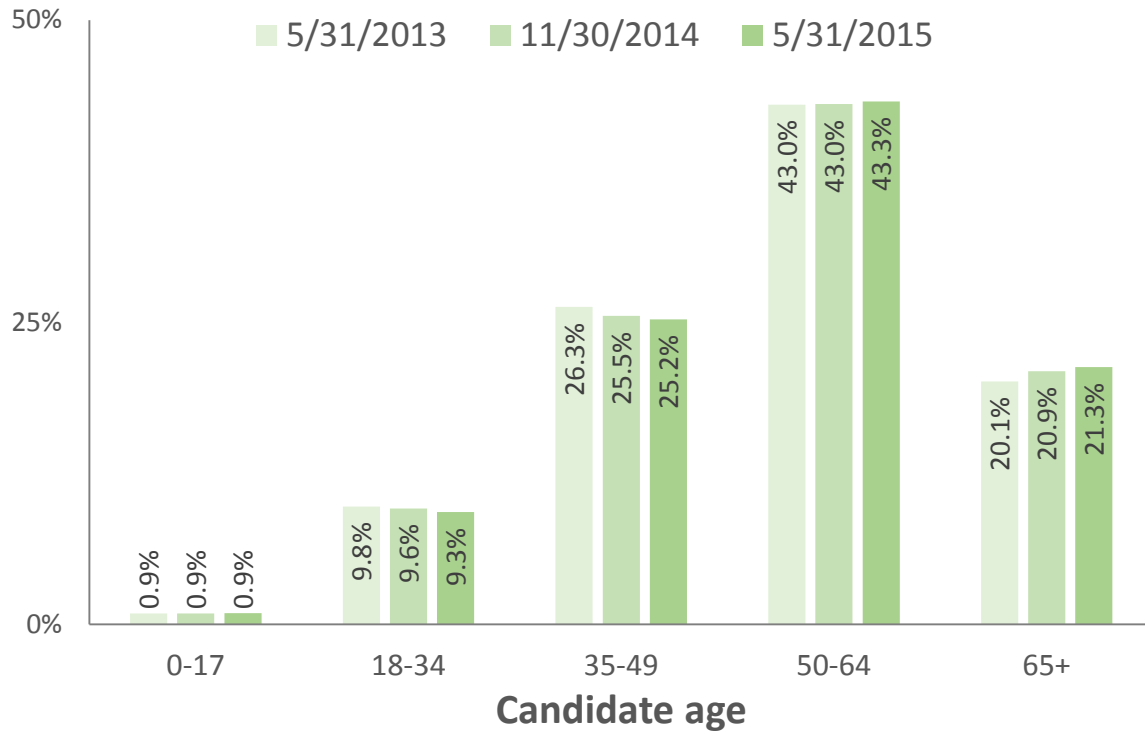
Trends in the kidney waiting list



- The % of registrations on the kidney waiting list in active status has remained relatively constant at about 60%.

Trends in the kidney waiting list

Comparing 3 month-end “snapshots” by candidate age and diagnosis



- The distribution of registrations on the waiting list by candidate age, race/ethnicity, diagnosis, and other factors has changed little.

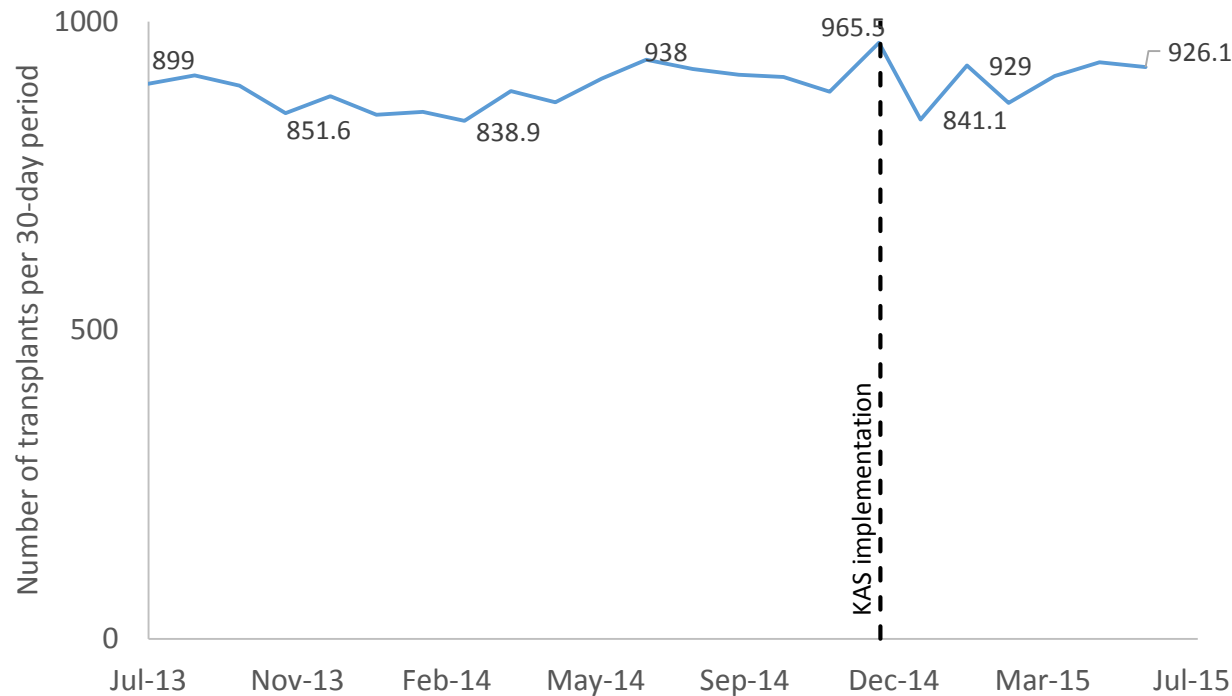


Deceased donor kidney transplants

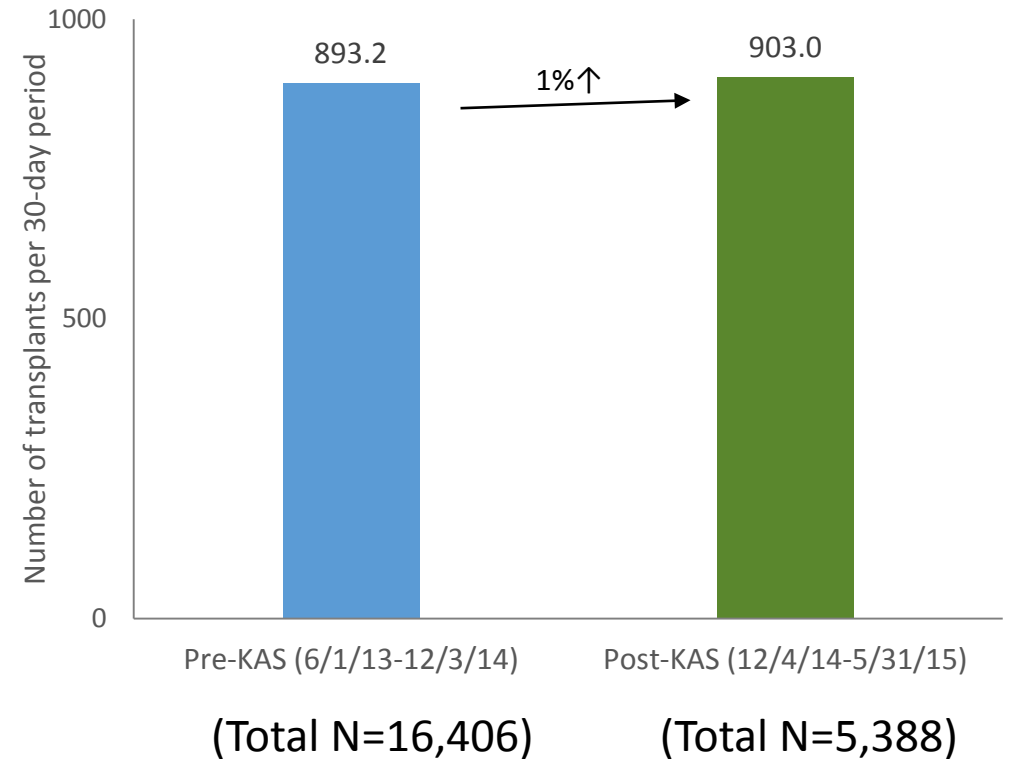
Solitary deceased donor transplants under KAS

Pre vs. post-KAS trends

Over time (per 30 days)



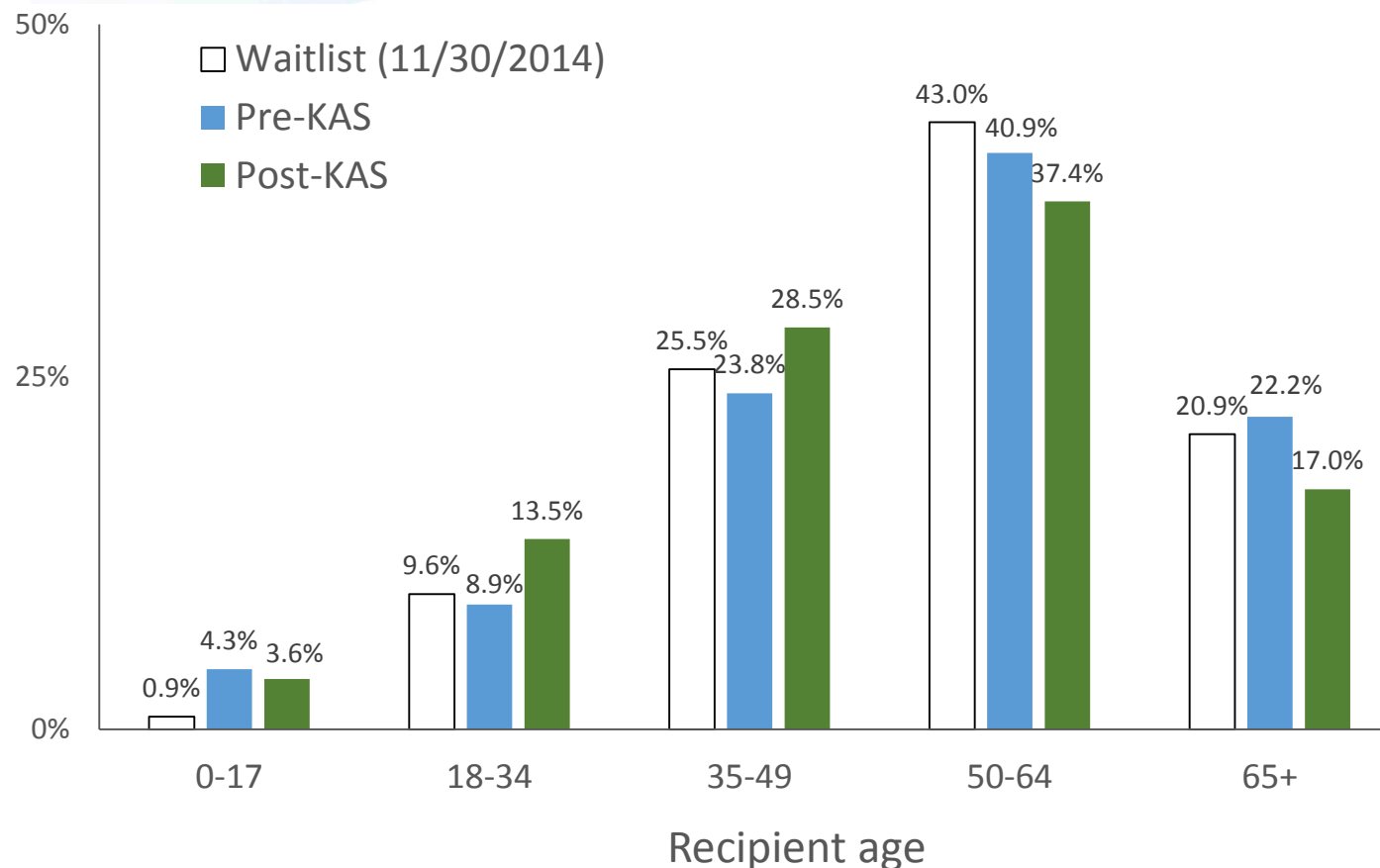
On average



- Transplant volume has increased slightly (about 1%) post-KAS.

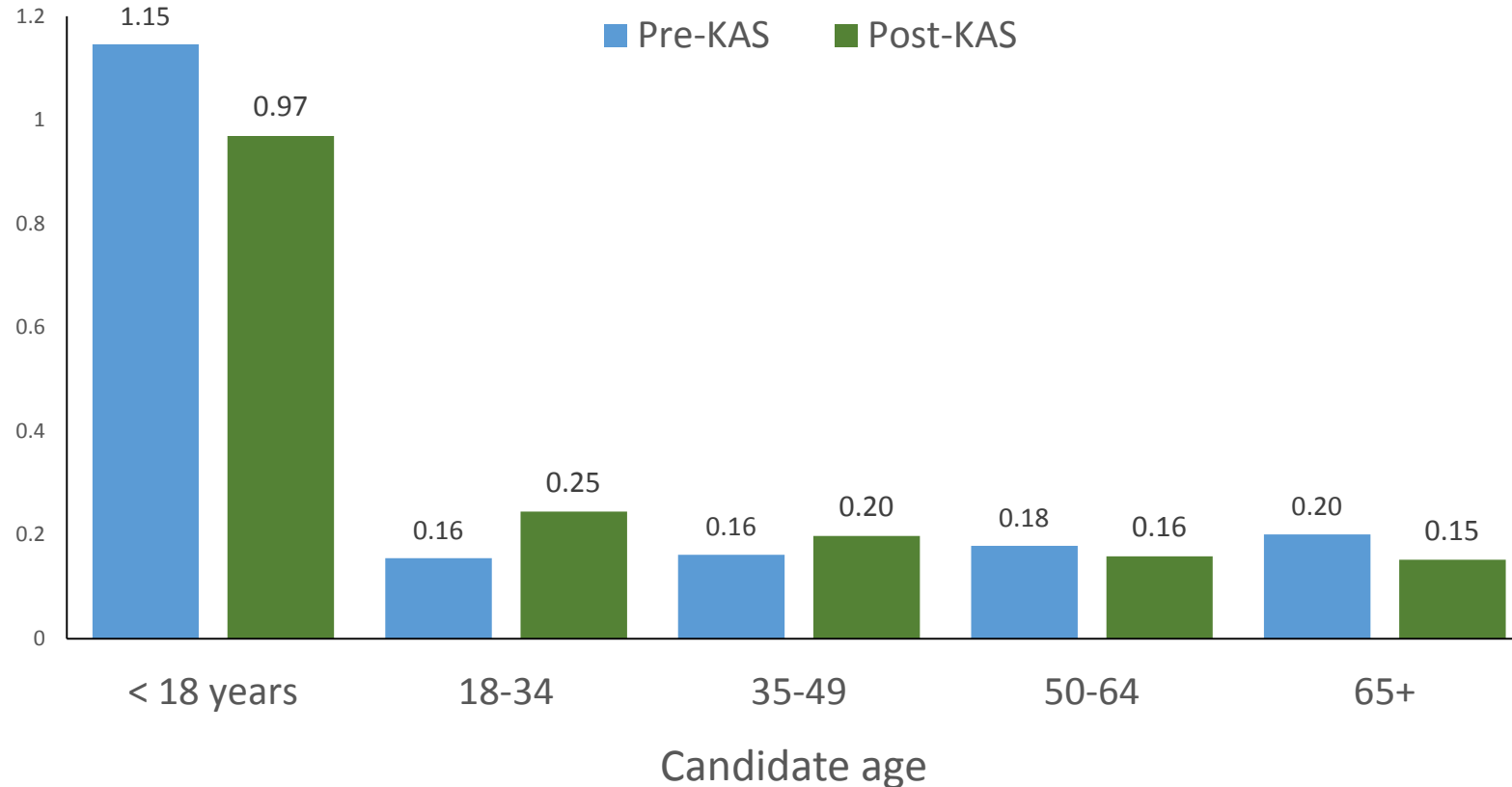
Who's getting transplanted under KAS?

Percentage of Deceased Donor Kidney Transplants by Recipient Age



- More young adults (18-49) are receiving kidney transplants.
- Still, over half of transplants are going to age 50+ recipients under KAS.

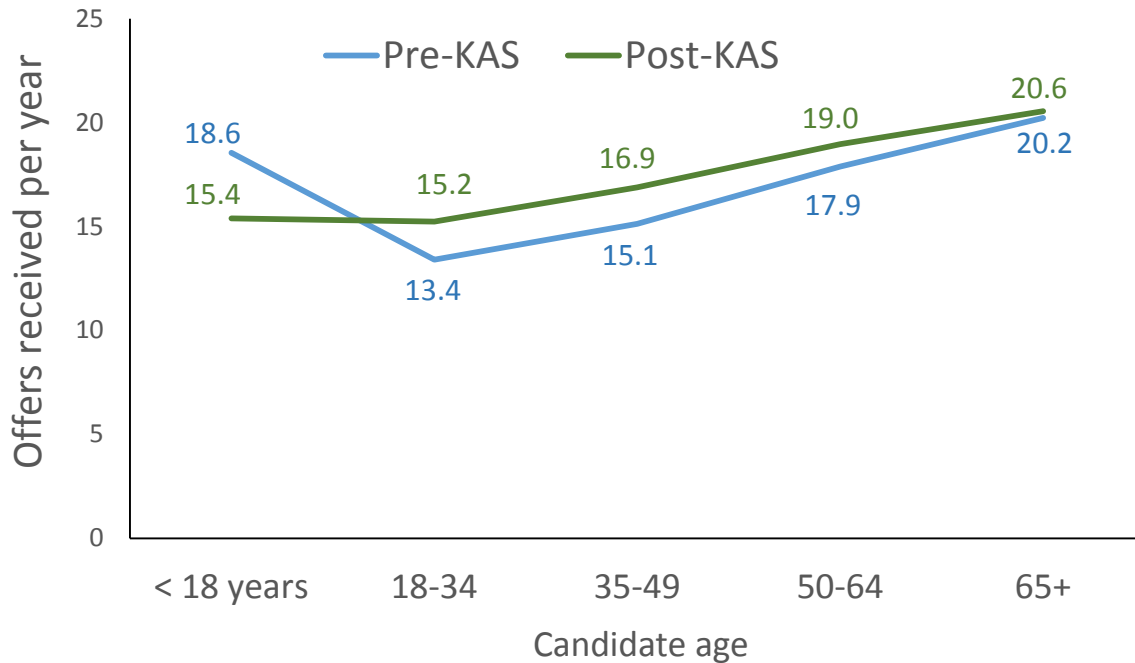
Transplant rates (per active patient-year) by candidate age



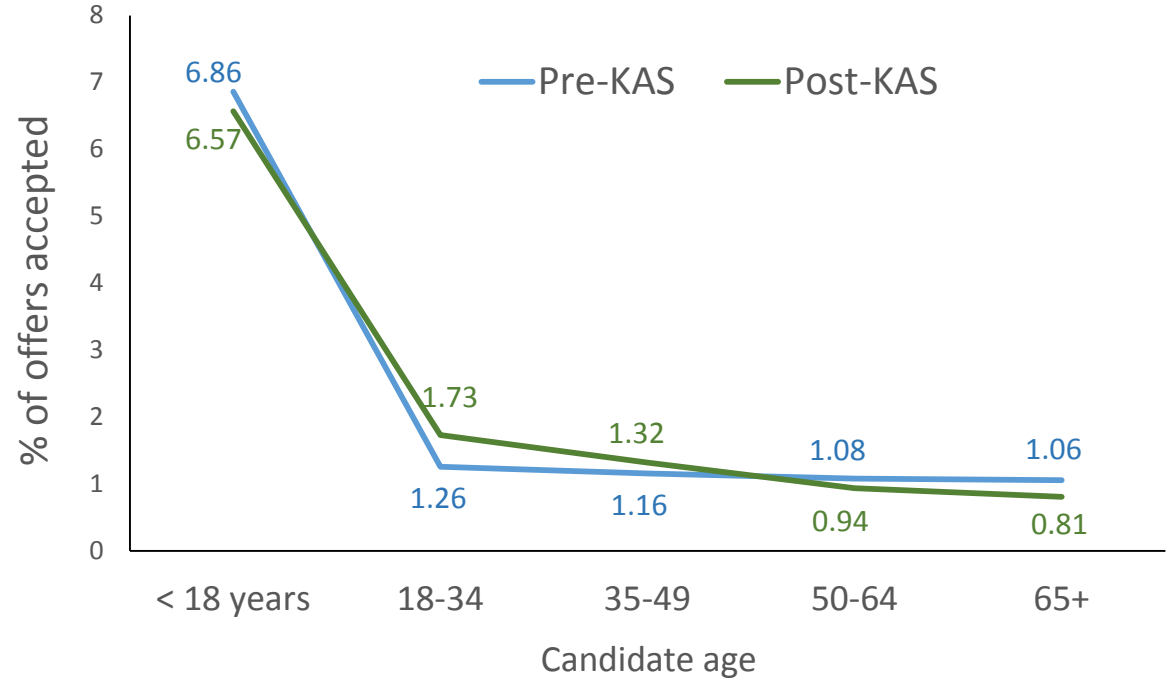
- Pediatric transplant rate fell slightly, but difference is only borderline statistically significant. Rate is still 5 times higher than for adults.
- Transplant rate increase for 18-34 and 35-49, decreased for older patients.

Rates of receiving and accepting offers by candidate age

Offers received



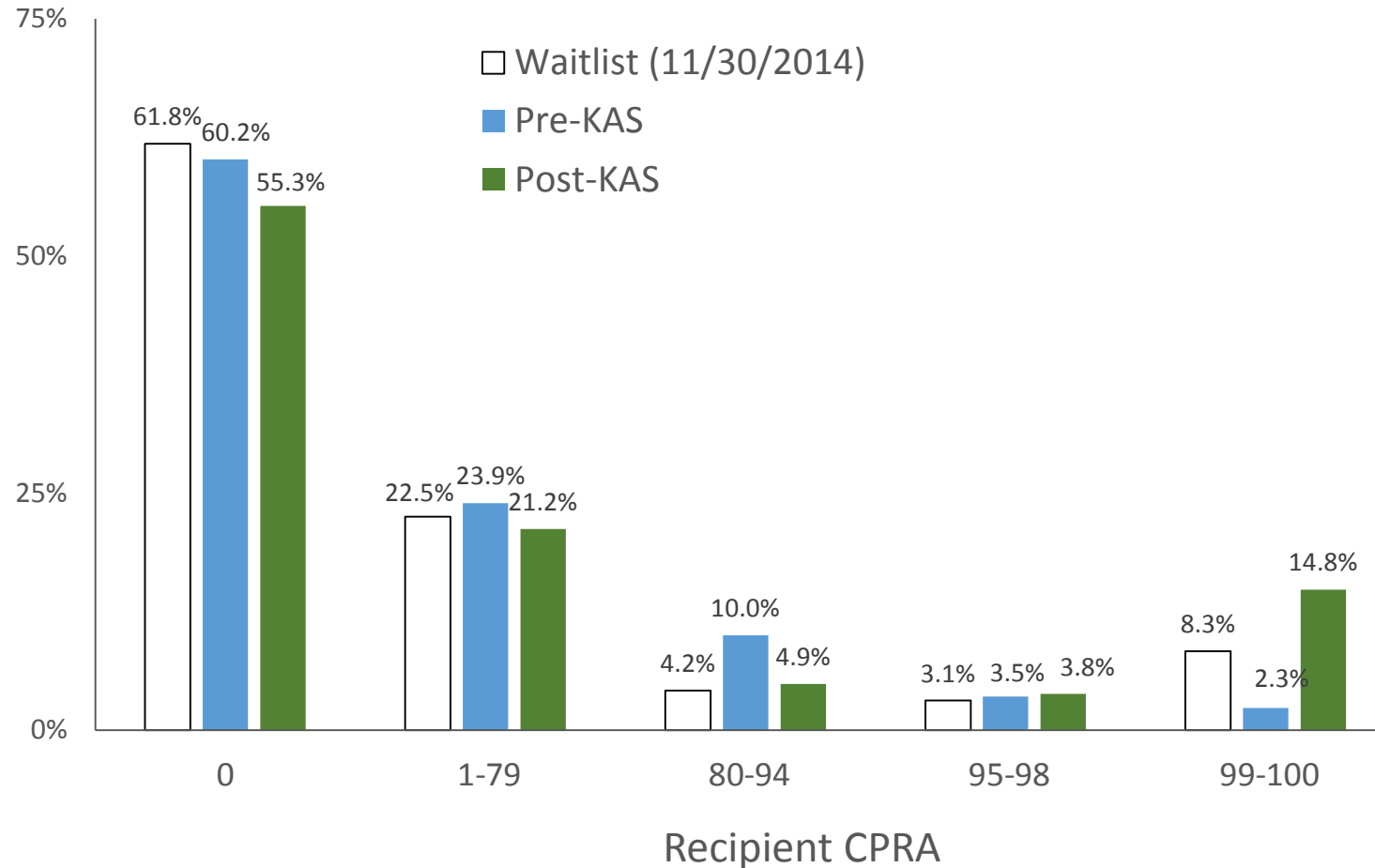
Acceptance rates



- Offer rates dropped post-KAS for pediatrics, but acceptance rates remained relatively high. Donor quality increased for pediatric offers (avg KDPI↓).
- Offer acceptance rates dropped for older patients and increased for younger adults, most likely due to organ quality (KDPI) differences.

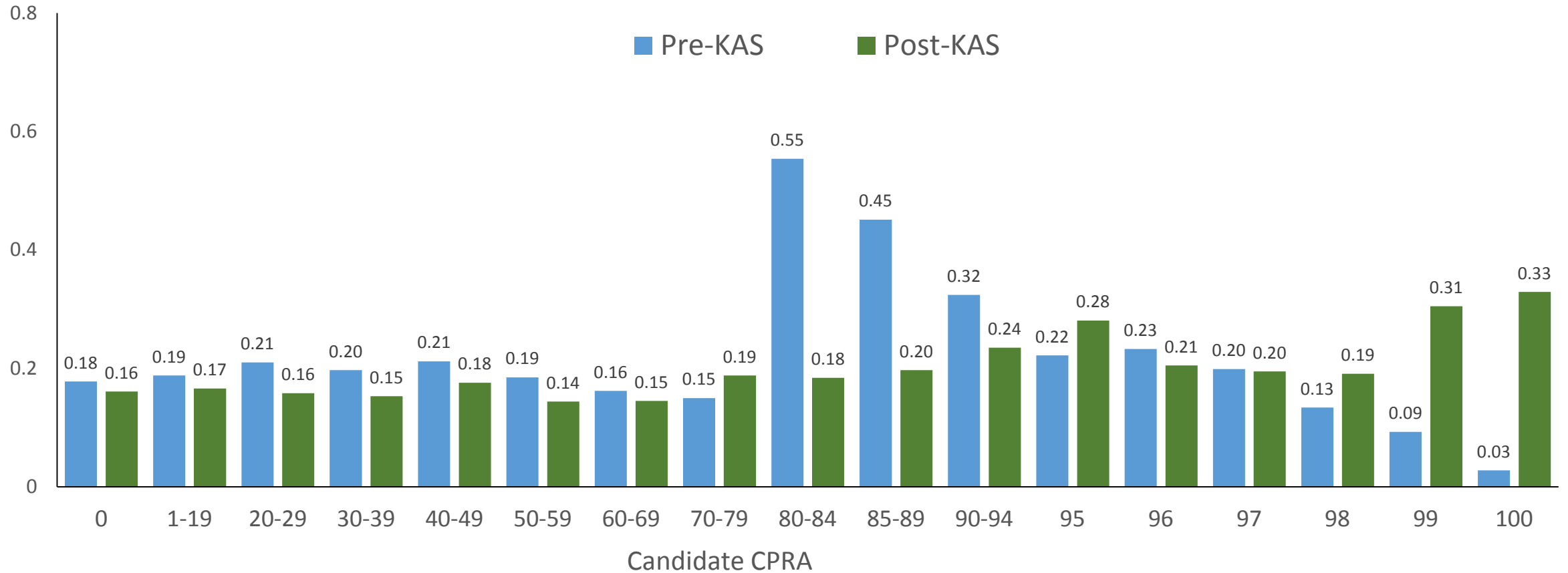
Who's getting transplanted under KAS?

Percentage of Deceased Donor Kidney Transplants by Recipient CPRA



- Transplants have increased sharply for CPRA 99-100% patients.
- Transplants have declined for CPRA=0% and 80-94% patients.

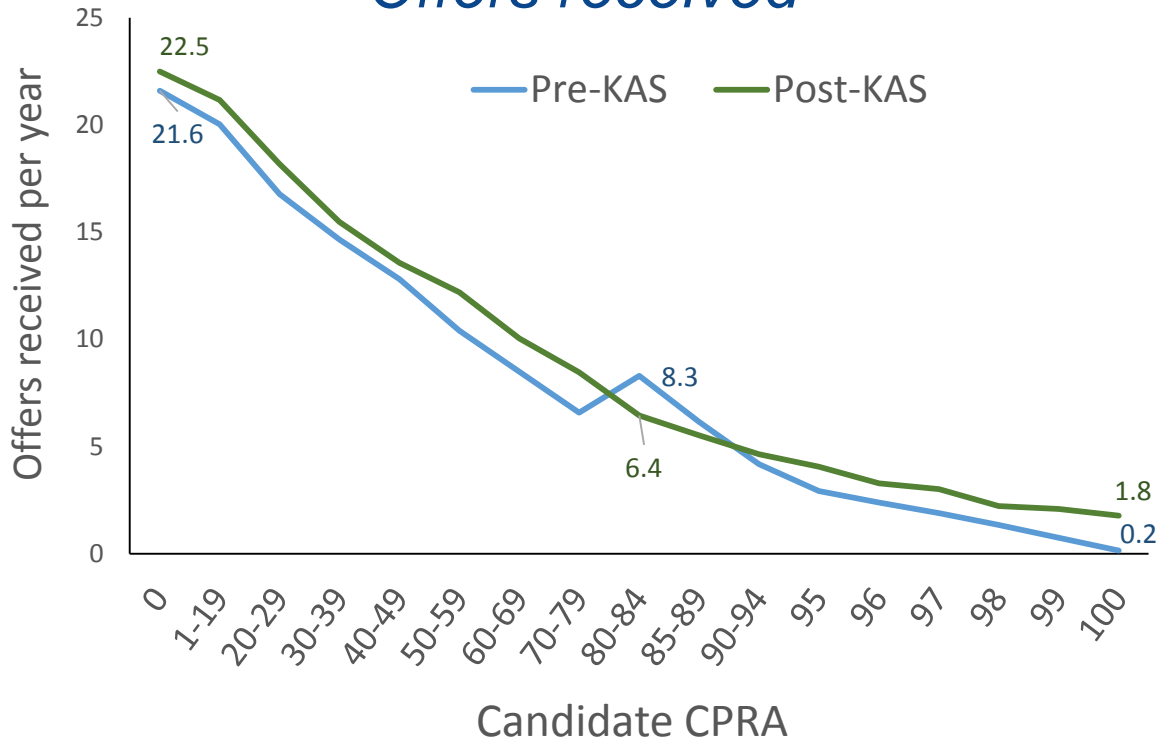
Transplant rates (per active patient-year) by candidate CPRA



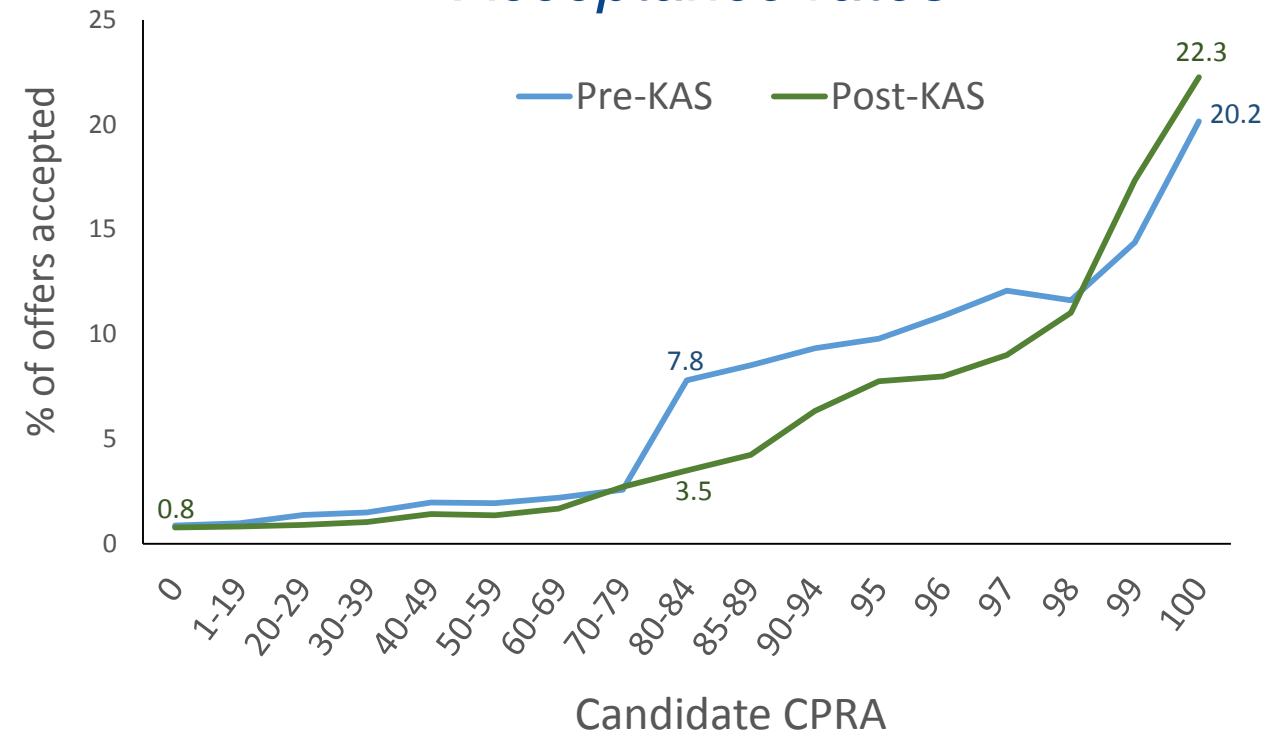
- Transplant rates decreased markedly for CPRA 80-94 candidates.
- Sharp increases for CPRA 99-100 candidates.

Offer & accept. rates by candidate CPRA

Offers received

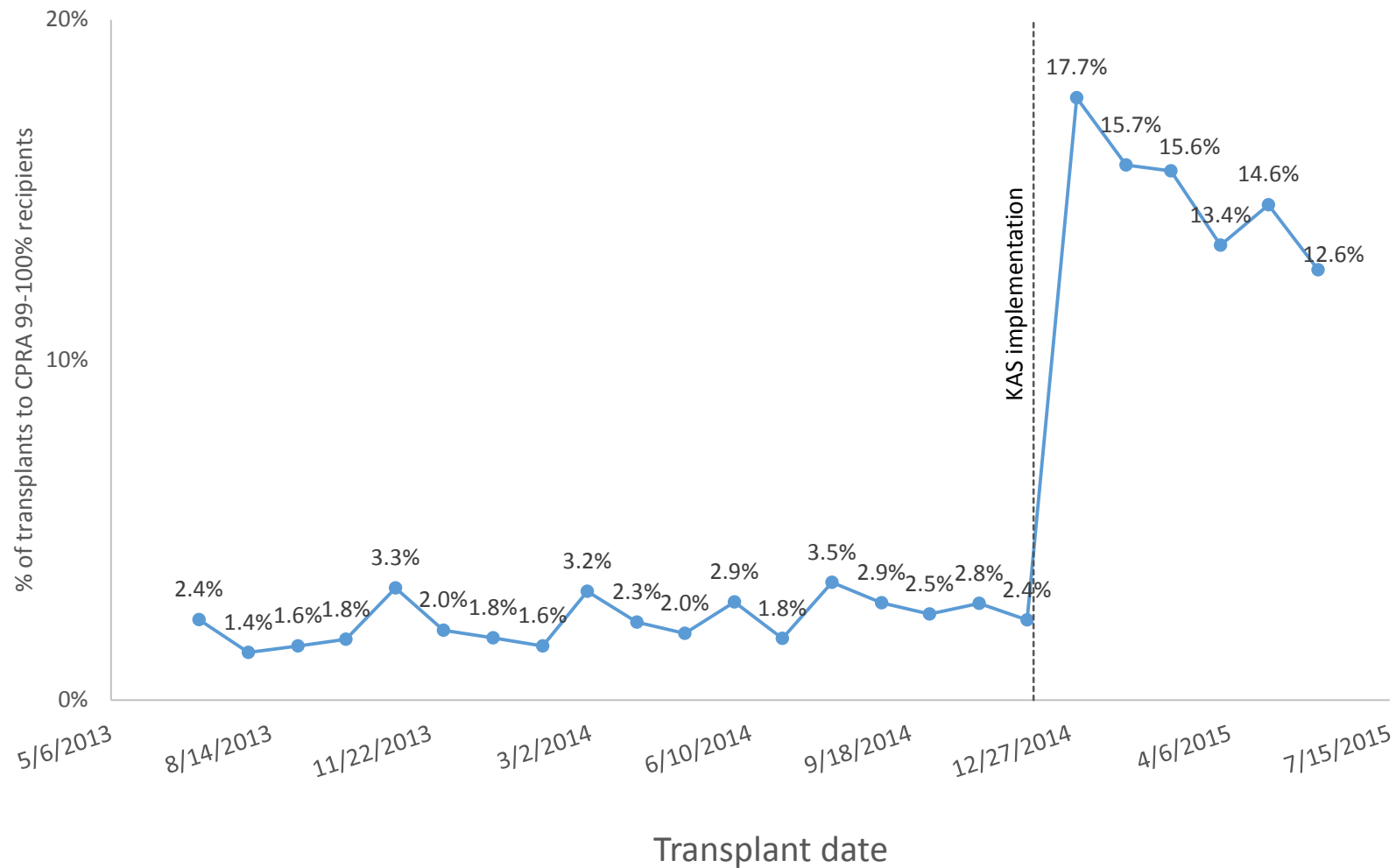


Acceptance rates



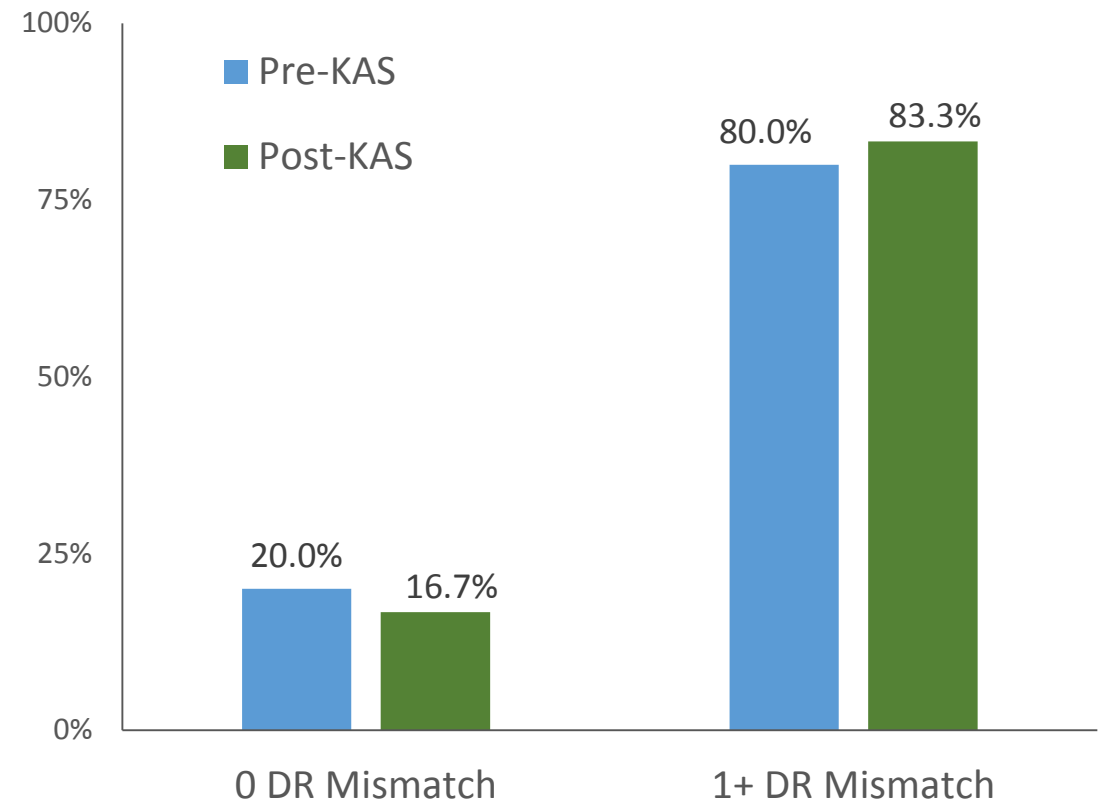
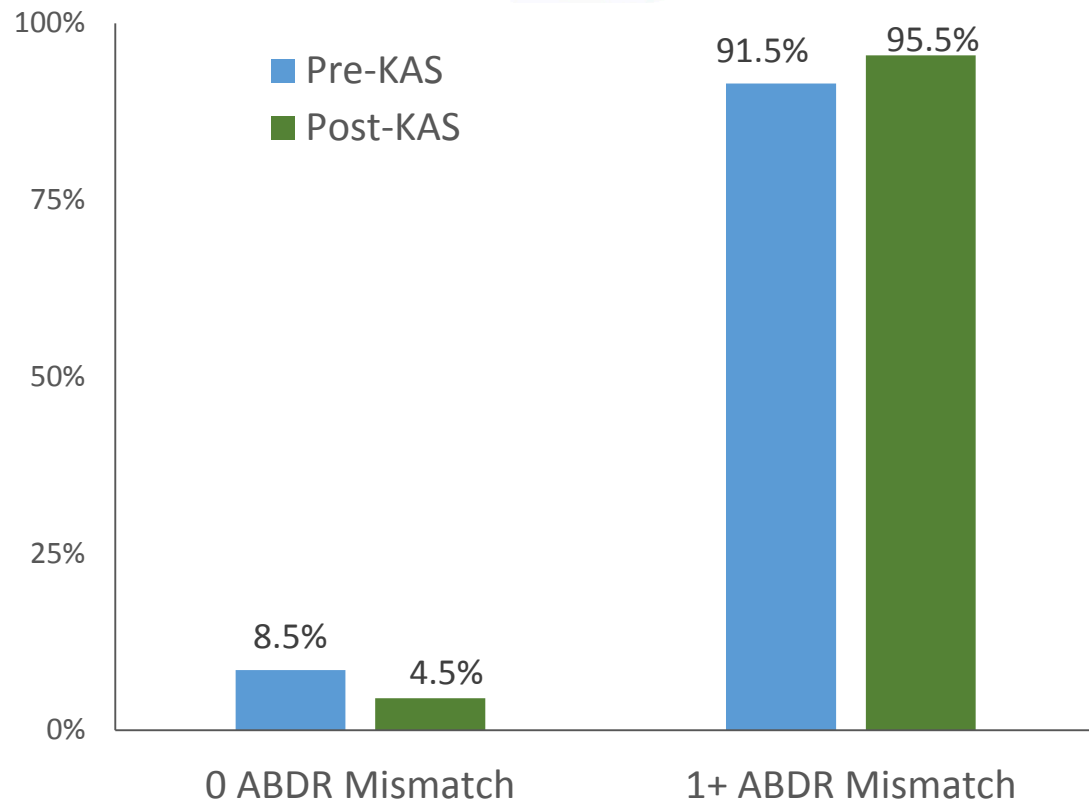
- Offer rate curve smoother post-KAS, and higher for CPRA > 95% patients.
- Offer acceptance rates increase as CPRA increases, both pre/post-KAS

CPRA 99-100% recipient “bolus effect”



- Transplants to CPRA 99-100% patients rose sharply after KAS but have been tapering over time, likely due to a bolus effect.

Transplants by HLA mismatch level

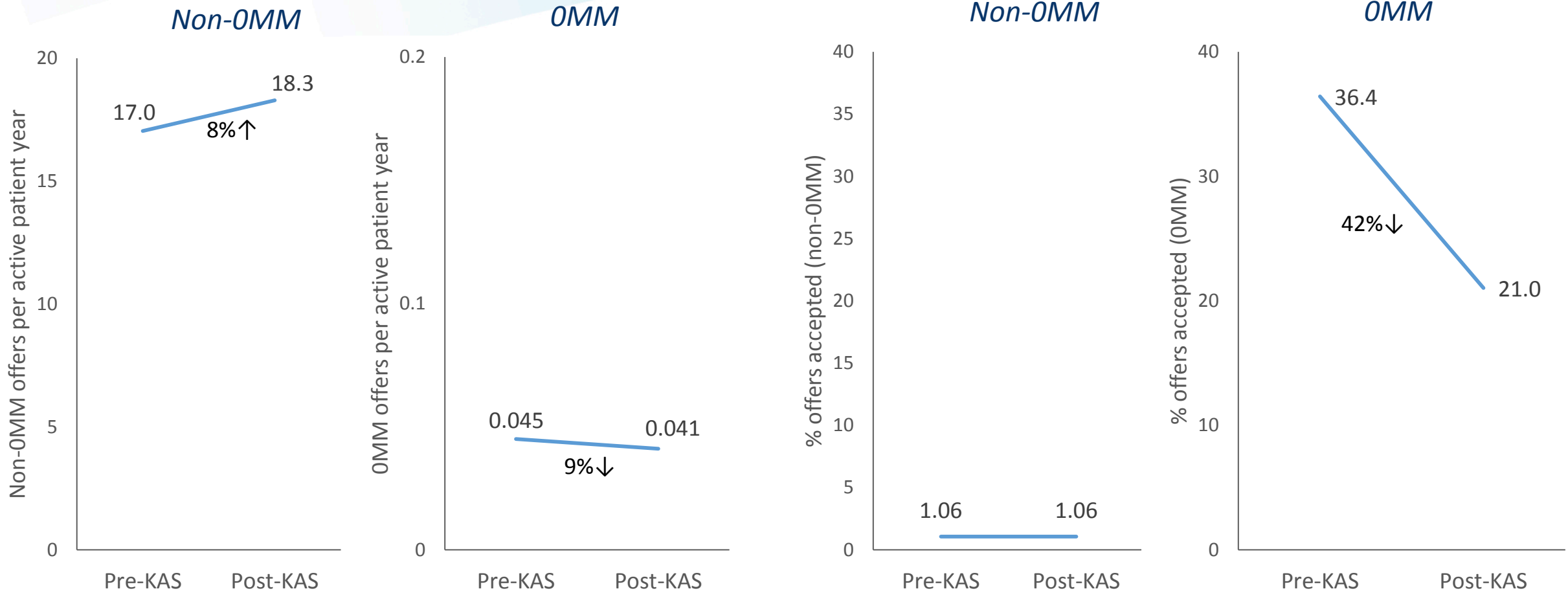


- Fewer 0-ABDR and 0-DR mismatch transplants occurred in the post-KAS period.

Offer rates and acc. rates by HLA mismatch level

Rates of receiving offers

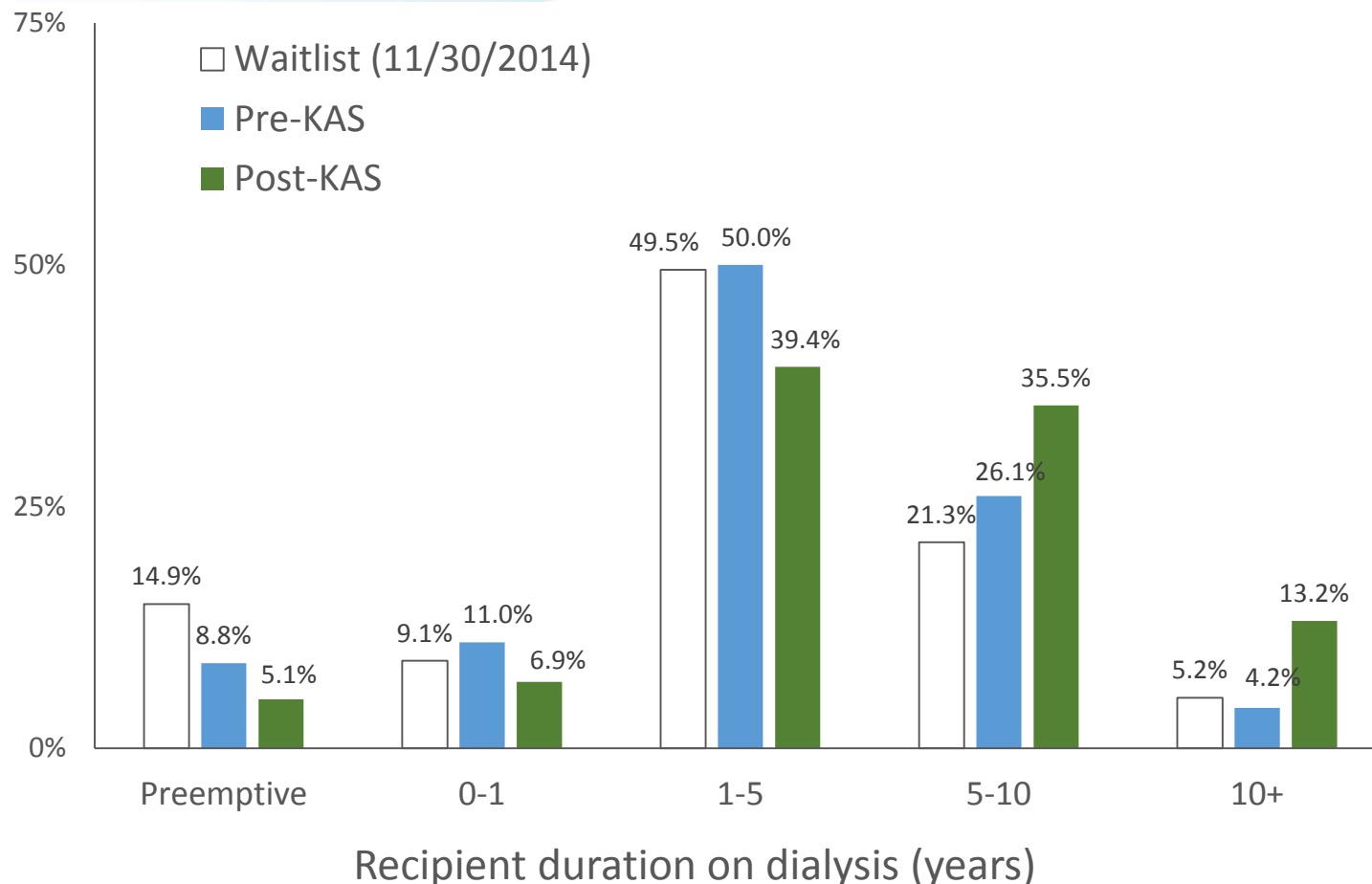
% of offers accepted



- 0MM offers decreased 9% post-KAS.
- Acceptance rates for 0MM offers dropped by 42%.

Who's getting transplanted under KAS?

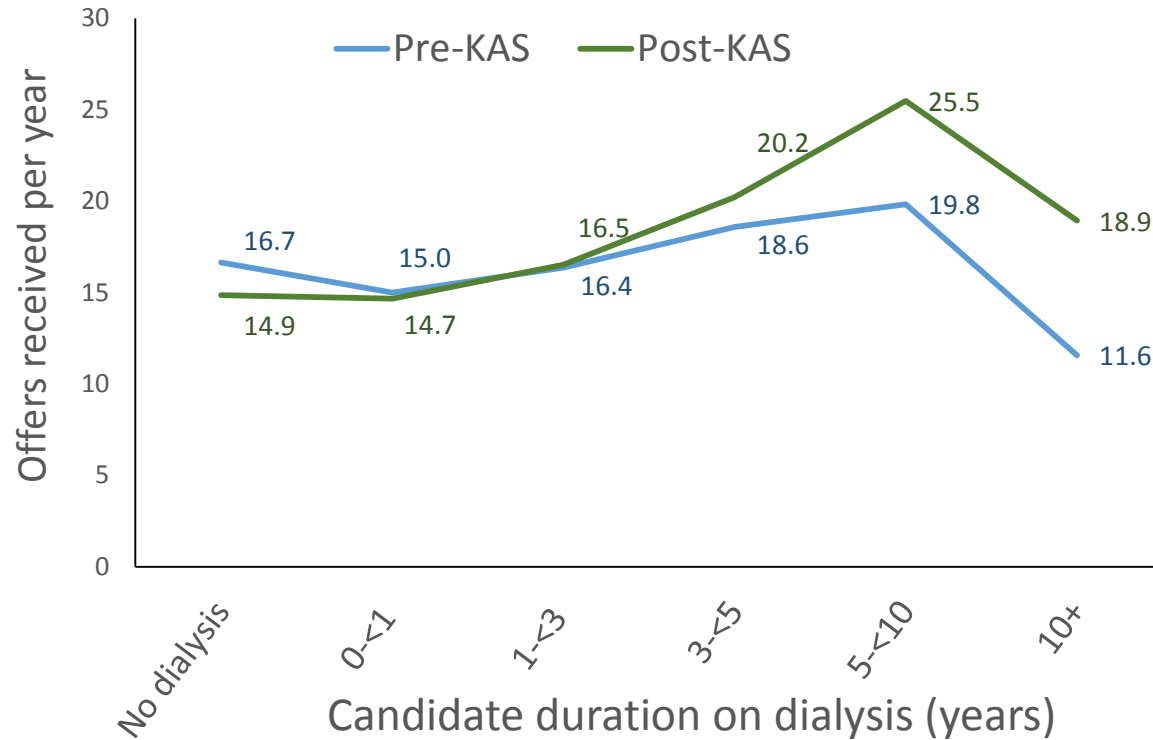
Percentage of Deceased Donor Kidney Transplants by Recipient Duration on Dialysis



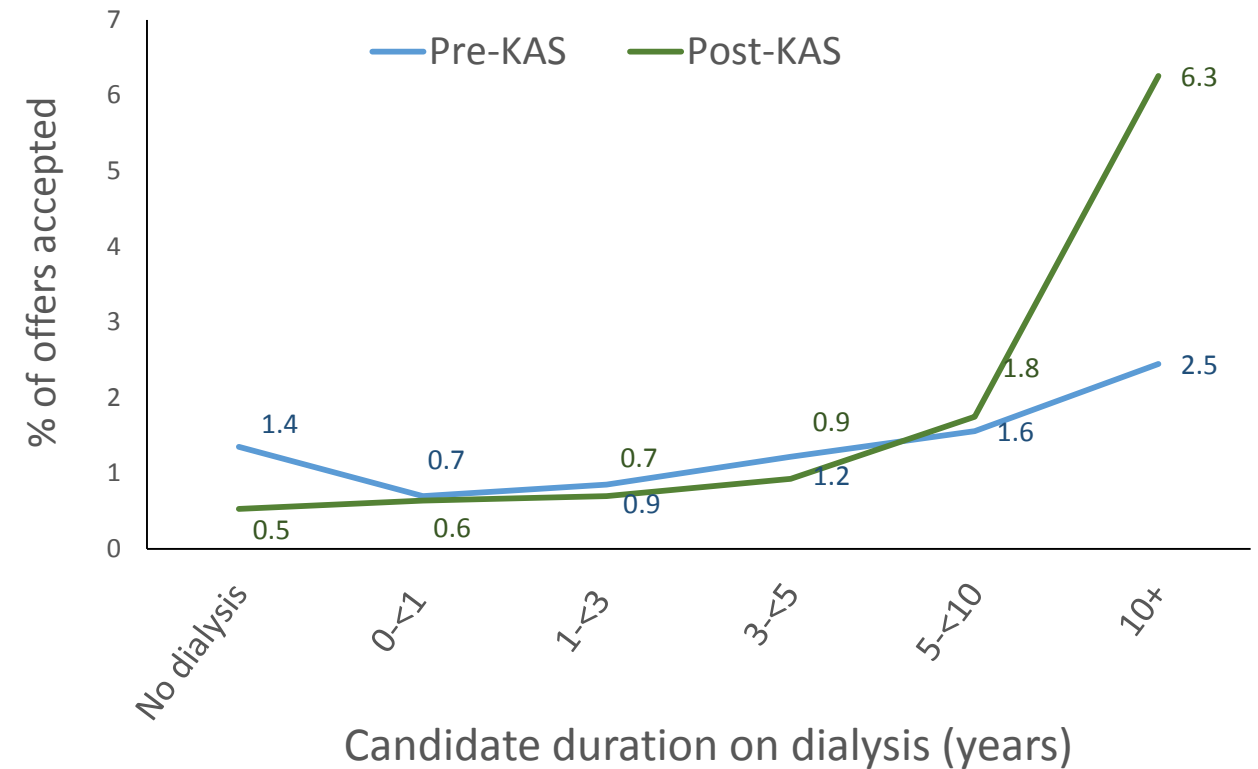
- More transplants are going to long dialysis duration recipients.
- Fewer preemptive (before dialysis) transplants.

Offer & accept. rates by candidate time on dialysis

Offers received

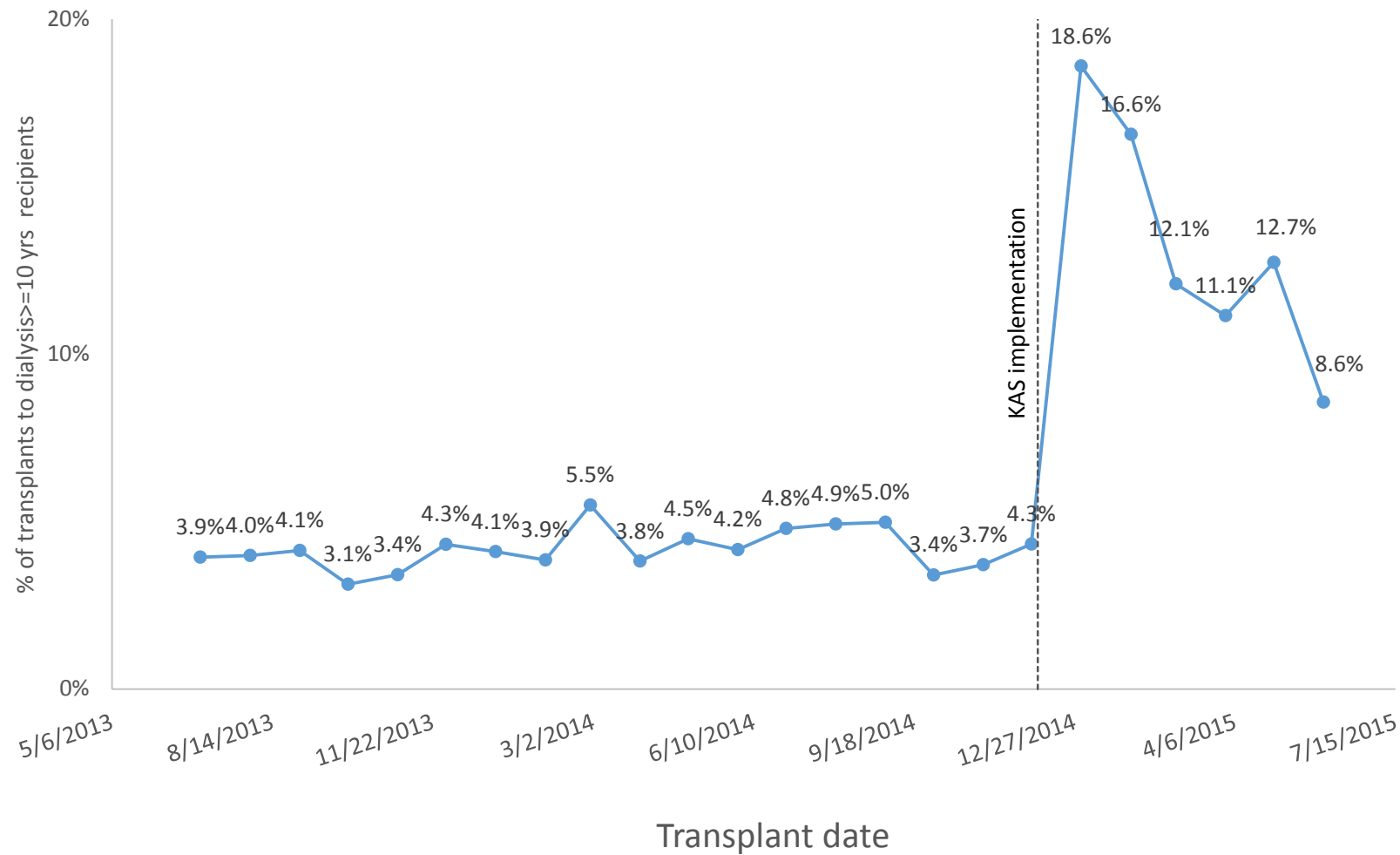


Acceptance rates



- Offer rates increased post-KAS for high dialysis time patients.
- Offer acceptance rates rose sharply for candidates with 10+ years on dialysis and dropped sharply for preemptive patients.

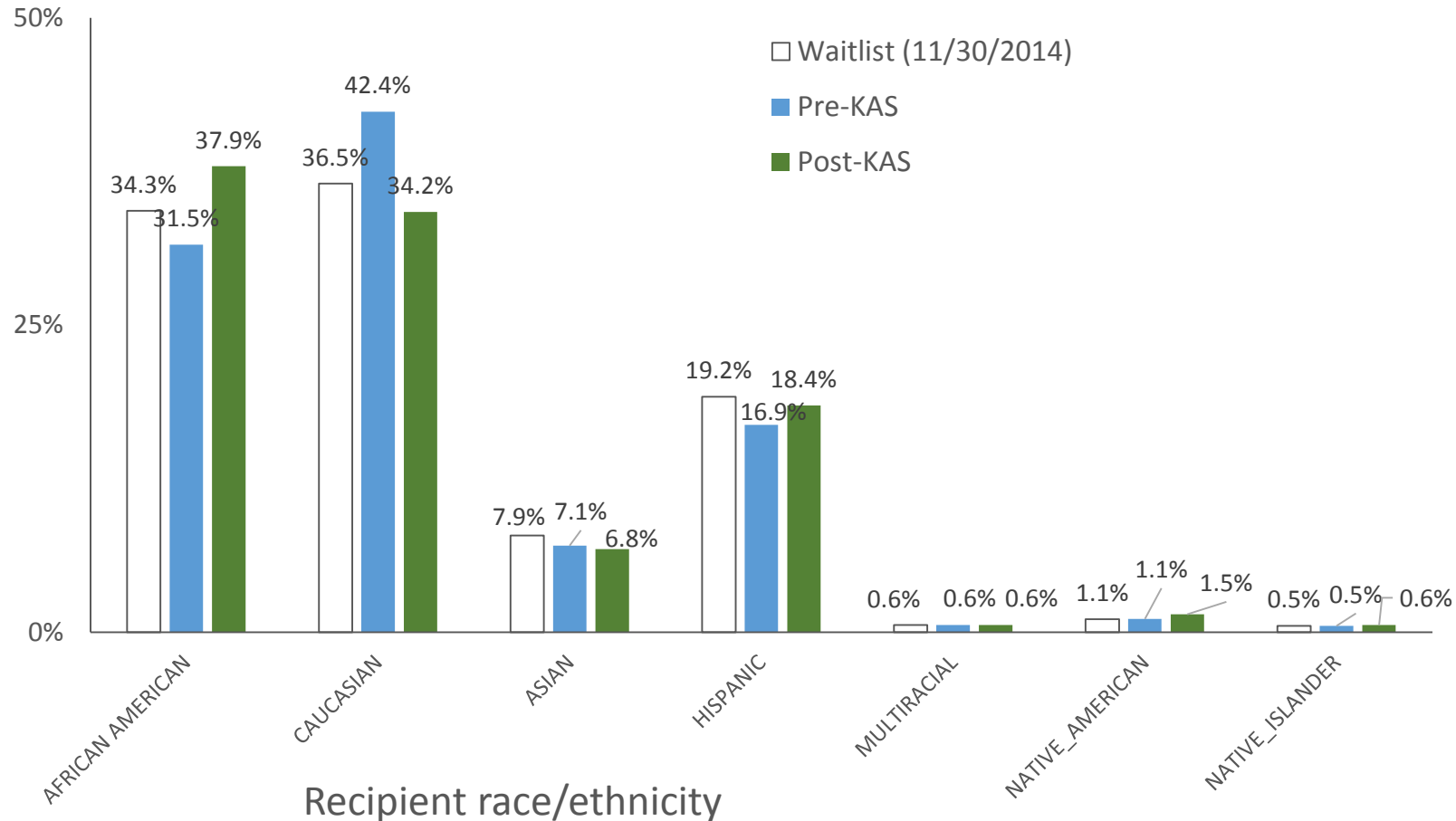
High dialysis time recipient “bolus effect”



- Transplants to recipient with 10+ years of dialysis rose sharply after KAS but have been tapering over time, likely due to a bolus effect.

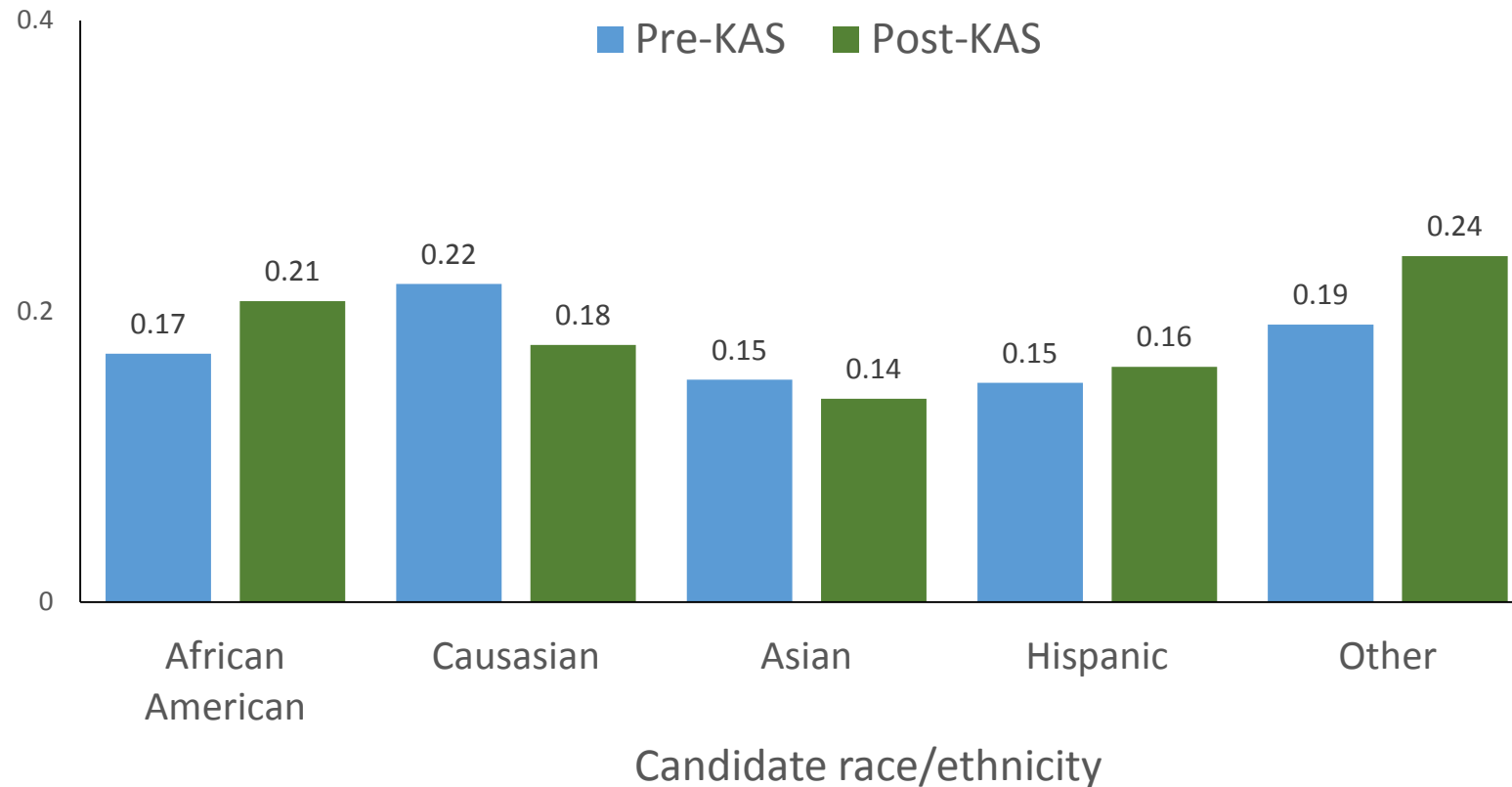
Who's getting transplanted under KAS?

Percentage of Deceased Donor Kidney Transplants by Recipient Race/ethnicity



- More African Americans are receiving kidney transplants under KAS.
- Transplants have also increased for Hispanics, but declined for Whites.

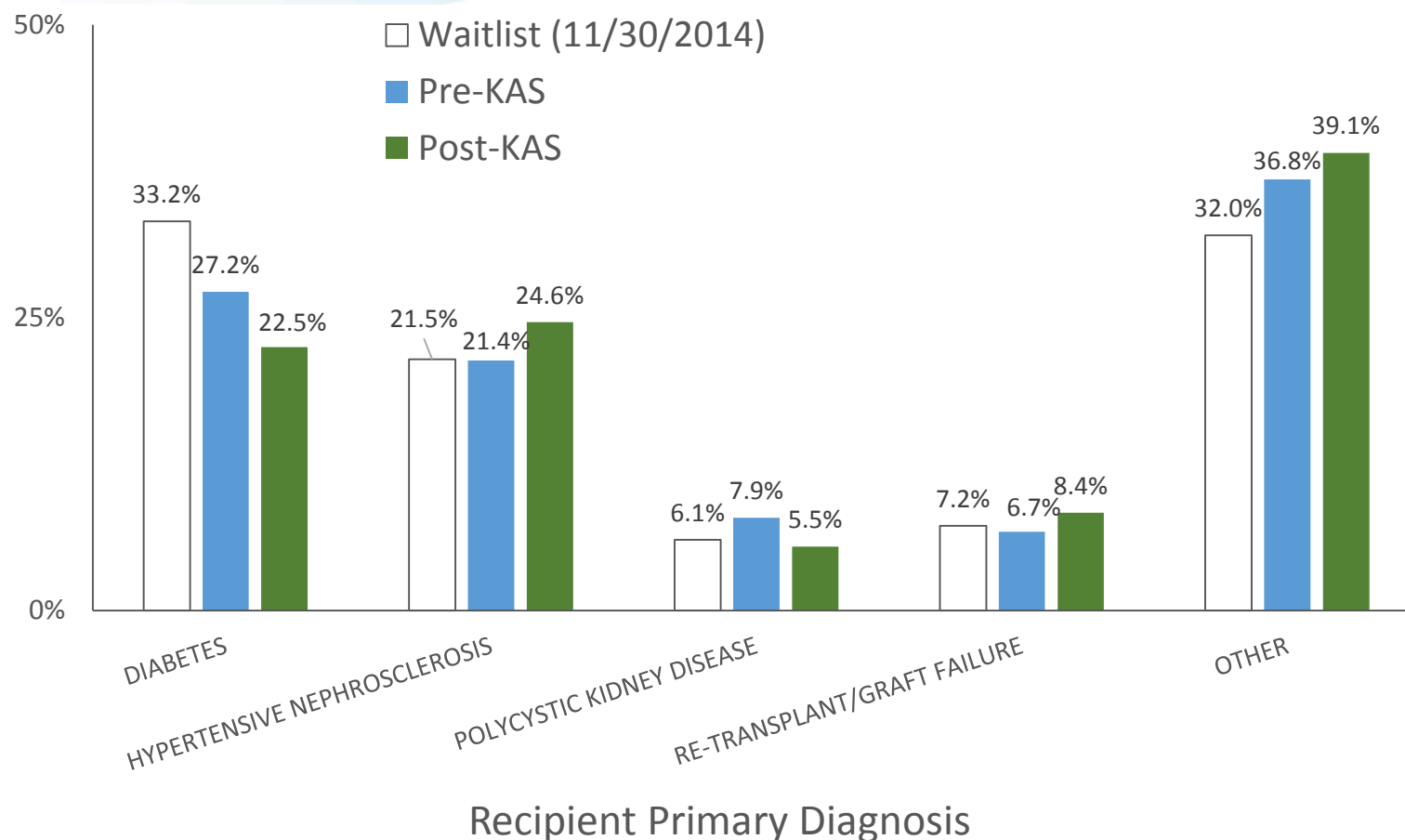
Transplant rates (per active patient-year) by candidate race/ethnicity



- Statistically significant increase in transplant rates for African American (AA) candidates, decrease for Caucasian candidates.
- Offer rates up 17% and acceptance rates up 6% for AA candidates.

Who's getting transplanted under KAS?

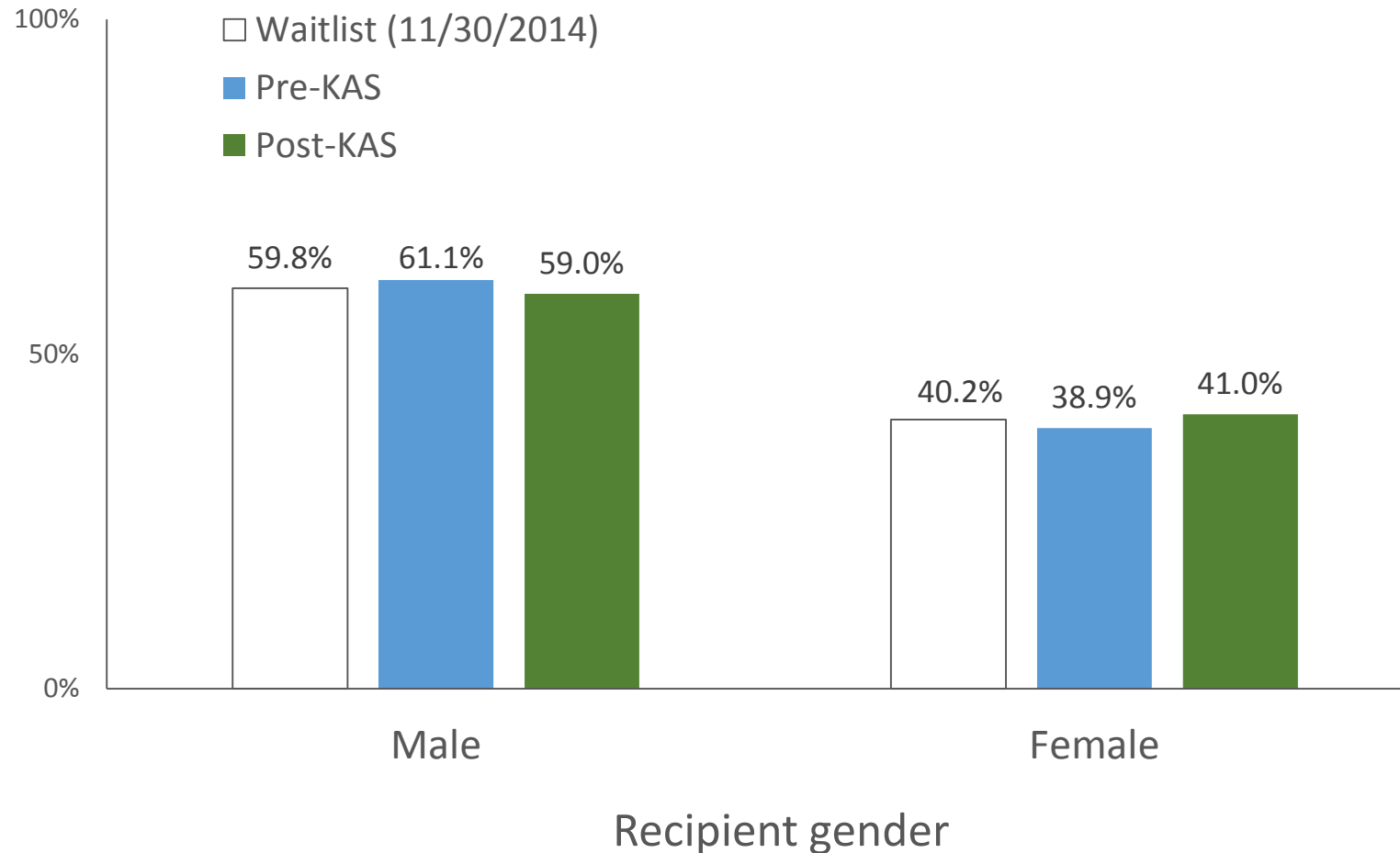
Percentage of Deceased Donor Kidney Transplants by Recipient Primary Diagnosis



- Transplants have increased for recipients with hypertensive nephrosclerosis as well as patients needing a retransplant.
- Transplants have decreased for diabetics and polycystic kidney disease patients.

Who's getting transplanted under KAS?

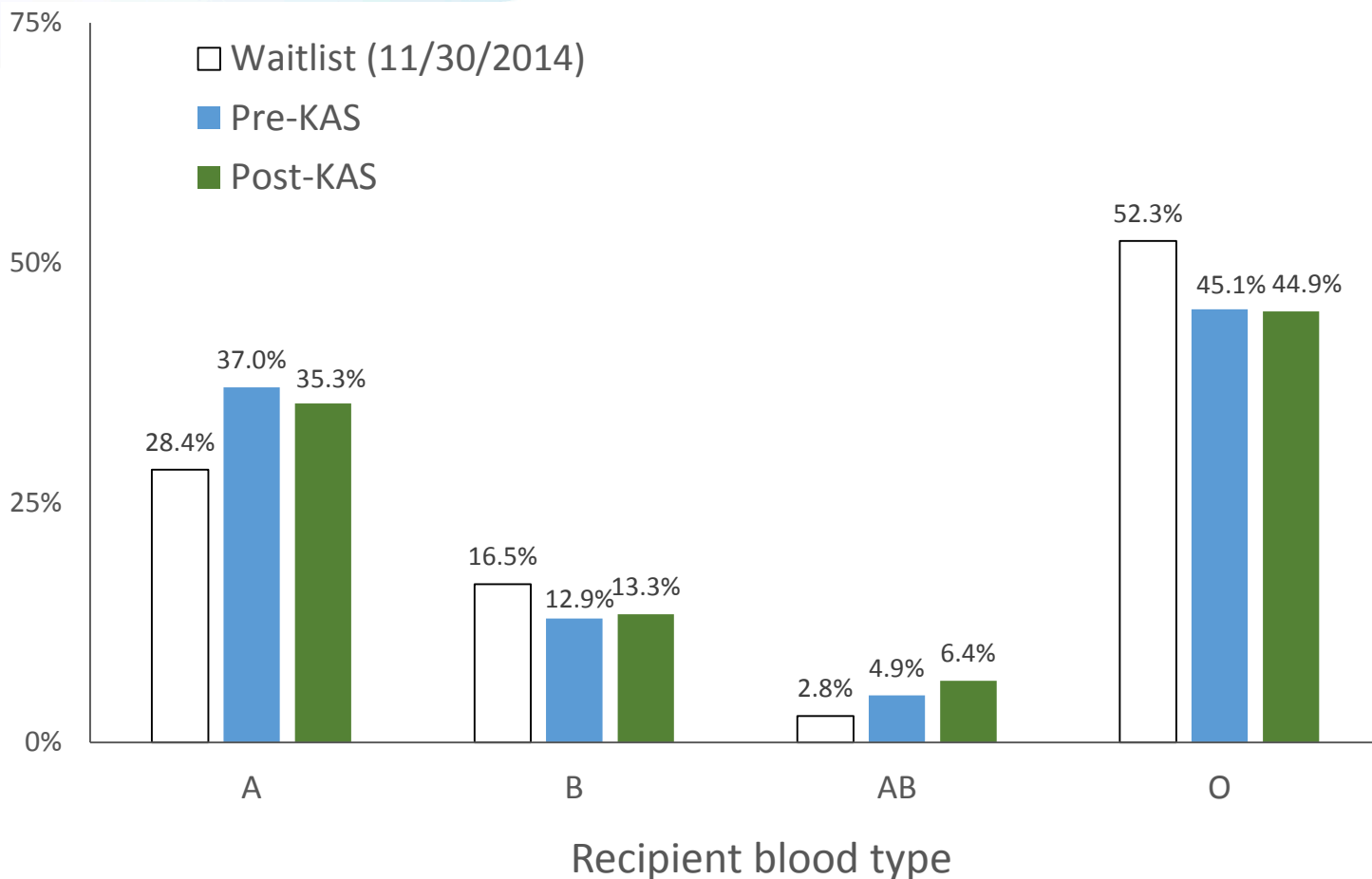
Percentage of Deceased Donor Kidney Transplants by Recipient Gender



- Transplants to female recipients have increased slightly under KAS.
- Highly sensitized patients tend to more often be female.

Who's getting transplanted under KAS?

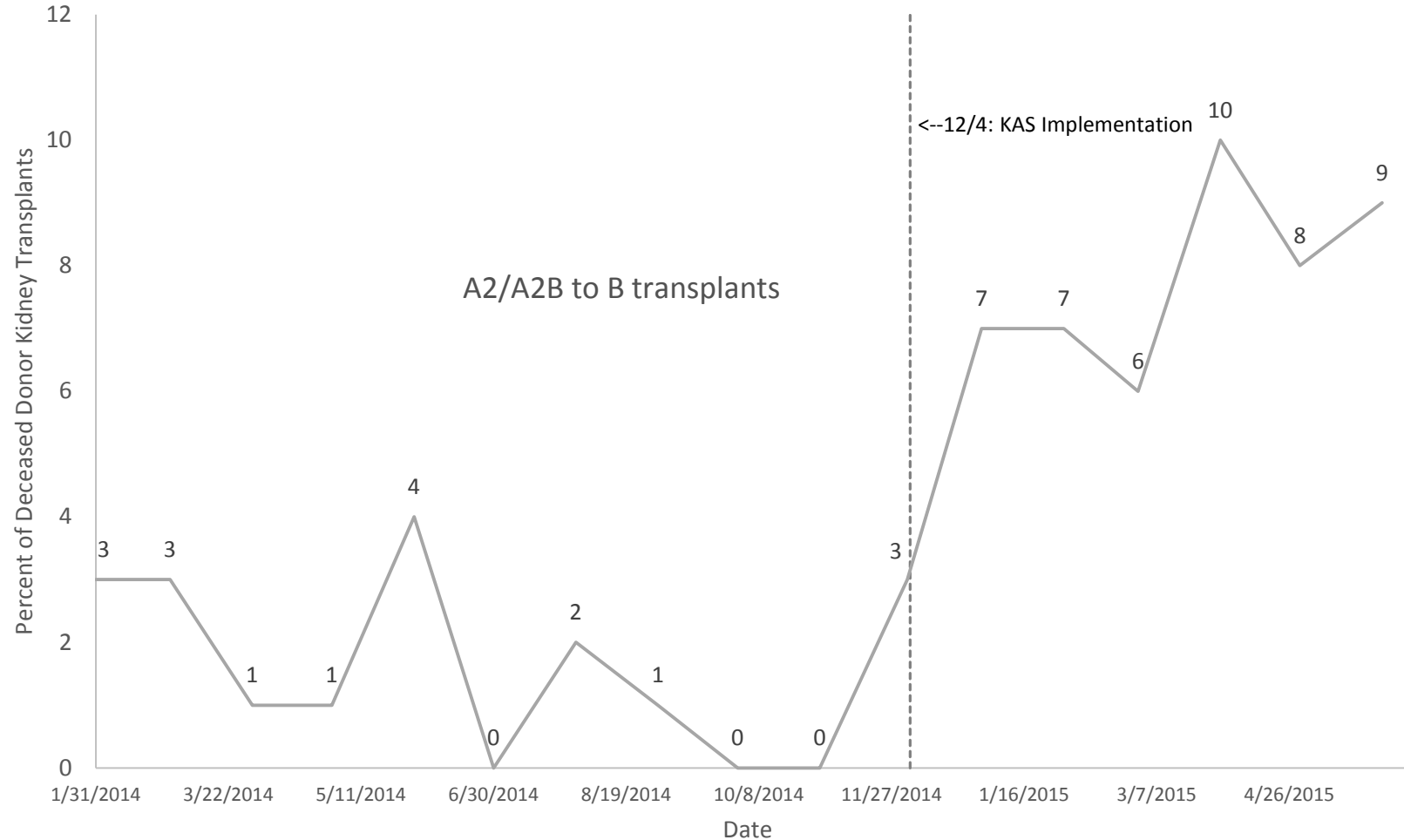
Percentage of Deceased Donor Kidney Transplants by Recipient Blood Type



- The distribution of transplants has changed little by recipient ABO.
- Slight increases for blood type B and AB patients.

A2/A2B subtype to blood type B recipients

Trends



- Sharp rise in A2/A2B transplants, though counts still small.

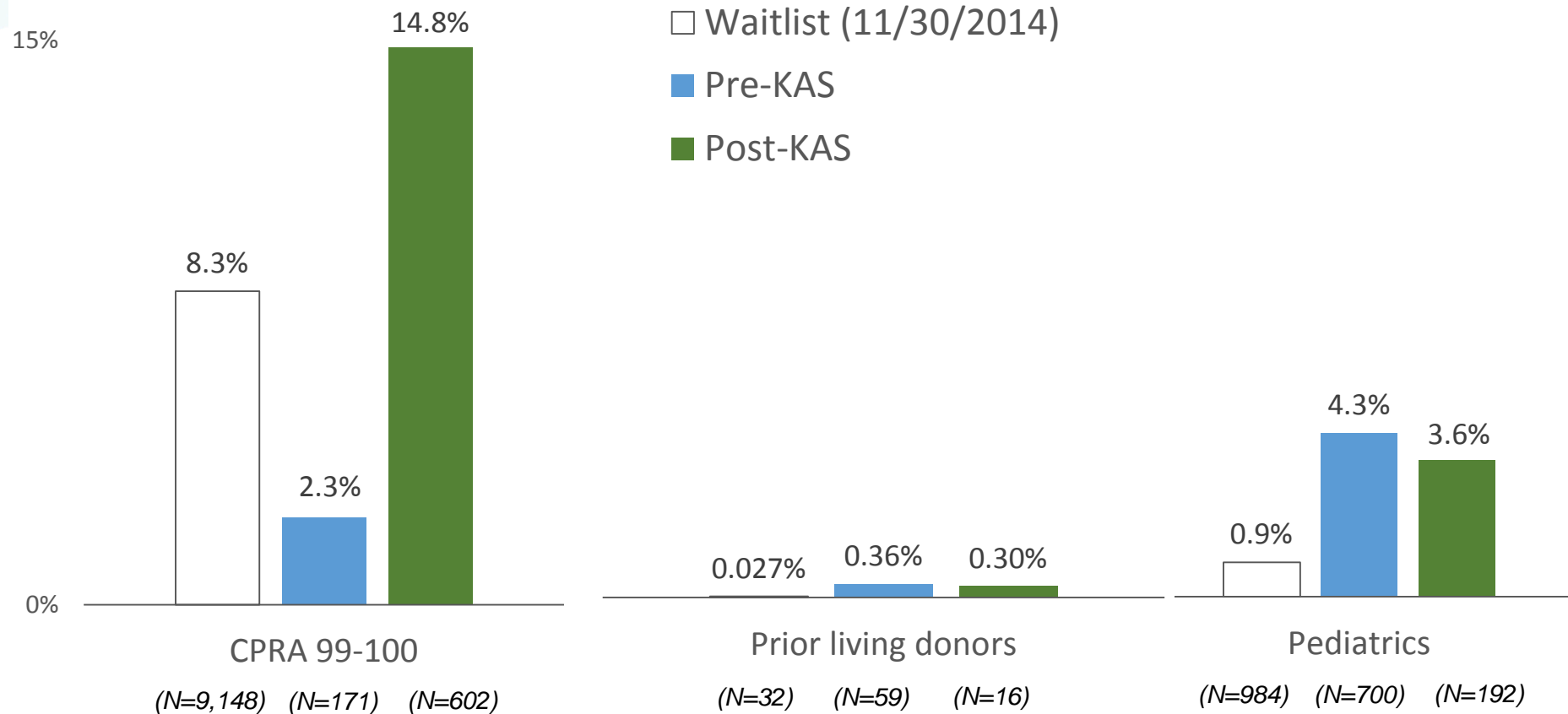
A2/A2B subtype to blood type B recipients

Pre vs post-KAS summary

Metric	Pre-KAS	Post-KAS
A2/A2B transplants	34	47
A2/A2B transplants (normalized per year)	22.5	95.8
% of transplants	0.2%	0.9%

- A2/A2B→B transplants have increased 4-fold.

Pediatrics, Highly Sensitized, and Prior Living Donors

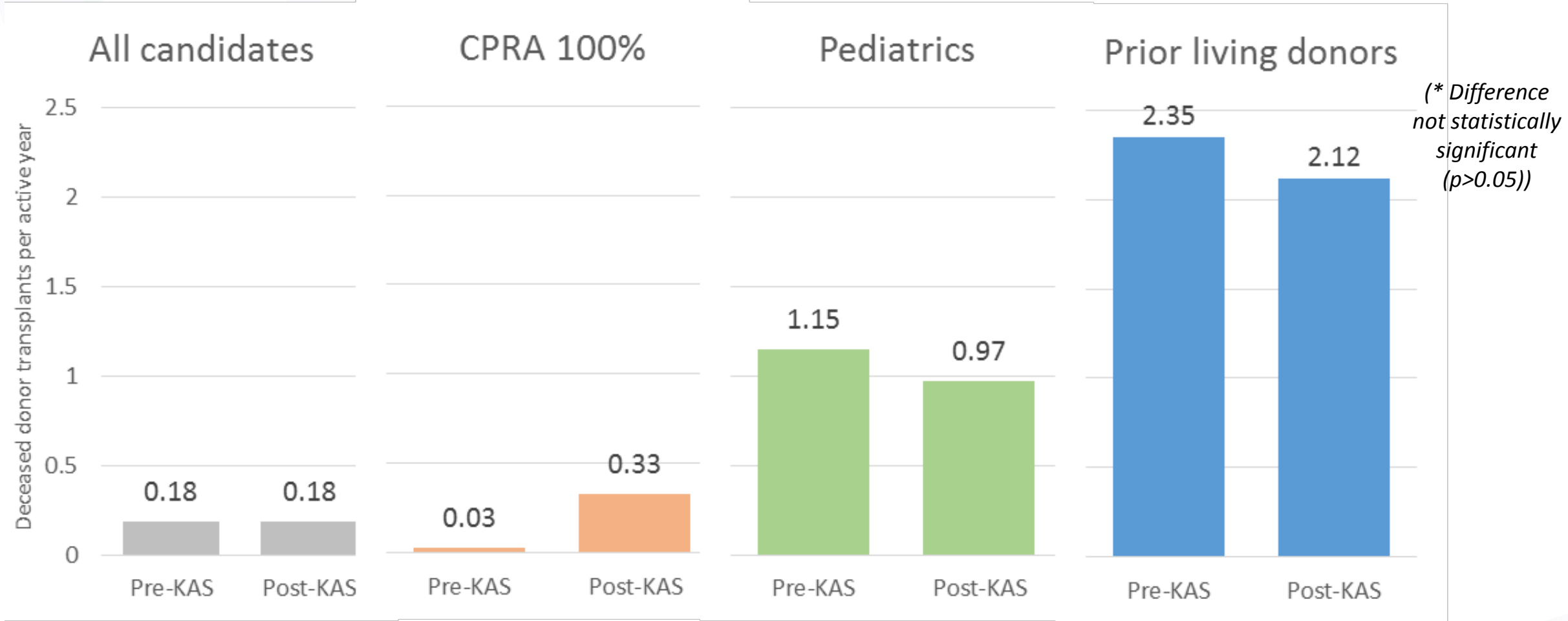


- Proportion of transplants relative to WL prevalence under KAS:

➢ CPRA 99-100: $14.8/8.3 = \underline{\underline{1.8}}$ PLDs: $0.30/0.028 = \underline{\underline{11}}$ Pediatrics: $3.6/0.9 = \underline{\underline{4}}$

Prior living donors' access to transplants

Deceased donor transplant rates per active patient-year on the WL



- Transplant rates for prior living donors are similar pre vs. post KAS and much greater than for other kidney candidate populations.

Single vs. Dual vs. En bloc kidney transplants

Pre vs post-KAS summary

	Pre-KAS		Post-KAS	
	N	%	N	%
Single	15948	97.2%	5239	97.2%
Dual	144	0.9%	38	0.7%
En bloc	314	1.9%	111	2.1%

- Dual kidney transplants have decreased slightly post-KAS.

Multi-organ kidney transplants

Pre vs post-KAS summary

Multi-organ kidney transplant type	Pre-KAS		Post-KAS	
	N	%	N	%
All	2086	11.3%	694	11.4%
Heart-Kidney	159	1.0%	54	1.0%
Kidney-Pancreas (KP)	1100	6.3%	346	6.0%
Liver-Kidney (SLK)	803	4.7%	288	5.1%
Other	24	0.1%	6	0.1%

- The proportion of transplanted deceased donor kidneys used in multi-organ transplants has changed little.

Longevity-matching under KAS

Percentage of Deceased Donor Kidney Transplants by KDPI and Recipient Age

PRE-KAS (6/1/2013-12/3/2014)					
AGE	KDPI				All
	KDPI 0-20	KDPI 21-34	KDPI 35-85	KDPI 86-100	
	%	%	%	%	%
0-17	2.9	0.8	0.6	0.0	4.3
18-34	2.5	1.9	4.4	0.1	8.9
35-49	5.5	4.5	13.2	0.6	23.8
50-64	7.1	6.5	23.6	3.7	40.9
65 Plus	2.9	2.6	13.1	3.6	22.2
All	20.9	16.2	54.8	8.1	100.0

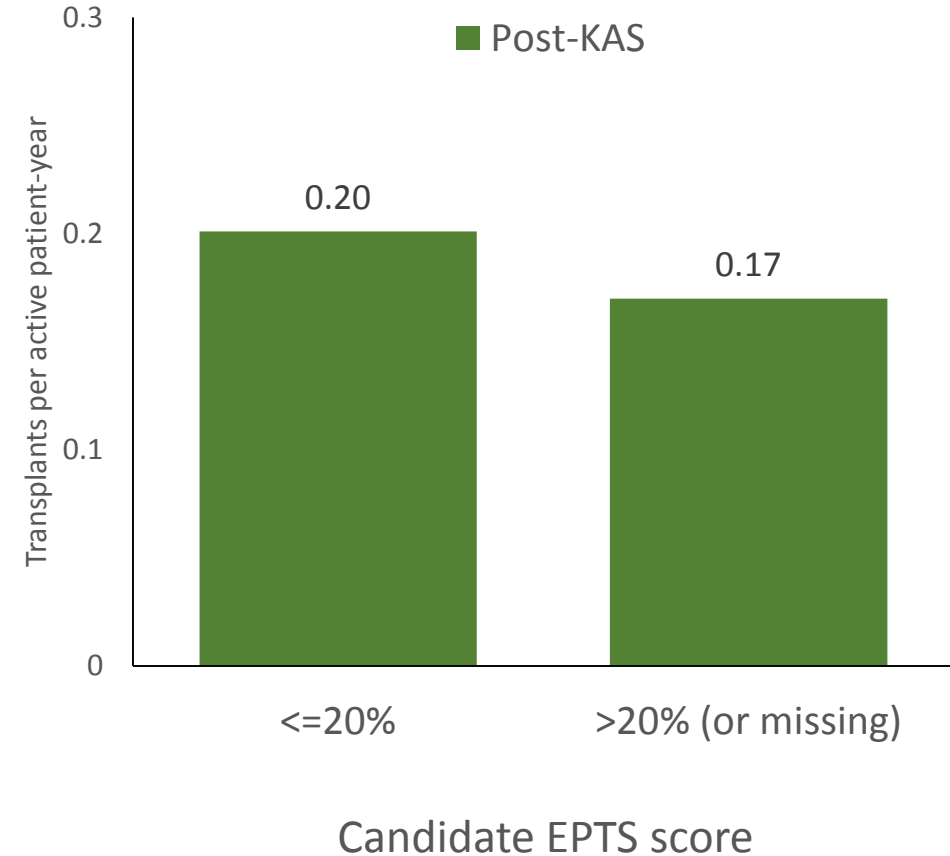
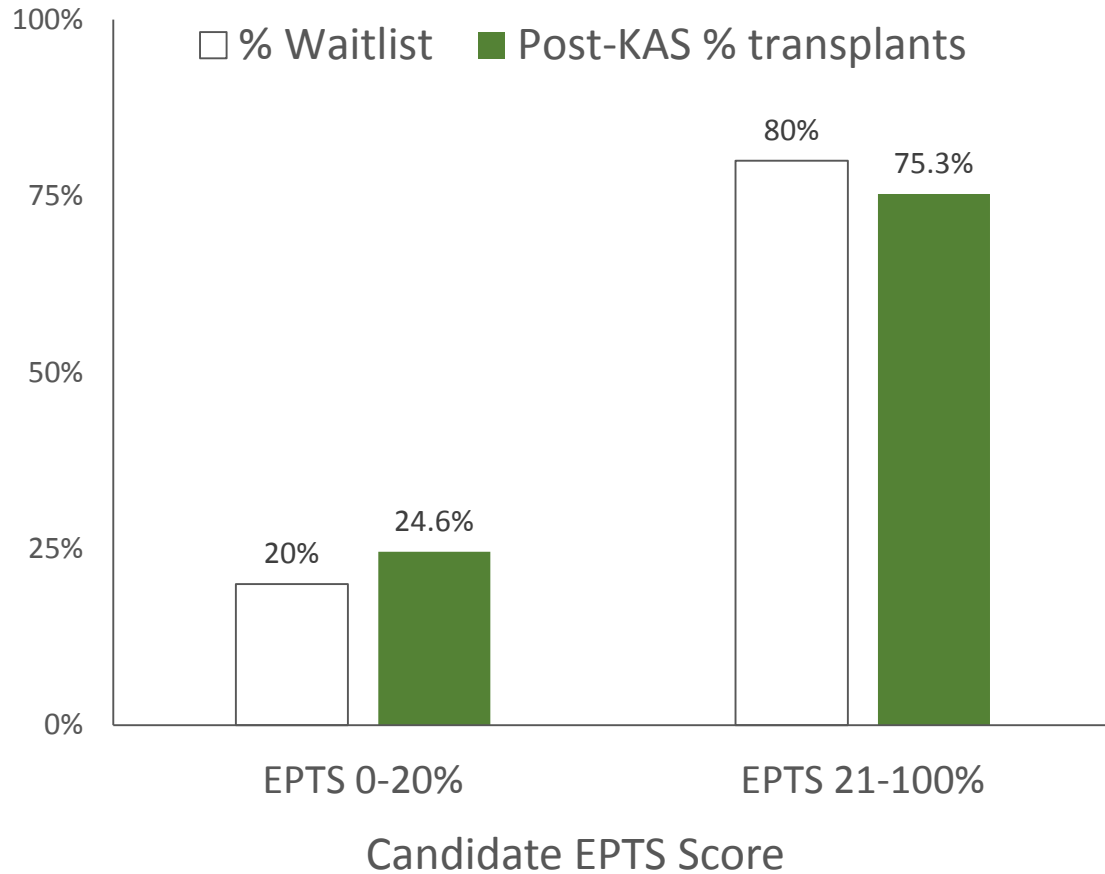
POST-KAS (12/4/2014-5/31/2015)					
AGE	KDPI				All
	KDPI 0-20	KDPI 21-34	KDPI 35-85	KDPI 86-100	
	%	%	%	%	%
0-17	2.5	0.9	0.2	0.0	3.6
18-34	↑ 6.7	2.4	4.3	0.1	13.5
35-49	7.3	4.7	15.9	0.6	28.5
50-64	↓ 2.8	6.0	25.4	3.3	37.4
65 Plus	↓ 1.0	2.2	10.9	3.0	17.0
All	20.3	16.2	56.5	7.0	100.0

- Transplants with KDPI 0-20% and recipient age 18-34:
 - Pre-KAS: 2.5% of transplants / Post-KAS: 6.7% of transplants
- Transplants with KDPI 0-20% and recipient age 50+:
 - Pre-KAS: 10% of transplants / Post-KAS: 4% of transplants

Longevity-matching under KAS

- Of KDPI 0-20% kidney transplants, 61% are going to EPTS Top 20% recipients under KAS.
- Under KAS, over half (52%) of EPTS Top 20% recipients received a KDPI 0-20% kidney.
- Increased percentage of pediatric recipients receiving KDPI<35% kidneys:
 - Pre-KAS (85%) vs. Post-KAS (94%).
- However, a higher % of KDPI>85% kidneys are going to patients under age 50 (8.4% vs. 10% after KAS)

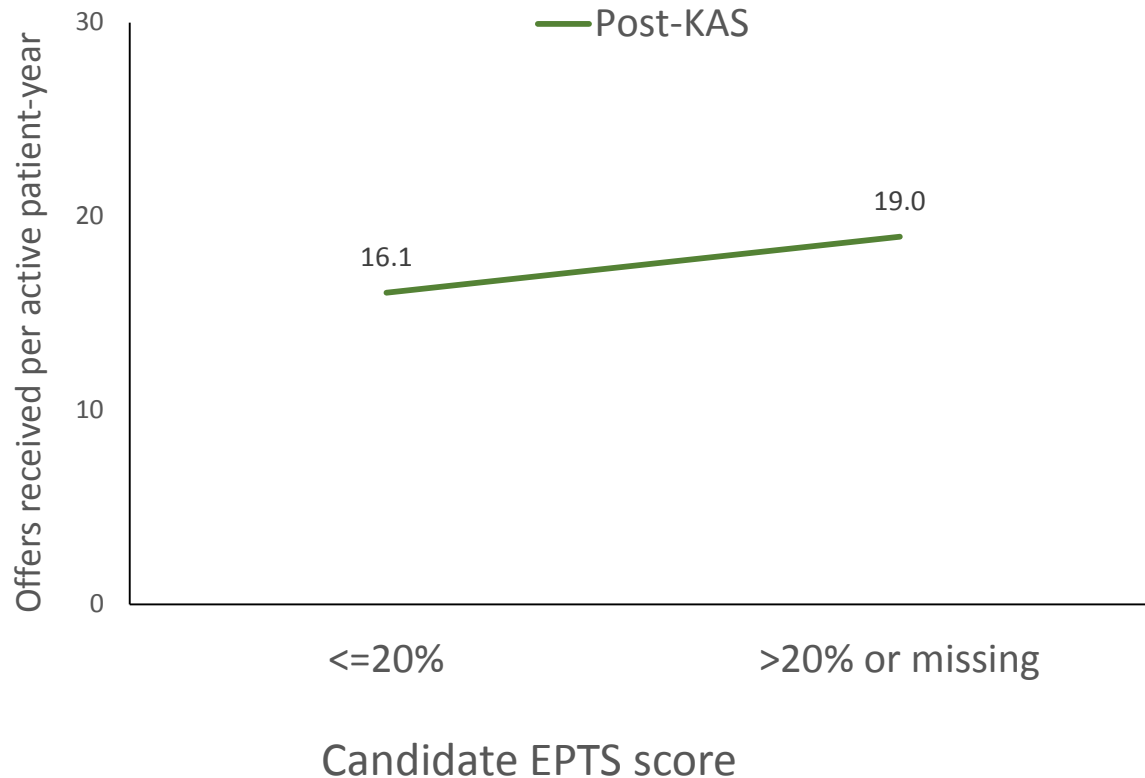
Post-KAS access to transplants by EPTS score



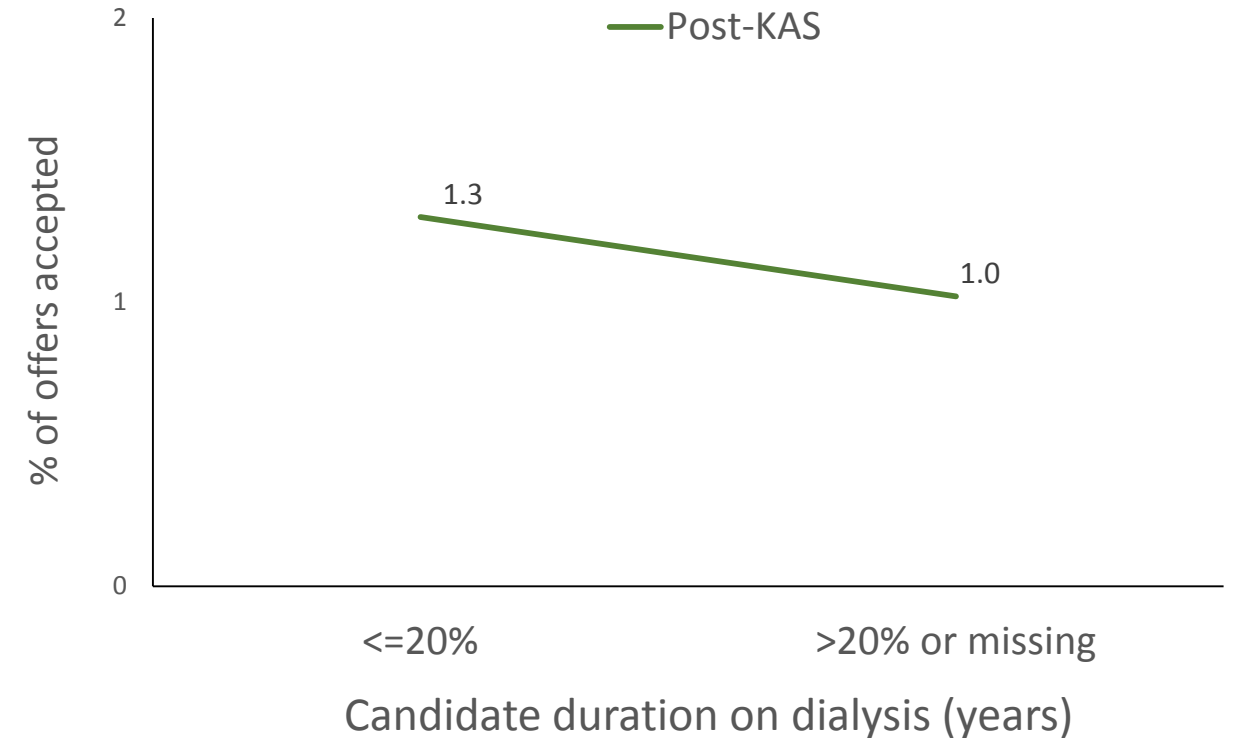
- EPTS 0-20% candidates have moderately higher access to transplants than EPTS 21-100% candidates under KAS, including 18% higher transplant rates.

Post-KAS offer and accept. rates by EPTS score

Offers received

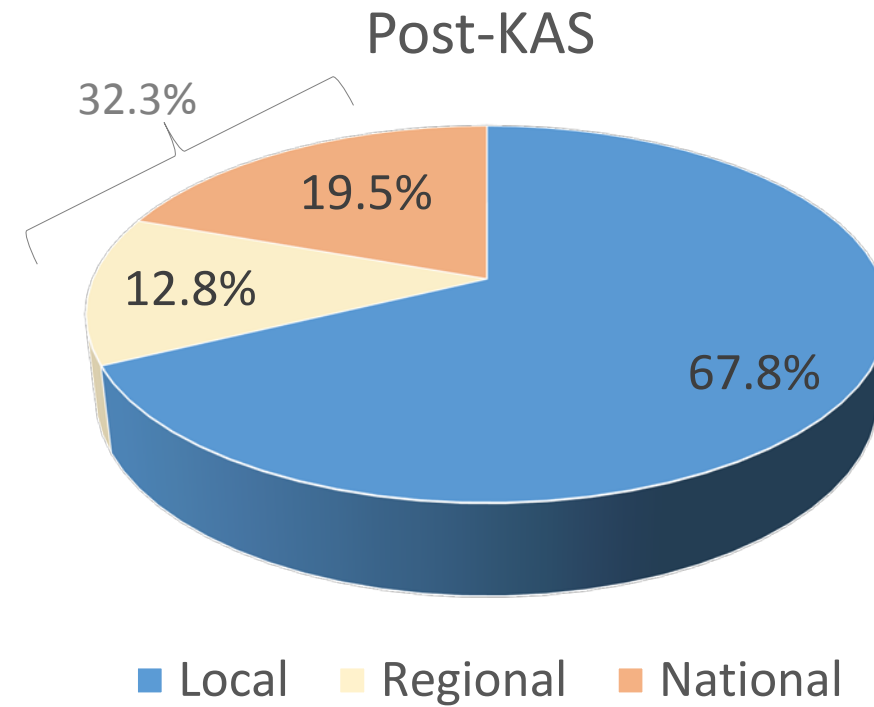
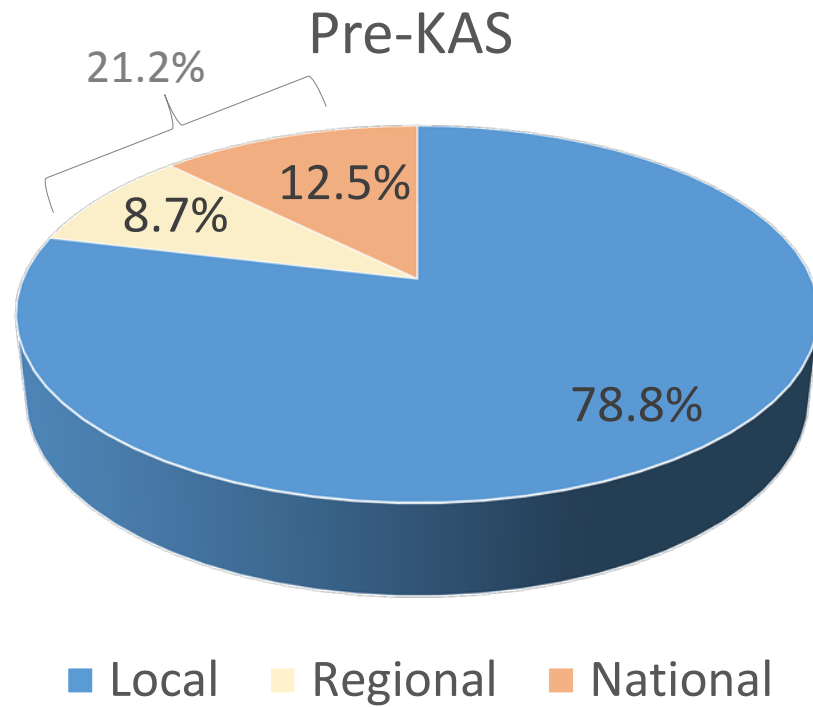


Acceptance rates



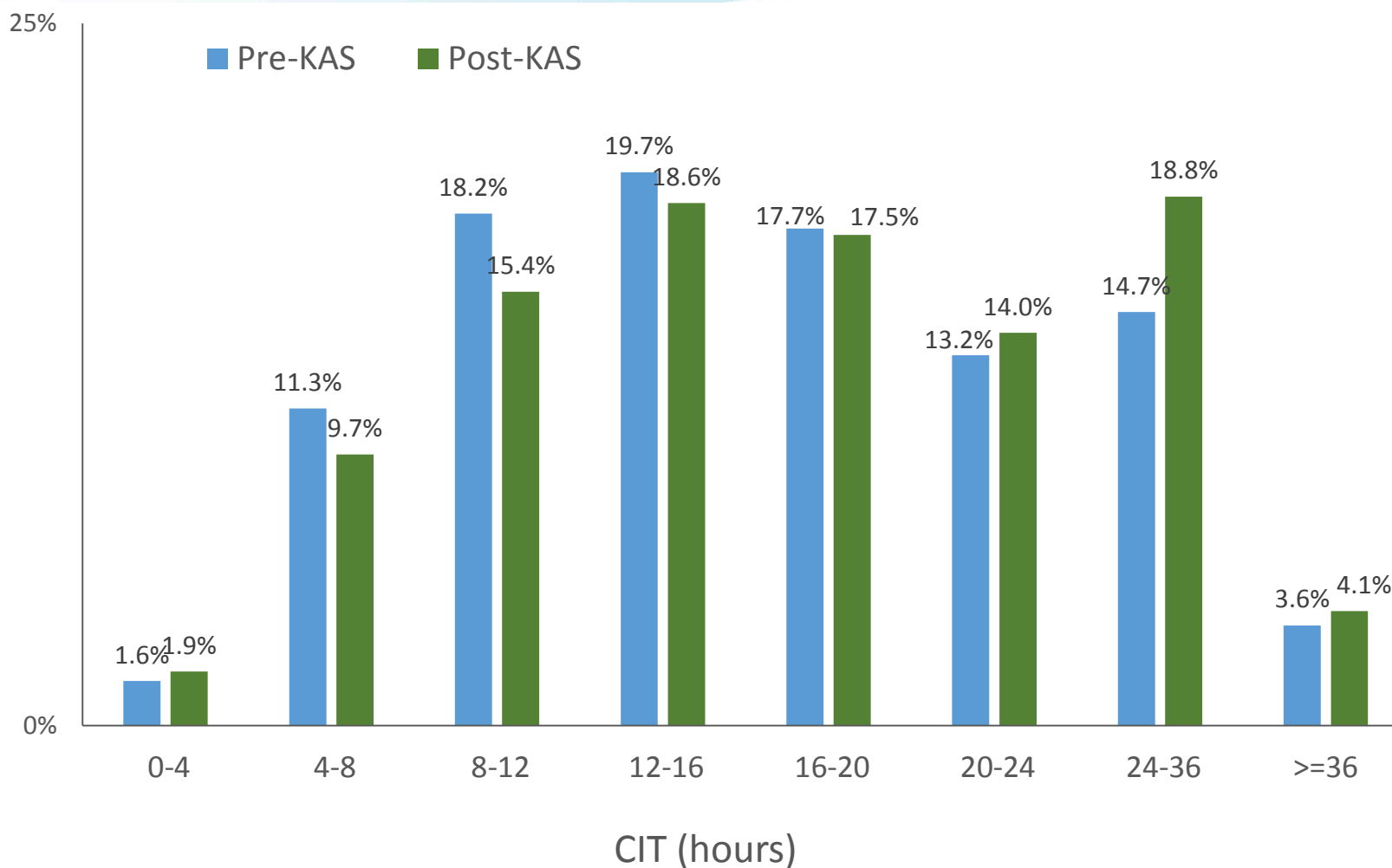
- Surprisingly, offer rates were lower for EPTS 0-20% patients.
- However, organ quality was better (lower average KDPI) and acceptance rates for EPTS 0-20% patients were 30% higher than for EPTS 21-100% patients.

Geographic distribution of kidney transplants



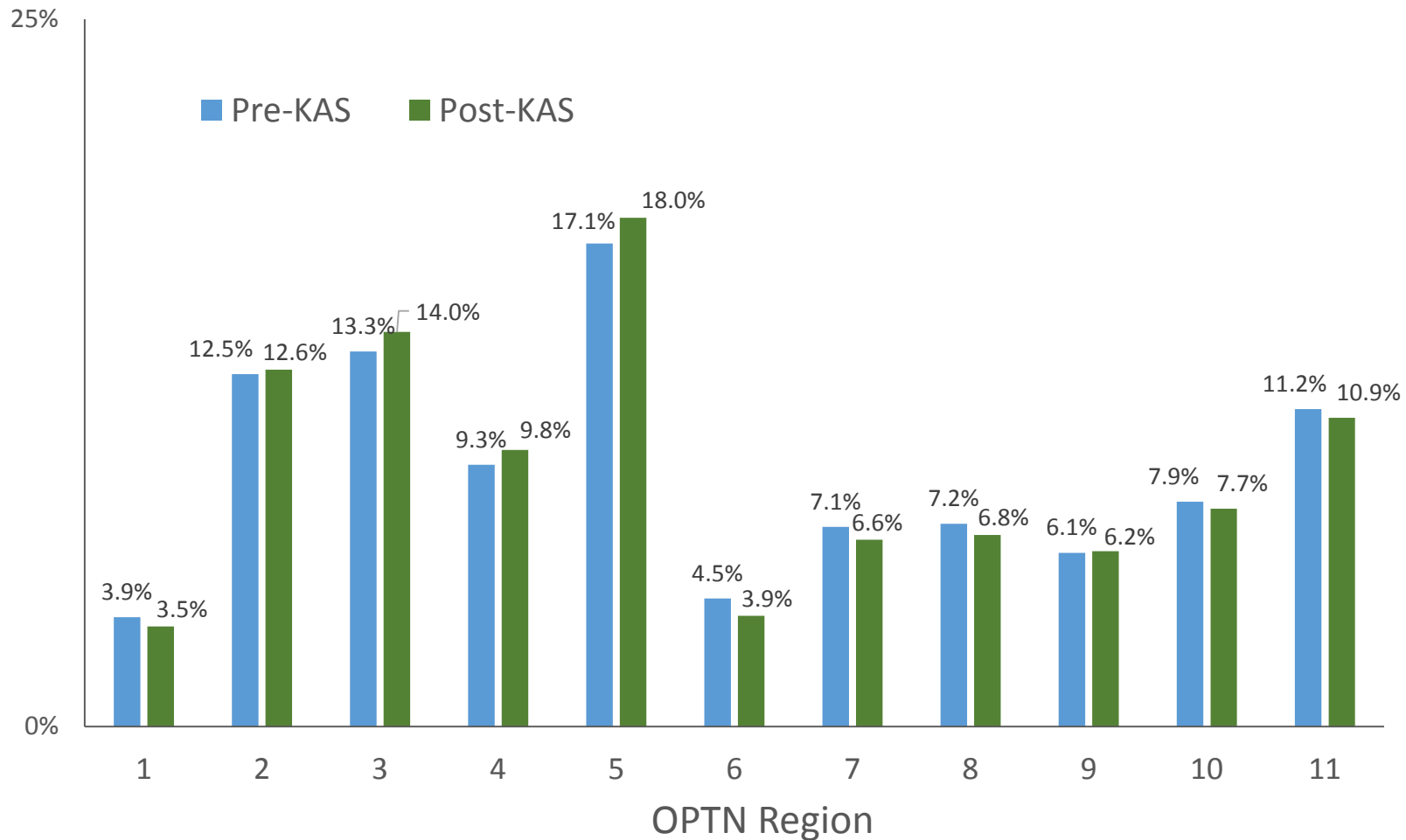
- More kidneys are being distributed outside recovery OPO's DSA.

Cold ischemic times for transplanted kidneys



- Average CIT increased 6% from 17.0 to 18.1 hours
- CIT > 24 hours - Pre-KAS: 18.3%, Post-KAS: 22.9%

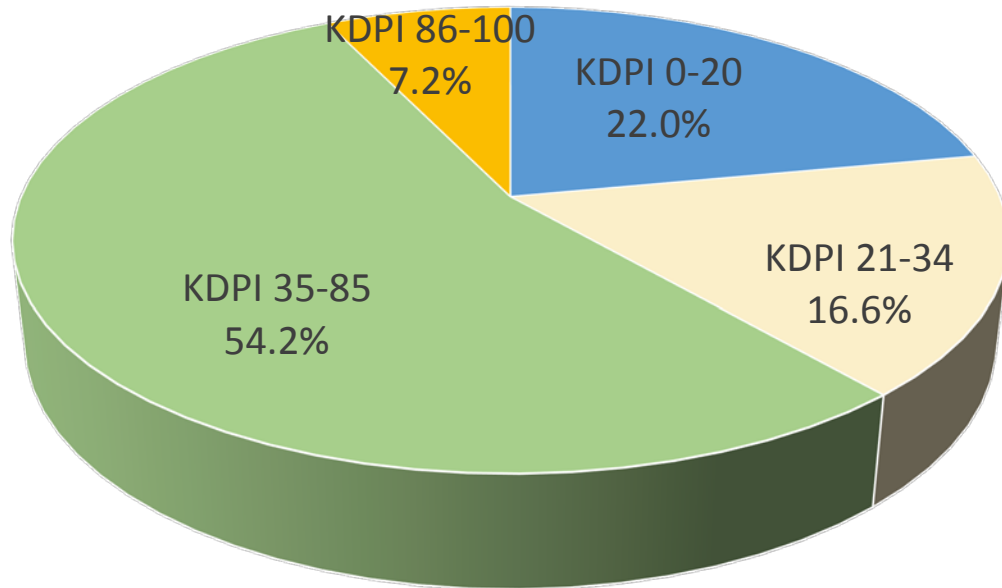
Geographic distribution of kidney transplants



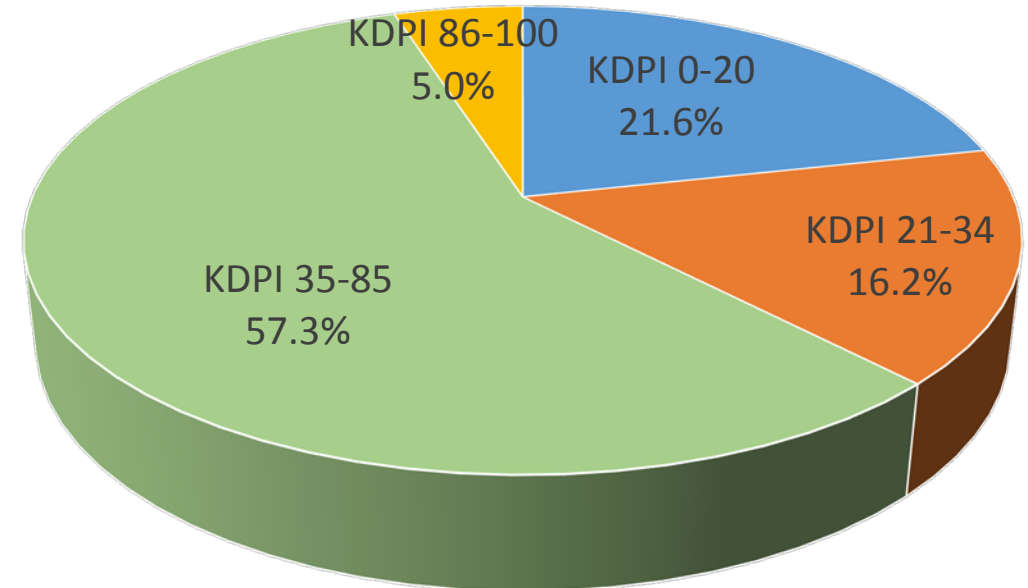
- No significant changes by OPTN region.

KDPI distribution of local transplants

Pre-KAS

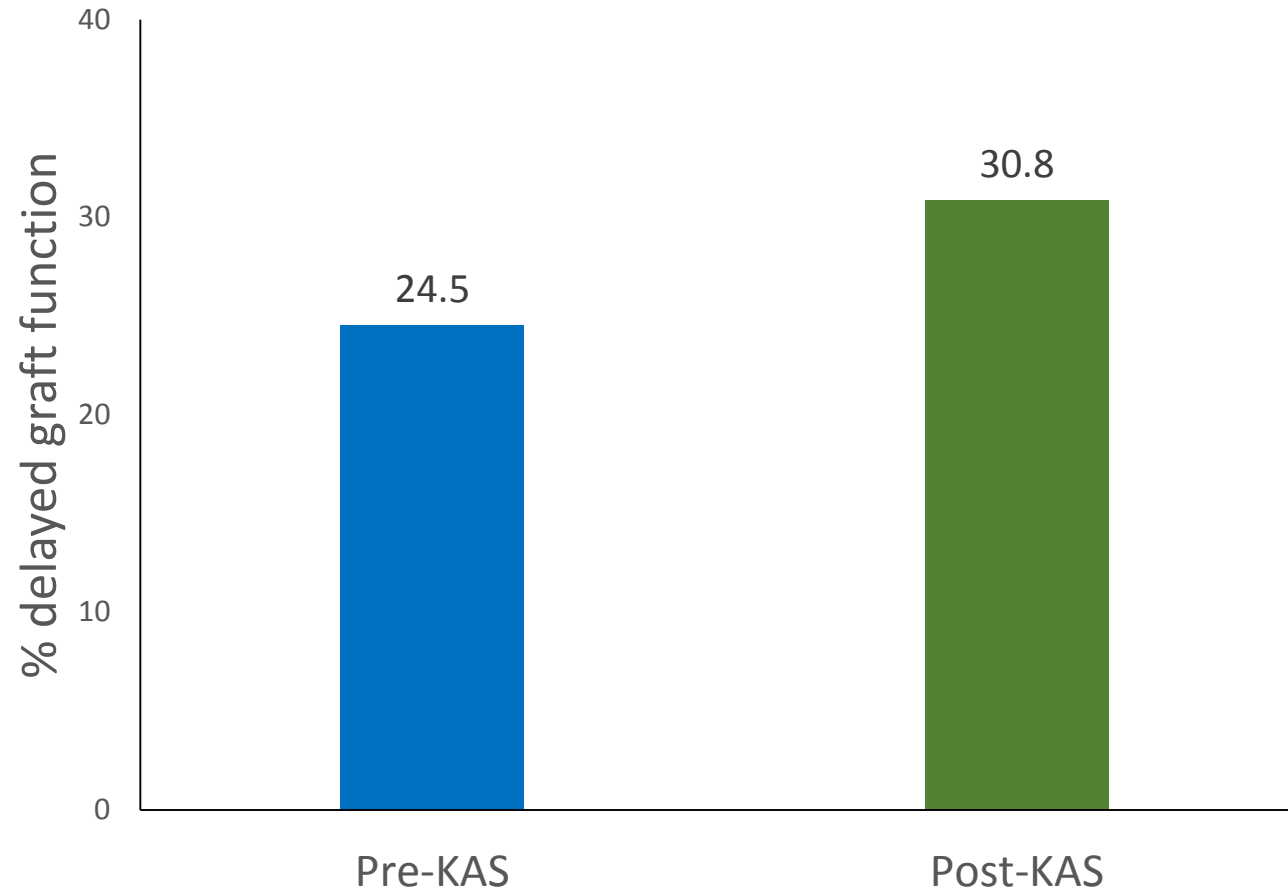


Post-KAS



- Though fewer transplants are occurring locally, approximately the same percentage had KDPI 0-20% kidneys: Pre (22.0%), Post (21.6%)

Delayed graft function (DGF) rates



- The percentage of recipients requiring dialysis within the first week after transplant increased from 24.5% pre-KAS to 30.8% after KAS.

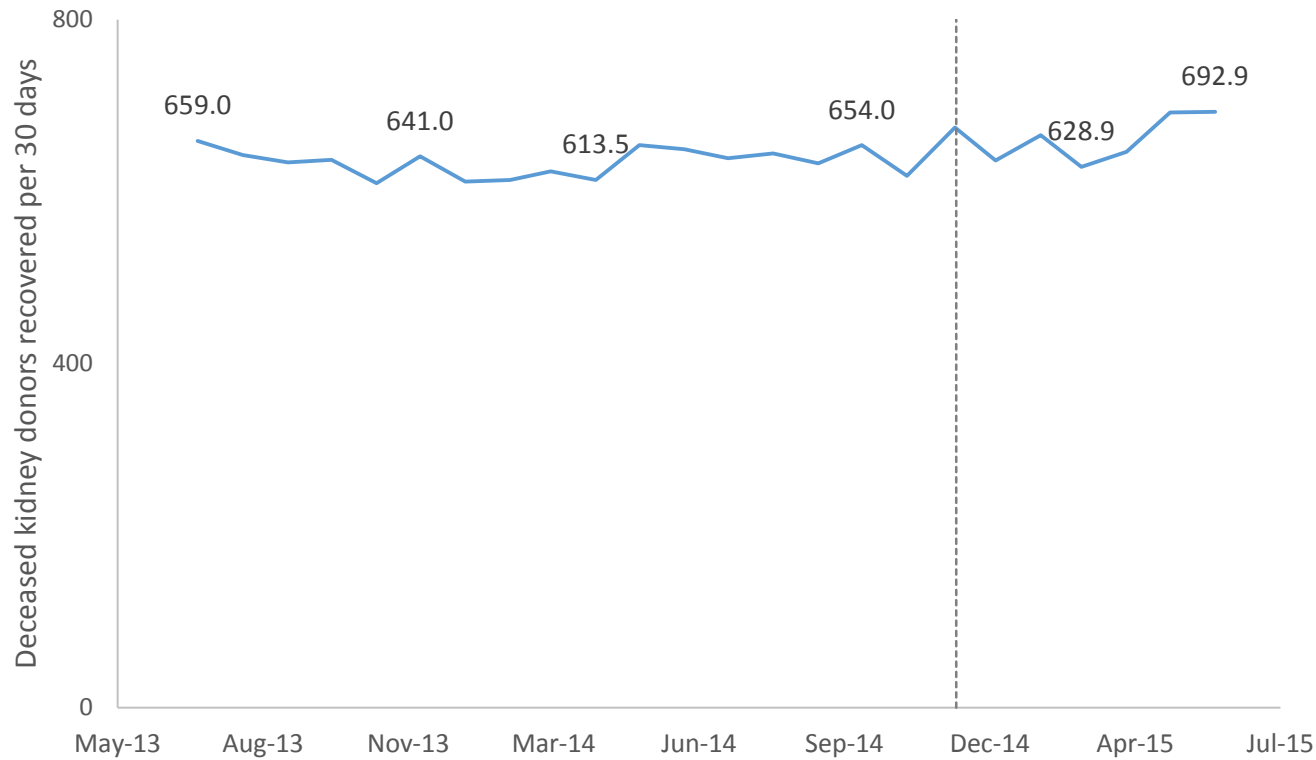


Decreased donor kidney recovery and utilization

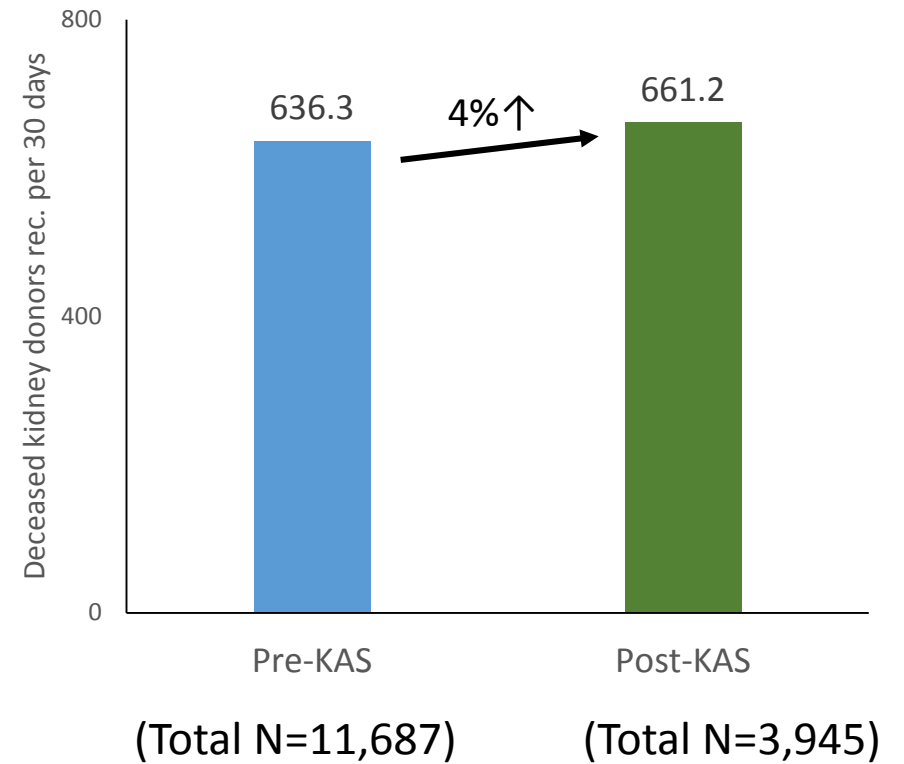
Deceased kidney donors recovered under KAS

Pre vs. post-KAS trends

Over time (per 30 days)



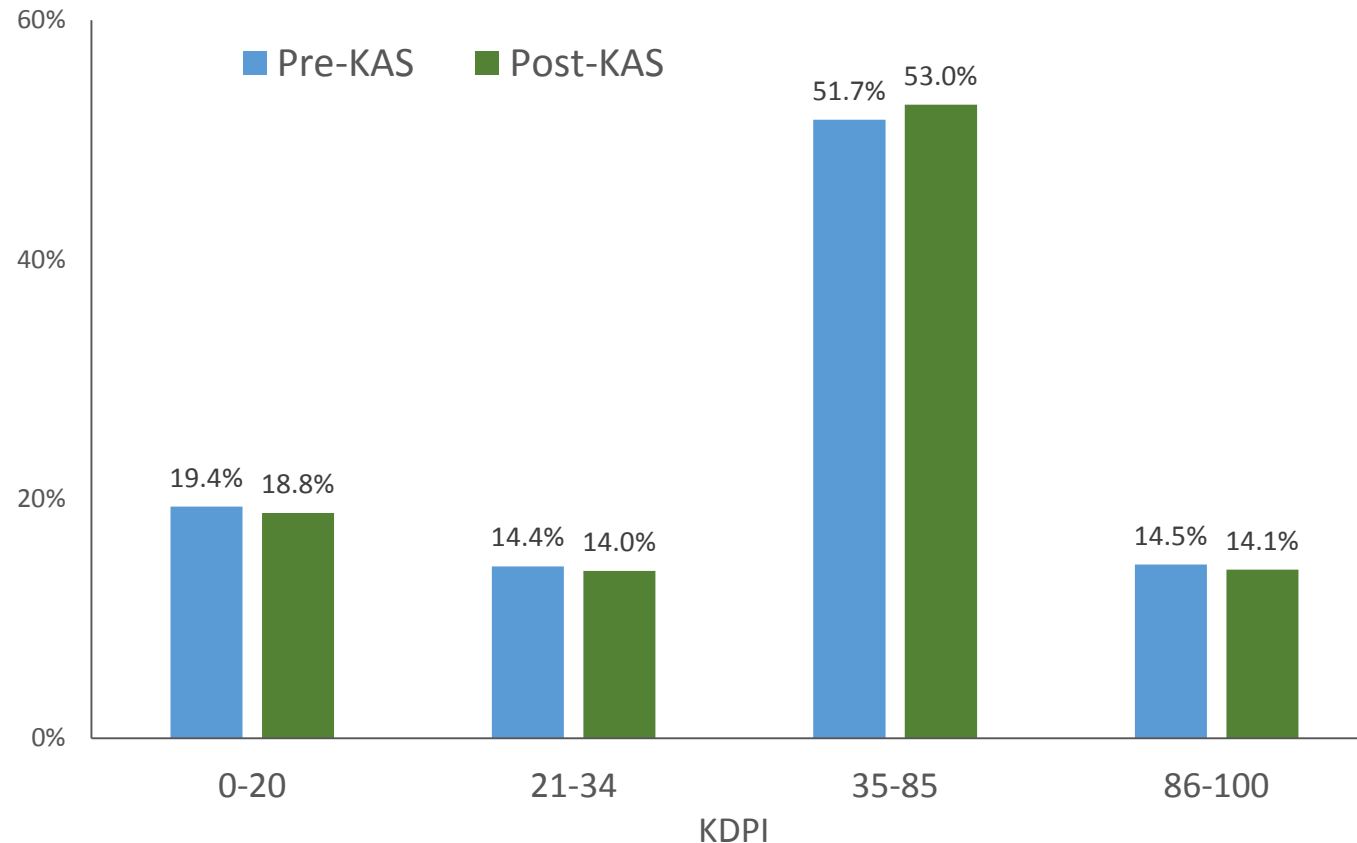
On average



- Recovered kidney donor volume has increased 4% post-KAS.

Kidney recovery & utilization under KAS

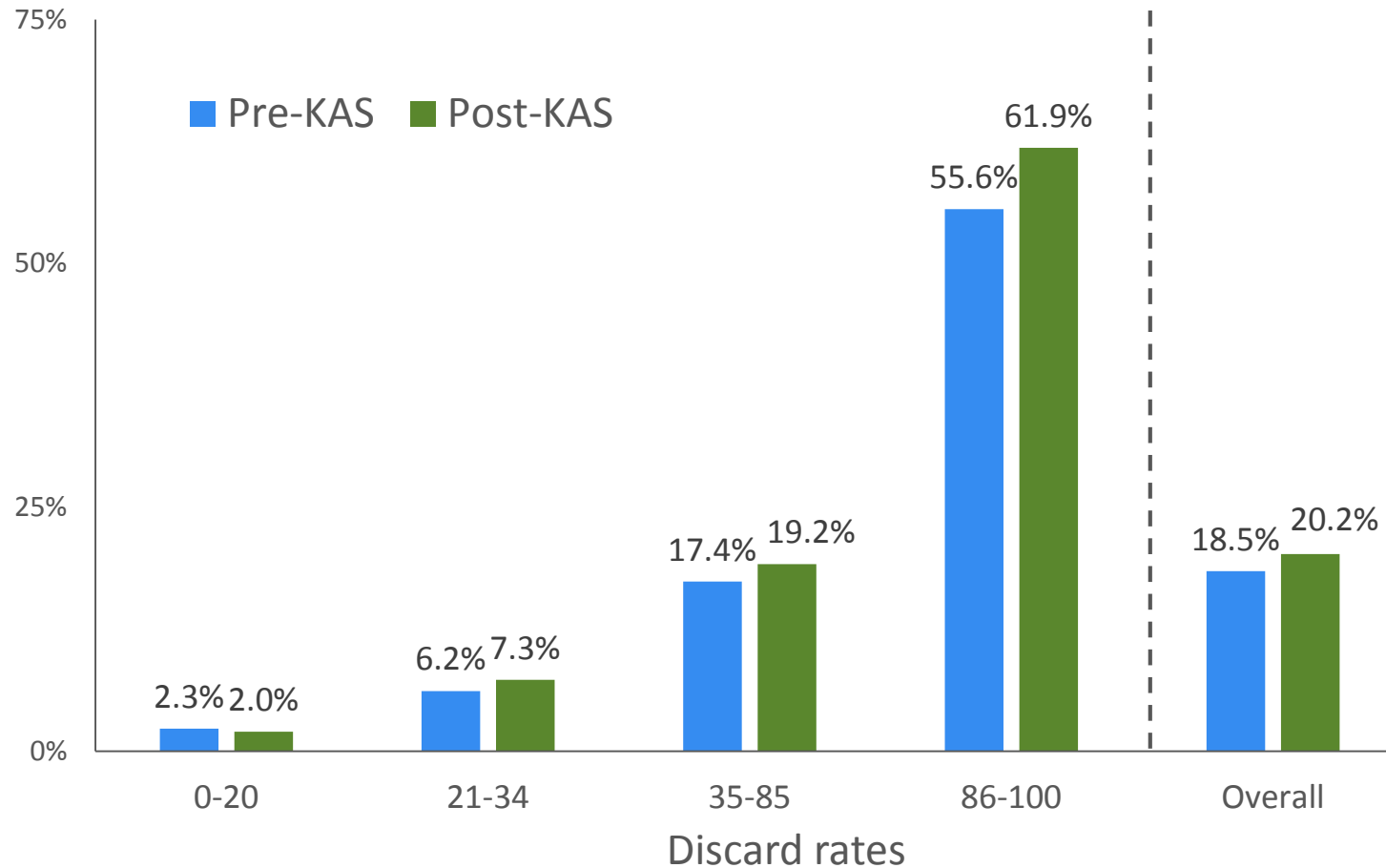
Percentage of Recovered Deceased Kidney Donors by KDPI



- Total kidney donors recovered per month increased 4% (636 to 661).
- However, the distribution by KDPI has remained very similar.

Kidney recovery & utilization under KAS

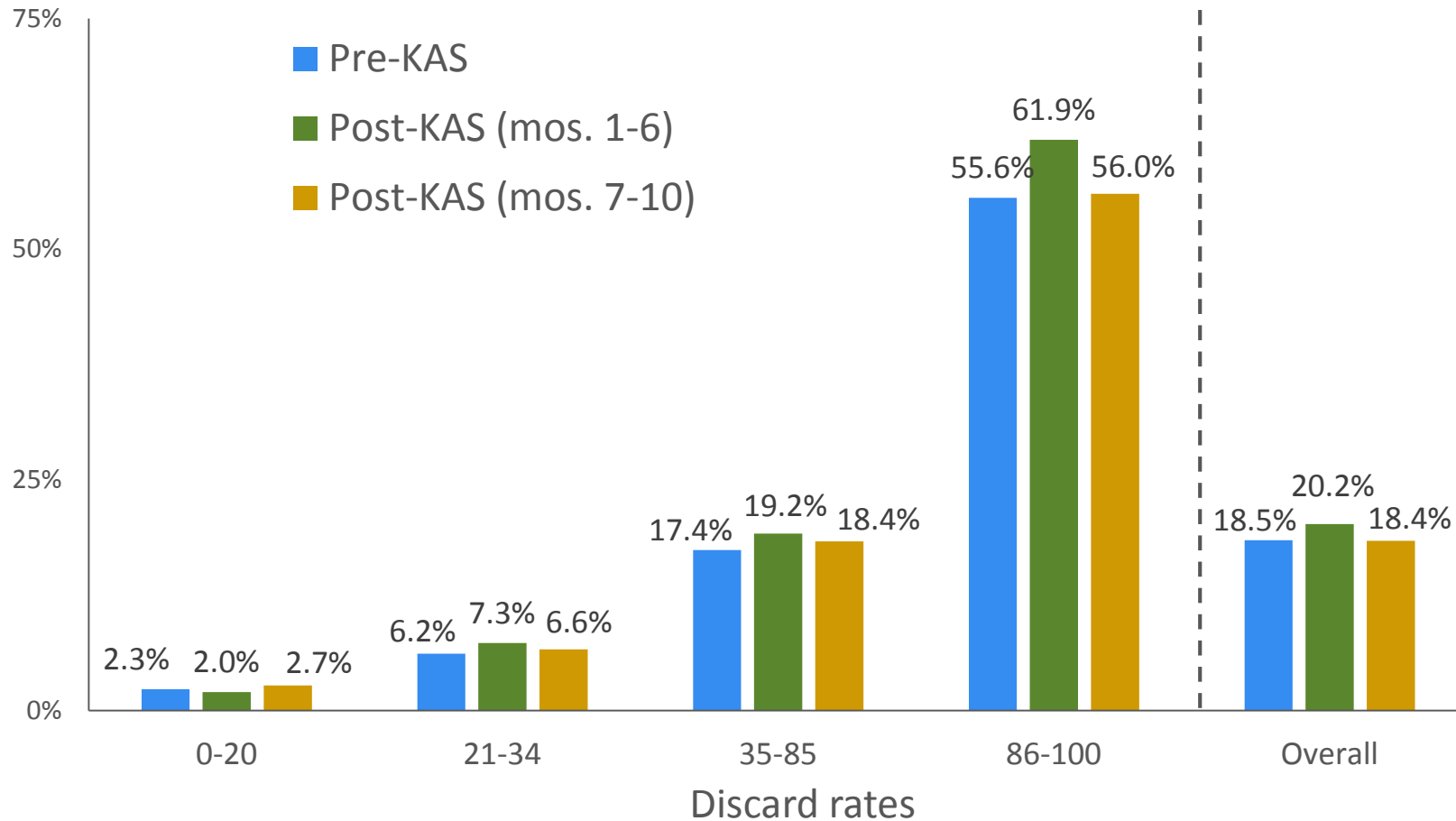
Kidney Discard Rate by KDPI



- Kidney discard rates increased by 1.7% points (about 10%).
- Increase largest for, but not limited to, KDPI>85% kidneys.

Kidney recovery & utilization under KAS

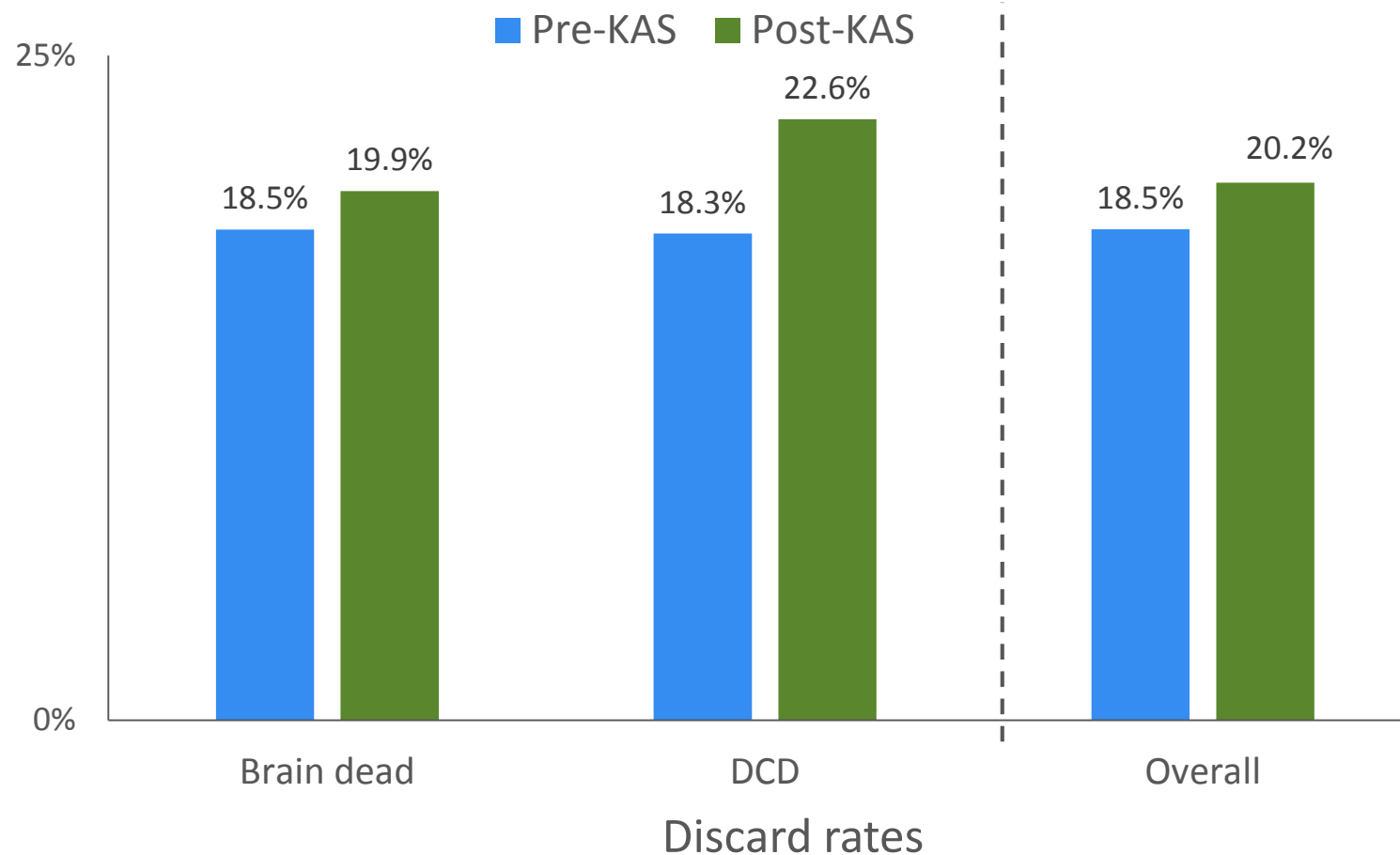
Kidney Discard Rate by KDPI -- *including months 7-10 (Jun – Sep '15)*



- Discard rates have returned to pre-KAS levels in recent months.

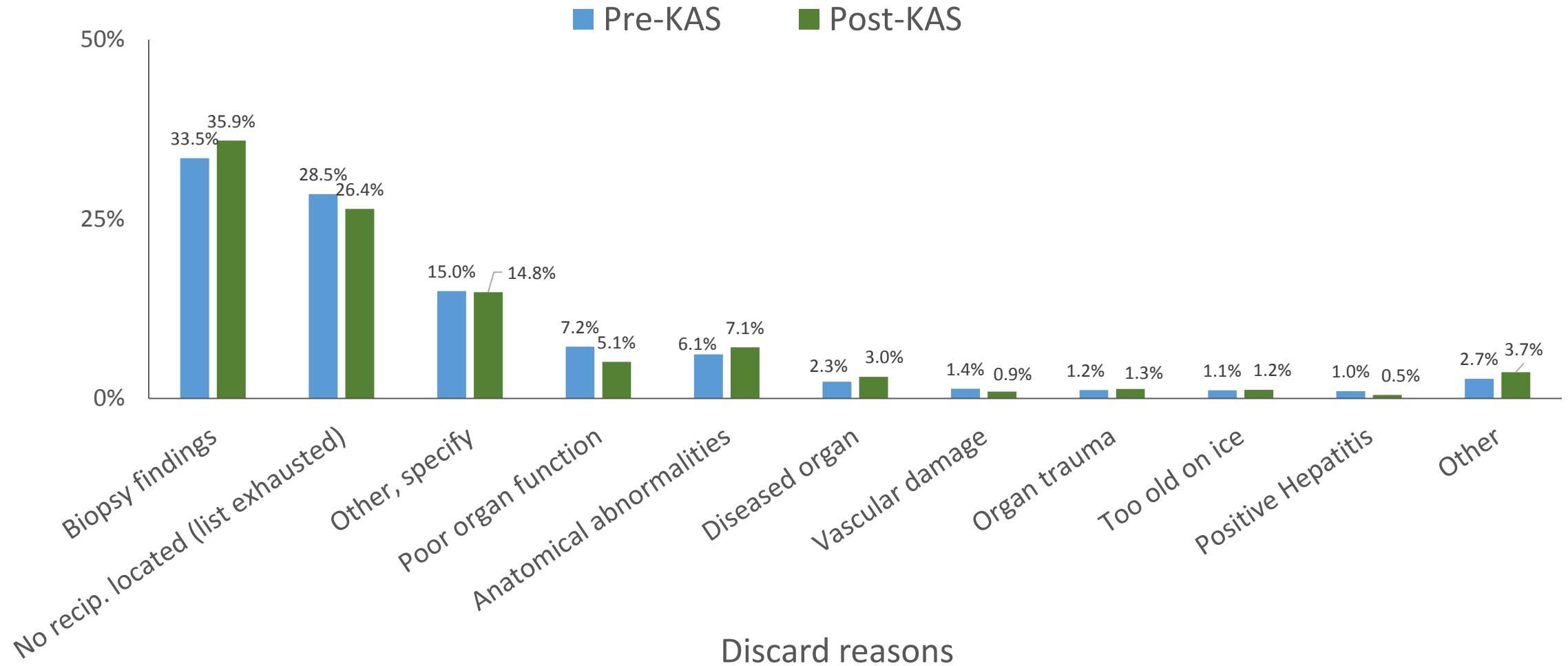
Kidney recovery & utilization under KAS

Kidney Discard Rate by DCD vs. BD



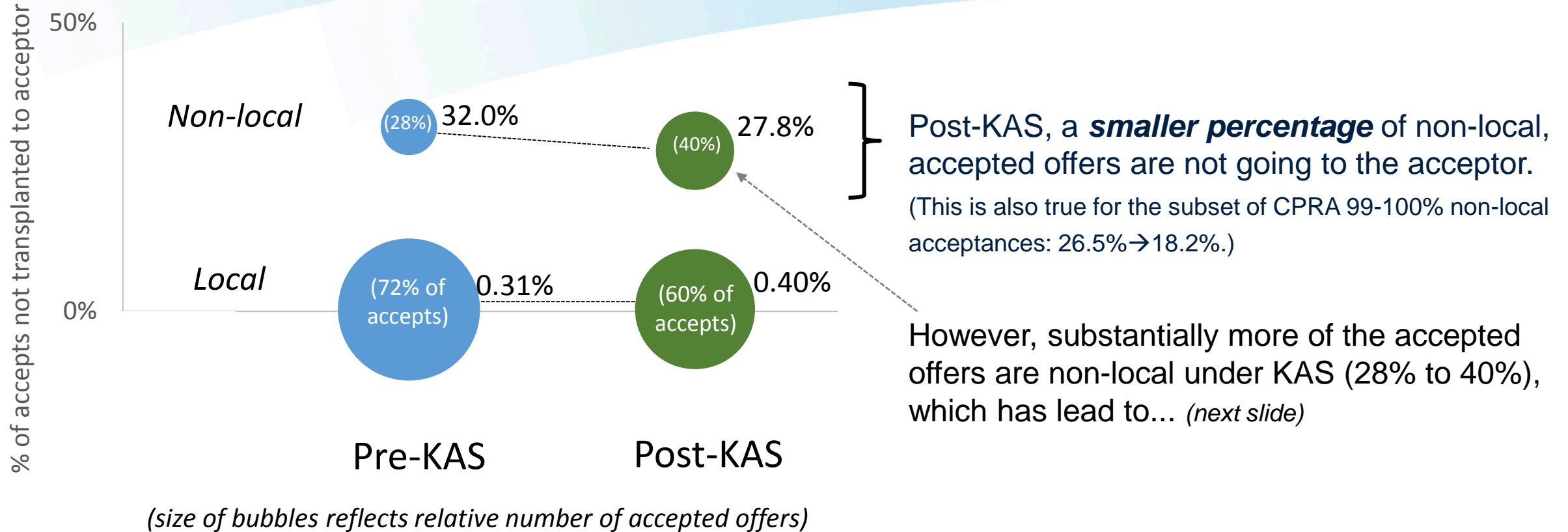
Kidney recovery & utilization under KAS

Kidney Discard Reasons

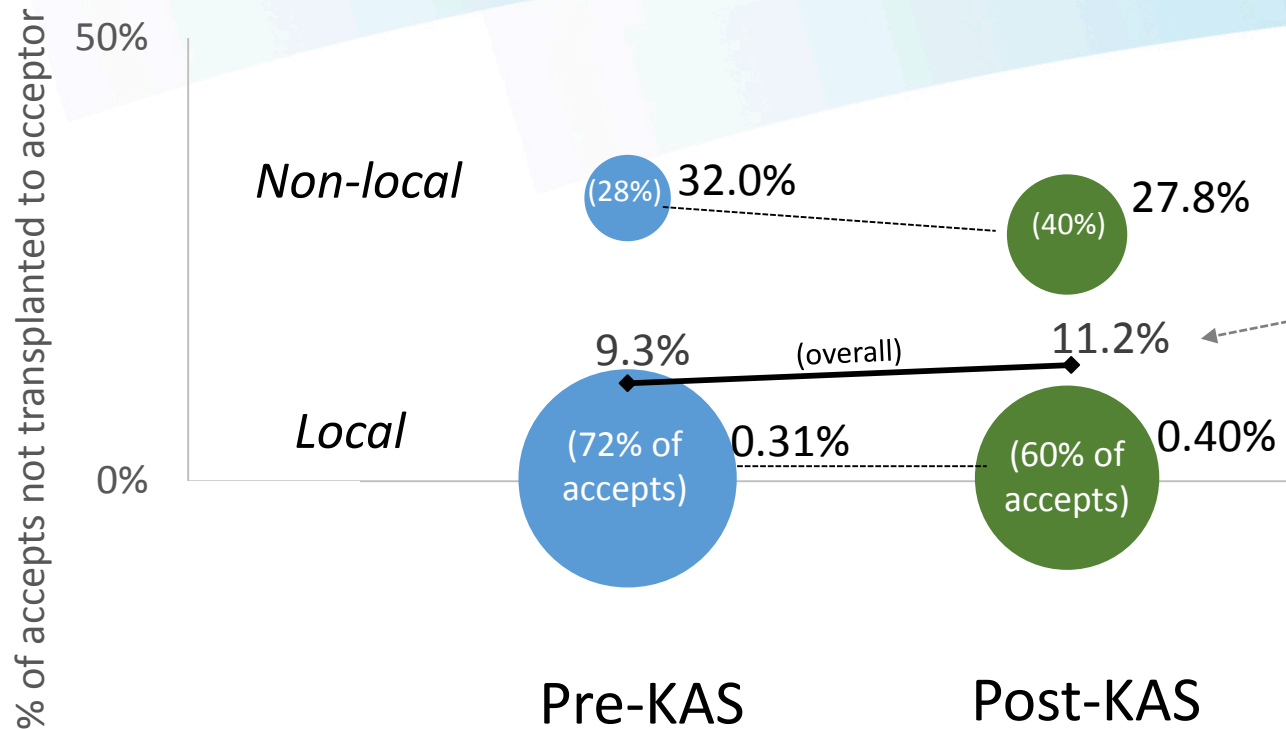


- Reasons for discard similar pre vs post-KAS.

Accepted Offers Not Transplanted to the Acceptor*



Accepted Offers Not Transplanted to the Acceptor*



...an **increase** in the overall % of accepts not going to the accepting patient.

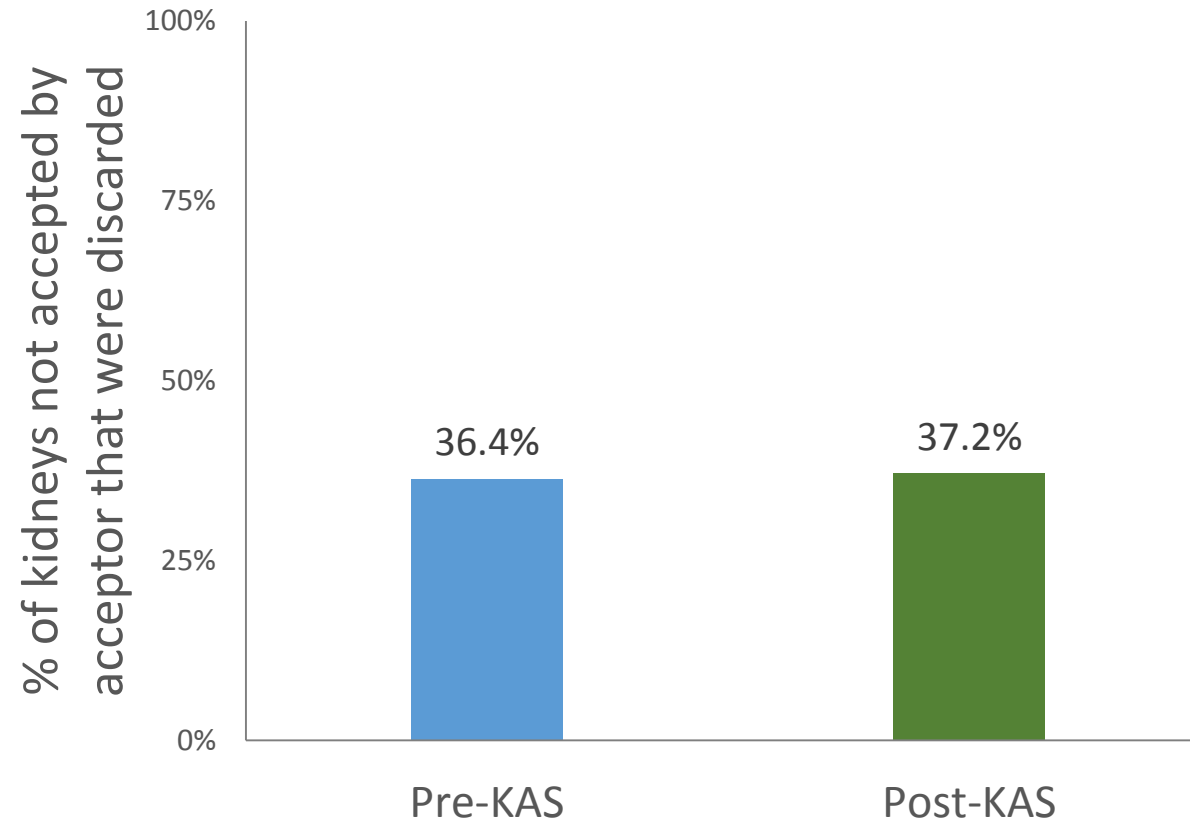
This is because the overall numbers (9.3% and 11.2%) are weighted averages of local and non-local offers, and 40% of the weight is non-local in the post-KAS era.

(size of bubbles reflects relative number of accepted offers)

(Example of “Simpson’s Paradox”)

- Bottom line: More kidneys are not going to the acceptor under KAS.
- However, this is because more kidneys are being allocated non-locally, not because of less efficient allocation of shipped kidneys.
- If the non-local rate had not improved but remained at 32%, the overall rate would have been 12.9%.

Accepted Offers Not Transplanted to the Acceptor Percent Discarded



- Just over a third of kidneys accepted but not transplanted to the accepting patient were discarded, pre and post-KAS.
- The remaining kidneys were transplanted into another recipient.

Summary: First Six Months of KAS

- Overall – KAS is meeting key goals
 - Highly successful 6-month pre-KAS preparation period
 - Decrease in longevity mismatches
 - Increase in the number of transplants among very highly sensitized patients
 - Increase in access to transplant for African Americans candidates
- “Bolus effects”: the percent of transplants to CPRA 99-100% and dialysis>10 years recipients are both tapering post-KAS
- Increase in A2/A2B→B transplants, but still room for growth
- Transplant volume up 1%

Summary: First Six Months of KAS (cont'd)

- Several trends deserve further attention:
 - Fewer OMM transplants
 - Slight drop in pediatric transplants will continue to be tracked closely
 - Logistical challenges in allocation
 - Increased CIT and DGF
 - Increase in discard rates, particularly KDPI>85% kidneys. ***Rates appear to be returning back to pre-KAS levels based on months 7-10.***
- Other metrics (e.g., graft survival rates) require additional lag time and will be available in future reports