

The New Kidney Allocation System (KAS): The First 18 Months

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Topics

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2. Transplant volume
3. Regional distribution of transplants
4. Pediatric transplants
5. “Bolus” effects
 - CPRA 99-100 recipients
 - Recipients with 10+ years on dialysis
6. Kidney utilization
7. Recipient outcomes
8. KDPI mapping table error (April 20 – May 19, 2016)

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

Analysis periods

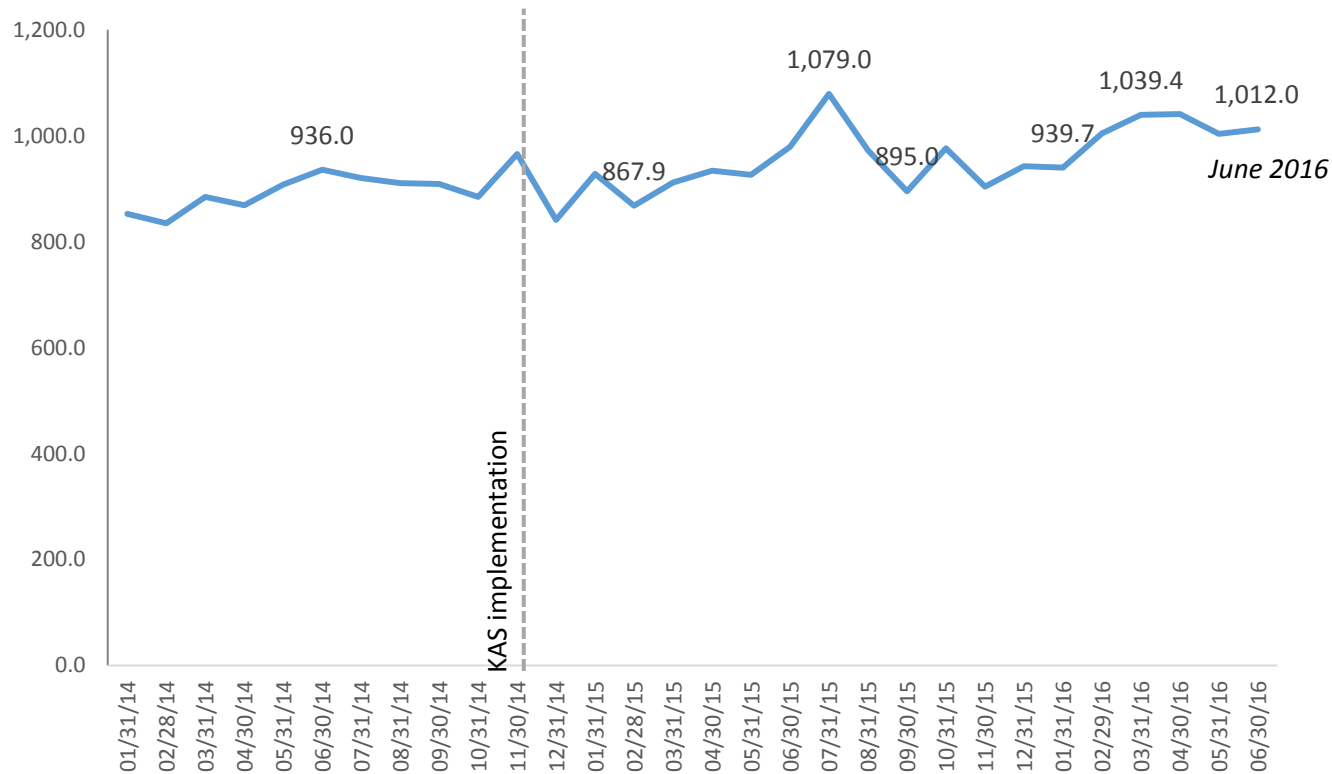
- Pre-KAS: Dec 4, 2013 – Dec 3, 2014 (12 months)
- Post-KAS: Dec 4, 2014 – May 31, 2016 (~18 months)

Some slides include a longer post-KAS evaluation (e.g., 19 or 20 months, as indicated)

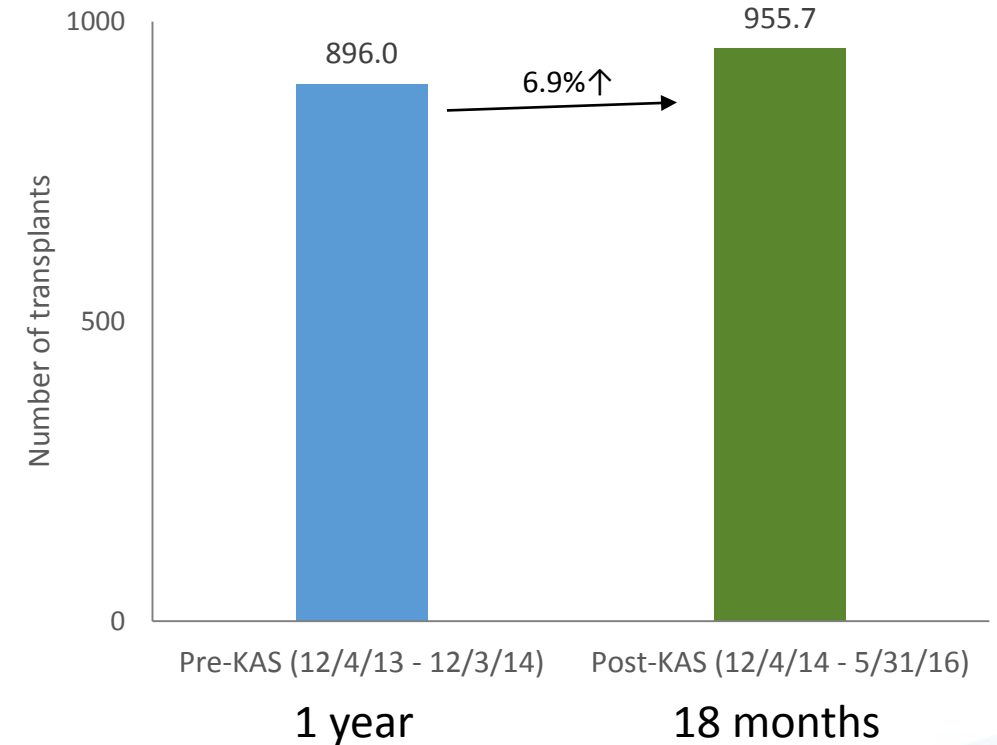
Solitary deceased donor kidney transplants under KAS

Pre vs. post-KAS trends

Over time (per 30 days)

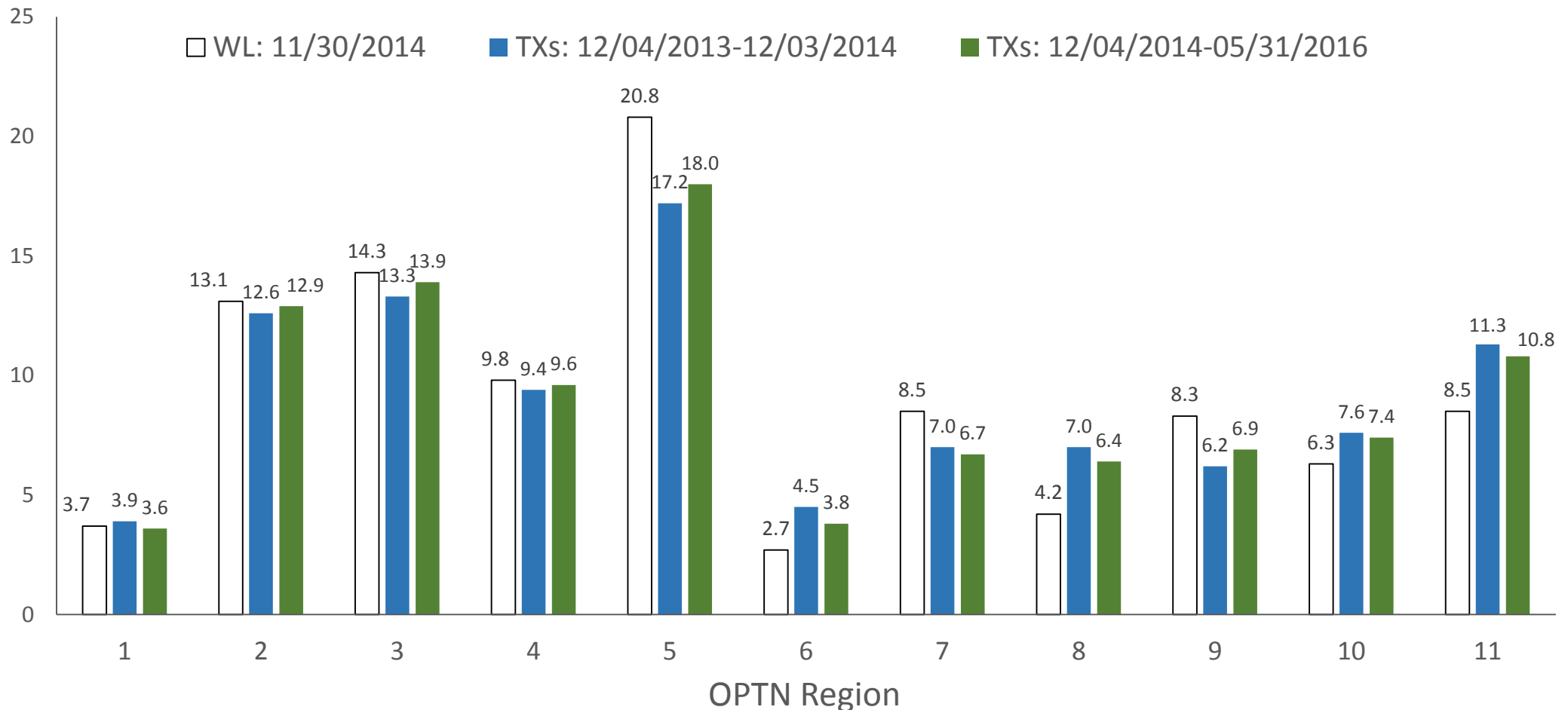


Overall (per 30 days)



- Transplant volume increased 6.9%, from 896.0 to 955.7 per month.

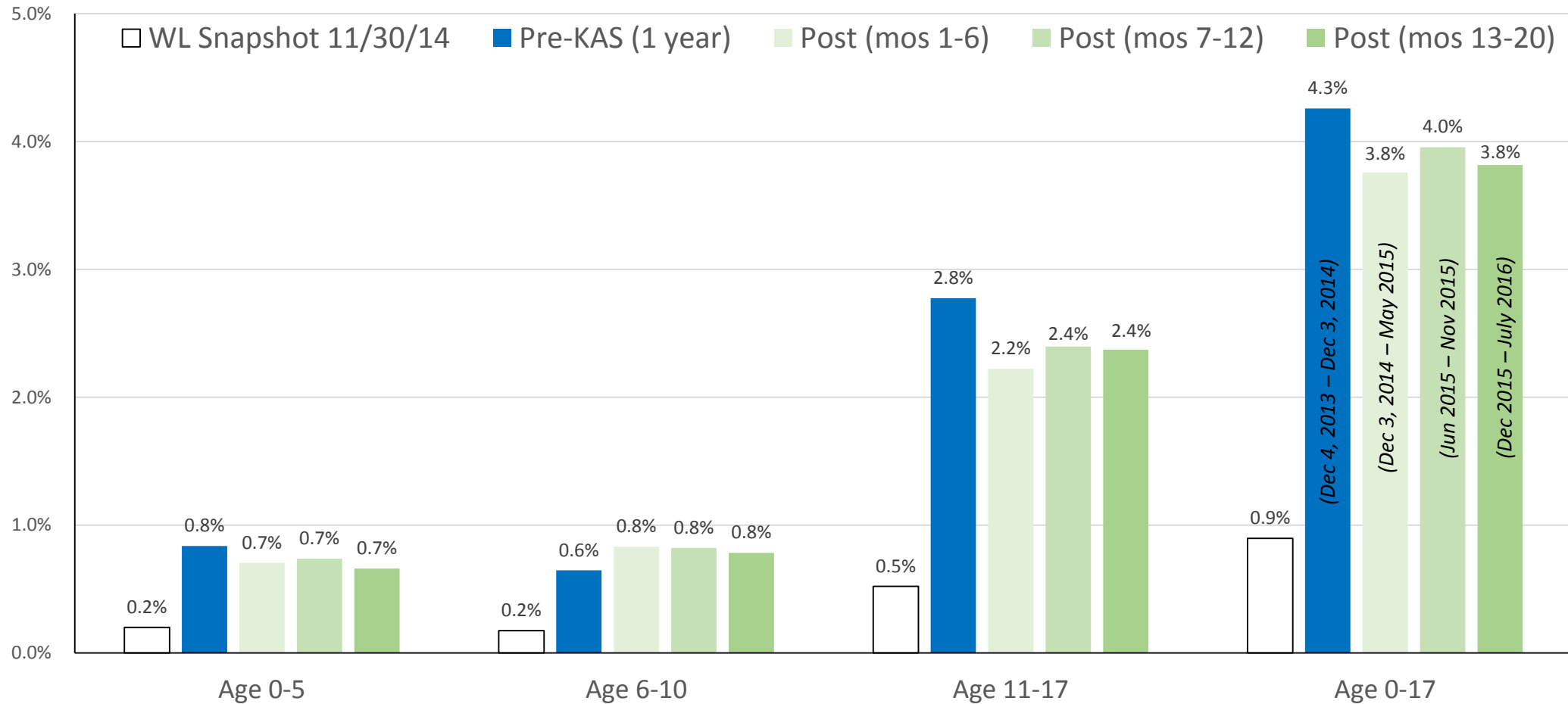
Regional distribution of kidney transplants



- Most changes in % of transplants by Region were very small.
- Largest relative changes: Region 9↑; Region 6↓.

Trends in pediatric transplants

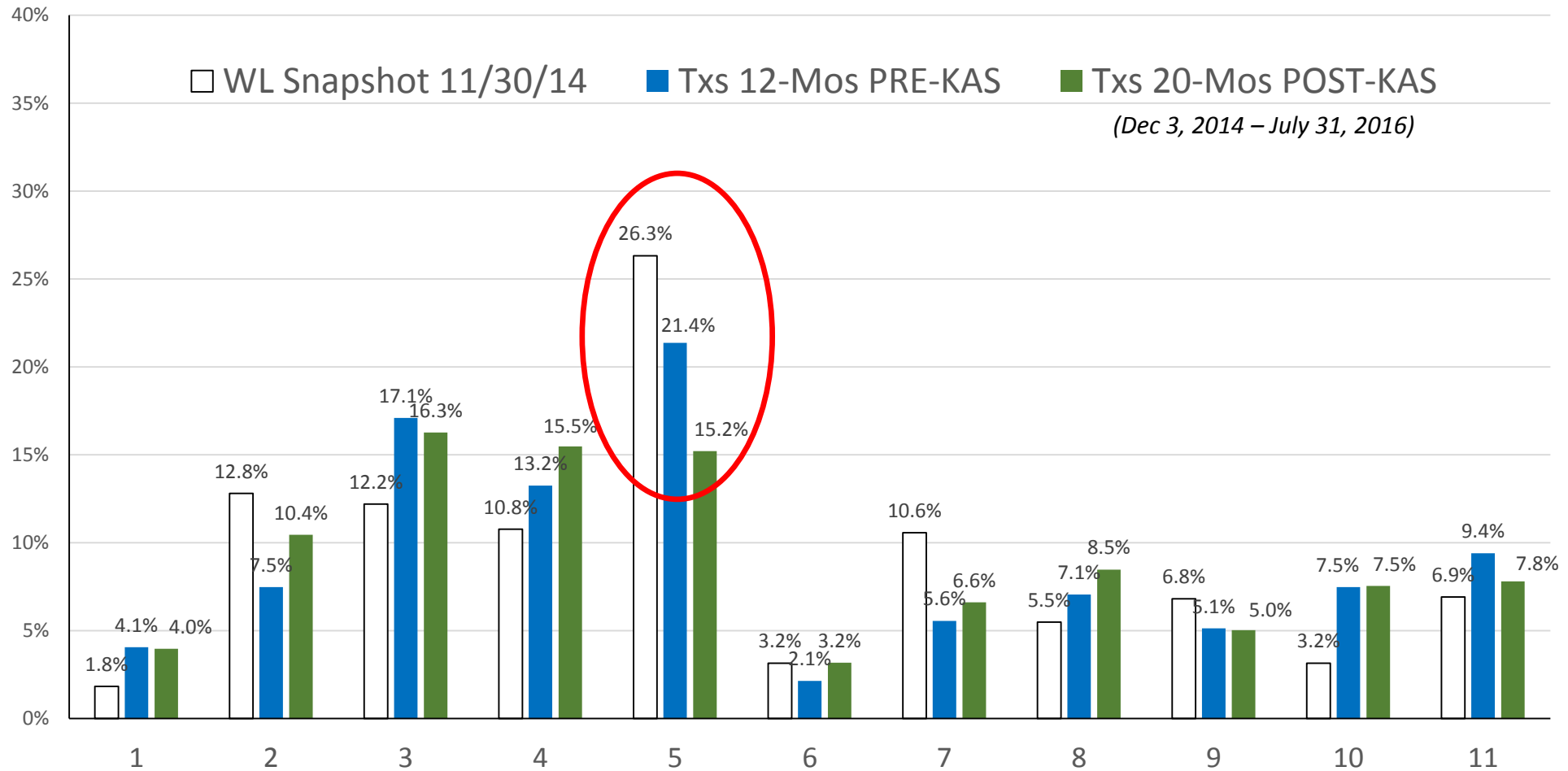
Percent of DD Kidney Transplants to Pediatrics (results through July 31, 2016)



- Pediatrics represent 0.9% of the kidney WL and account for about 4% of transplants.
- Small Post-KAS increase for age 6-10, decreases for age 0-5, 11-17, and overall.

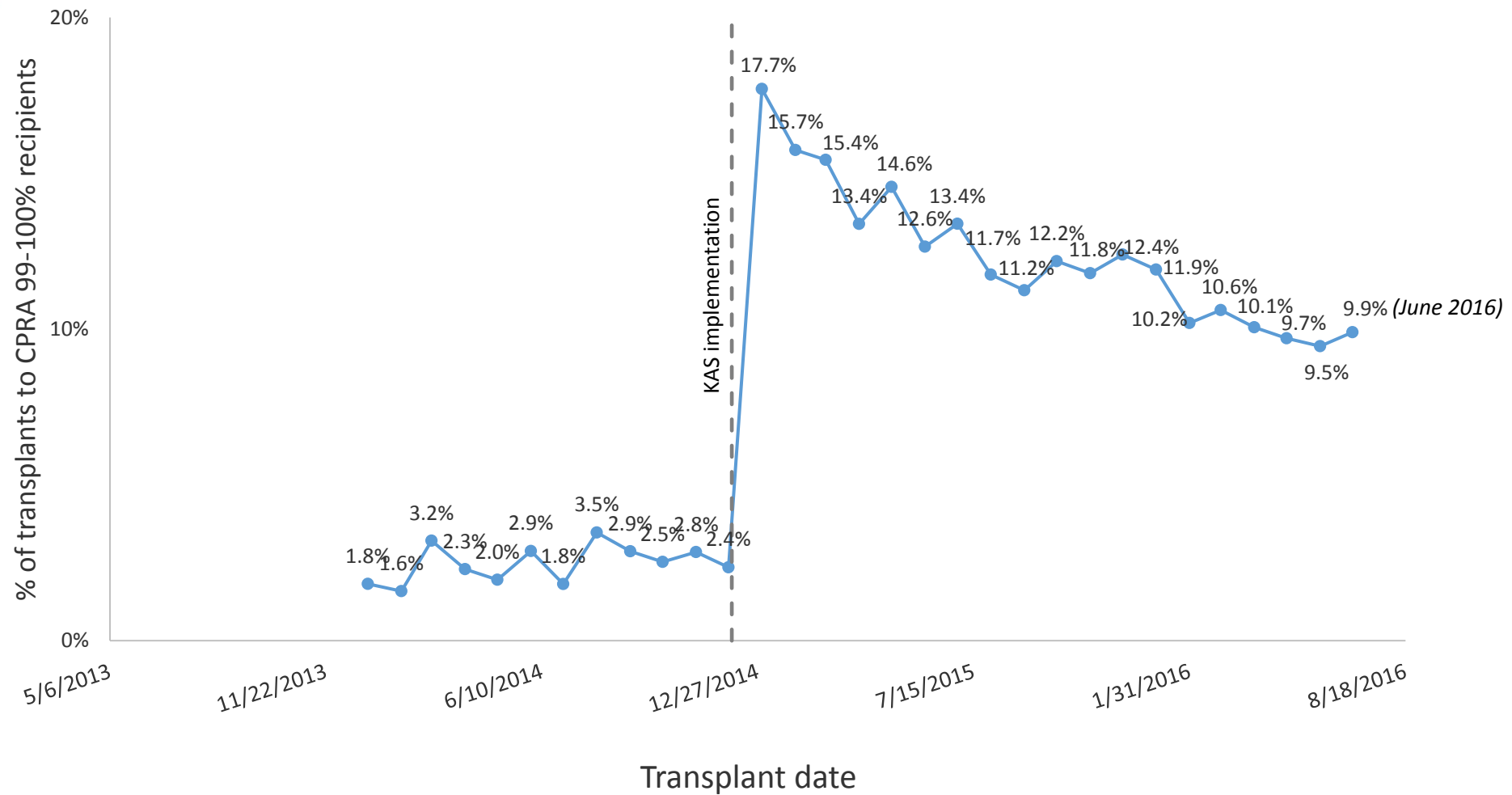
Geographic distribution of pediatric kidney transplants

Percent of Pediatric DD Kidney Transplants by Region (through July 31, 2016)



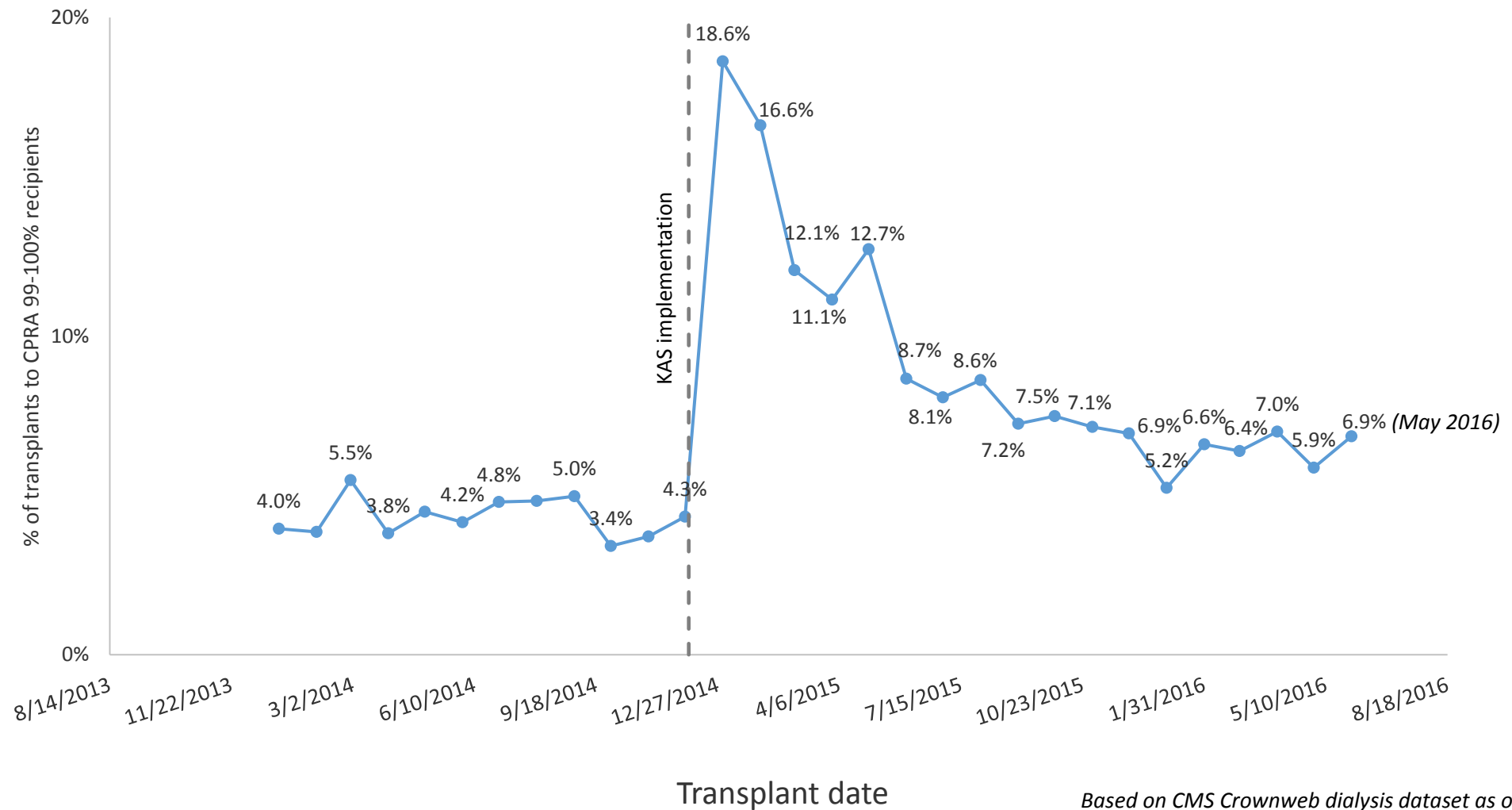
- Most regions had higher or similar percent of pediatric transplants post-KAS.
- However, the % of pediatric transplants occurring in region 5 dropped from 21.4% to 15.2%. 26.3% of pediatric candidates are registered in Region 5.

CPRA 99-100% recipient “bolus effect”



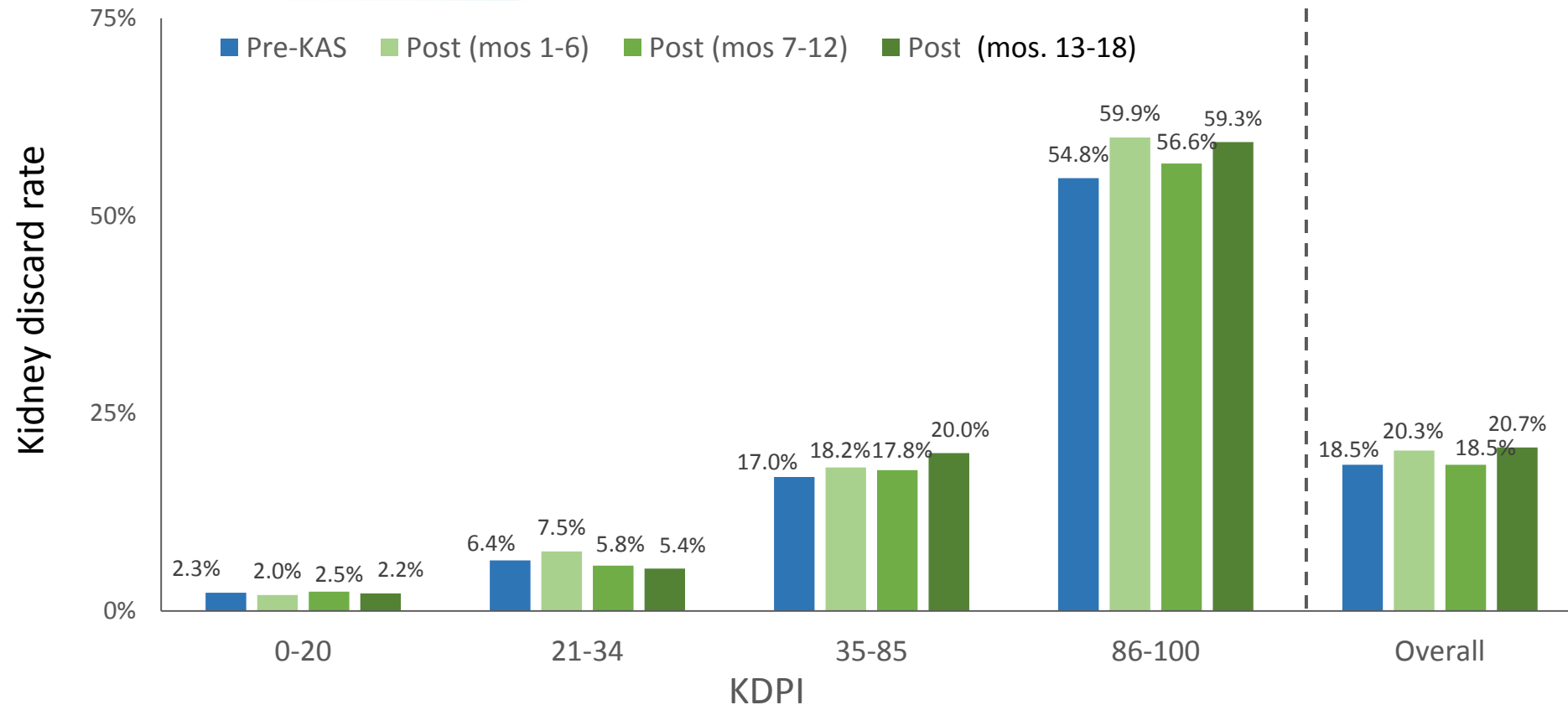
- Transplants to CPRA 99-100% patients rose sharply after KAS but have tapered to around 10%.

High dialysis time recipient “bolus effect”



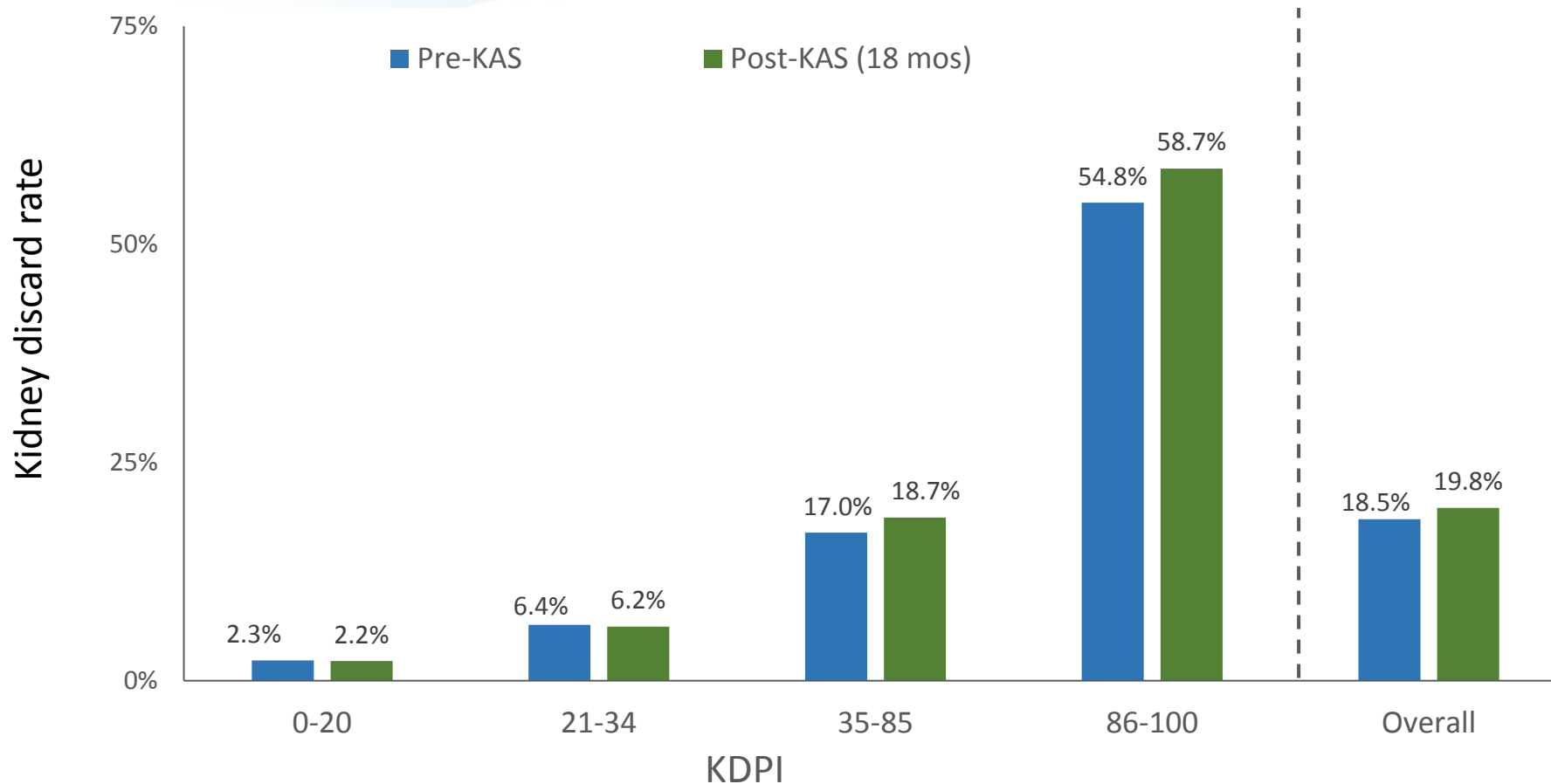
- After KAS, the % of transplants to recipients with 10+ years of dialysis rose sharply to nearly 19% but has tapered to about 7%.

Kidney Utilization by KDPI



- “Discard rate” = percentage of kidneys recovered for transplant but not transplanted. Rate increased, fell, then rose again post-KAS.

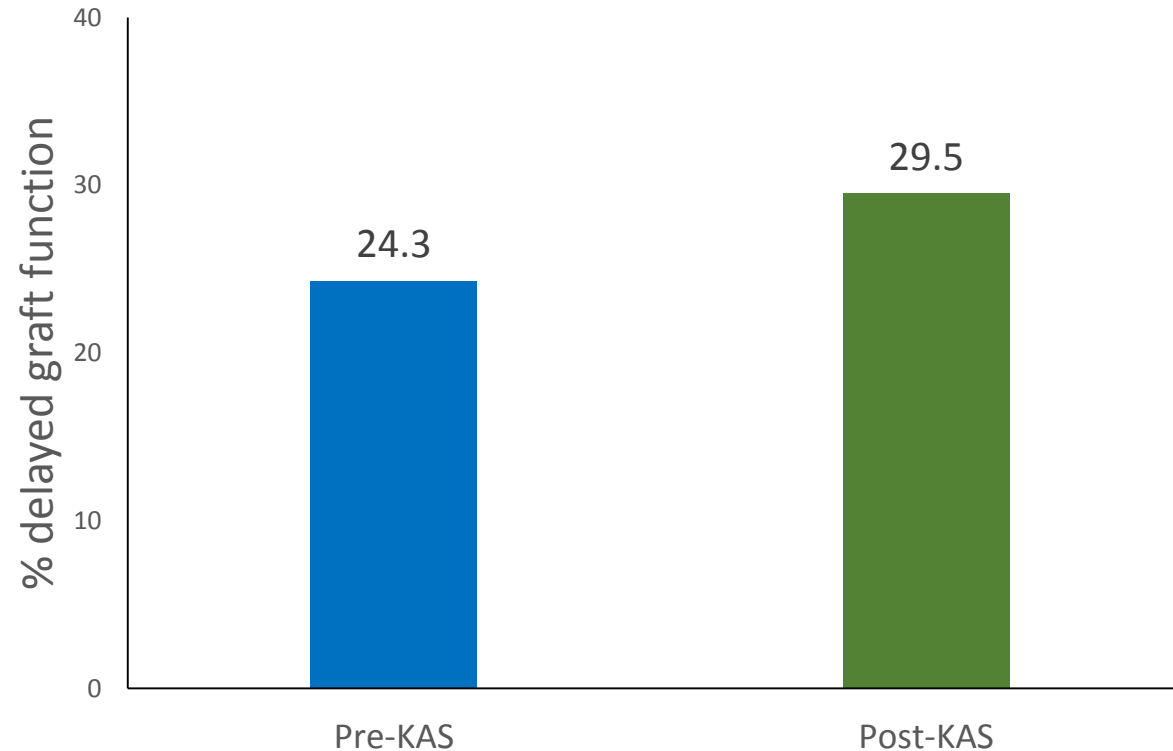
Kidney Utilization by KDPI



- Overall, the discard rate rose from 18.5% to 19.8% ($p=0.001$). The increase was most evident for KDPI 86-100% kidneys.

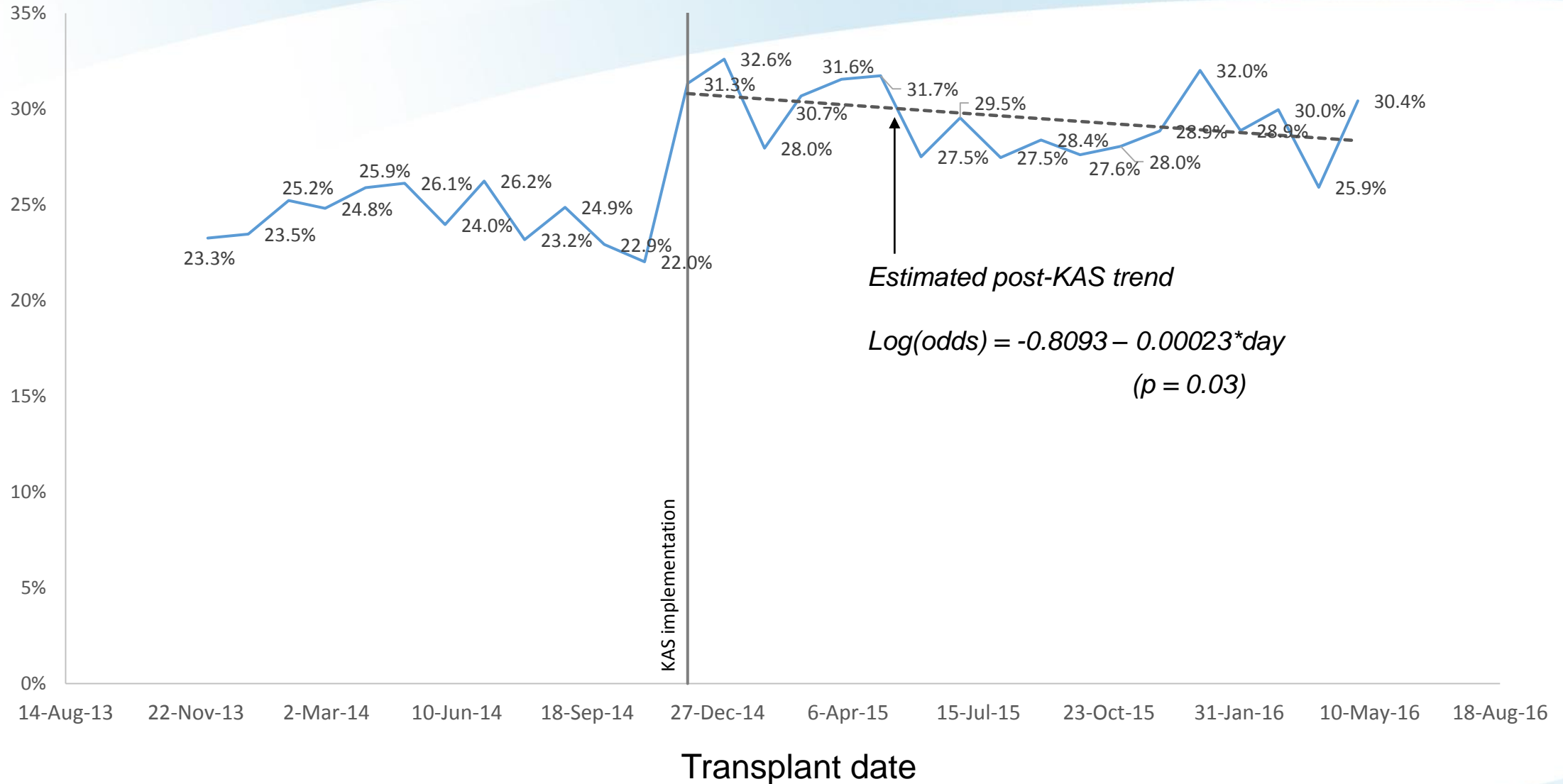
Delayed graft function (DGF) rates (1 year pre vs. 18-months post KAS)

DGF = dialysis within first week



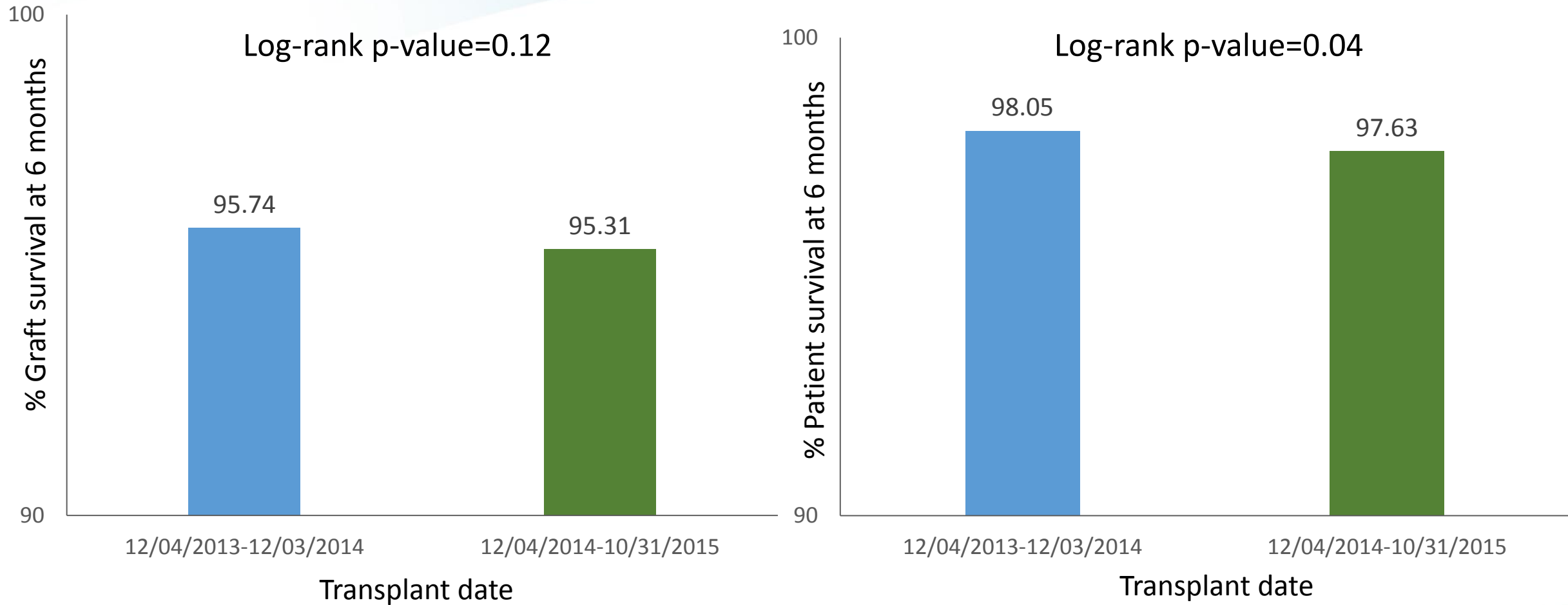
- The percentage of recipients requiring dialysis within the first week after transplant increased from 24.3% pre-KAS to 29.5% after KAS.
- Increase driven by more high dialysis time recipients and other factors.

DGF Trend (transplants through May, 2016)



- Slight decline in DGF rate post-KAS ($p=0.03$), likely due to diminishing bolus effects (e.g., fewer high dialysis time recipients).

Six Month Survival



- Six month graft survival rate over 95%. Patient survival over 97% but slightly lower than pre-KAS ($p < 0.05$).

Highlights: First 18 months of KAS

- Many very highly sensitized and high dialysis time patients have been transplanted under KAS
 - Transplants to these groups have tapered over 18 months
- Deceased donor transplant volume has increased 7%
- However, utilization of recovered kidneys has not improved
- Largest impact on pediatric transplants was observed in Region 5.
- DGF has increased but is slowly trending downward
- Post-KAS, 6-month graft (95.3%) and recipient (97.6%) survival are excellent, though slightly lower than pre-KAS.

Additional information

For more detailed analyses of KAS's impact after 1 year, other resources are available:

- https://www.transplantpro.org/wp-content/uploads/sites/3/KAS_12month_analysis.pdf
- Stewart, D. E., Kucheryavaya, A. Y., Klassen, D. K., Turgeon, N. A., Formica, R. N., & Aeder, M. I. (2016). Changes in Deceased Donor Kidney Transplantation One Year After KAS Implementation. *American Journal of Transplantation*, 16(6), 1834-1847.)

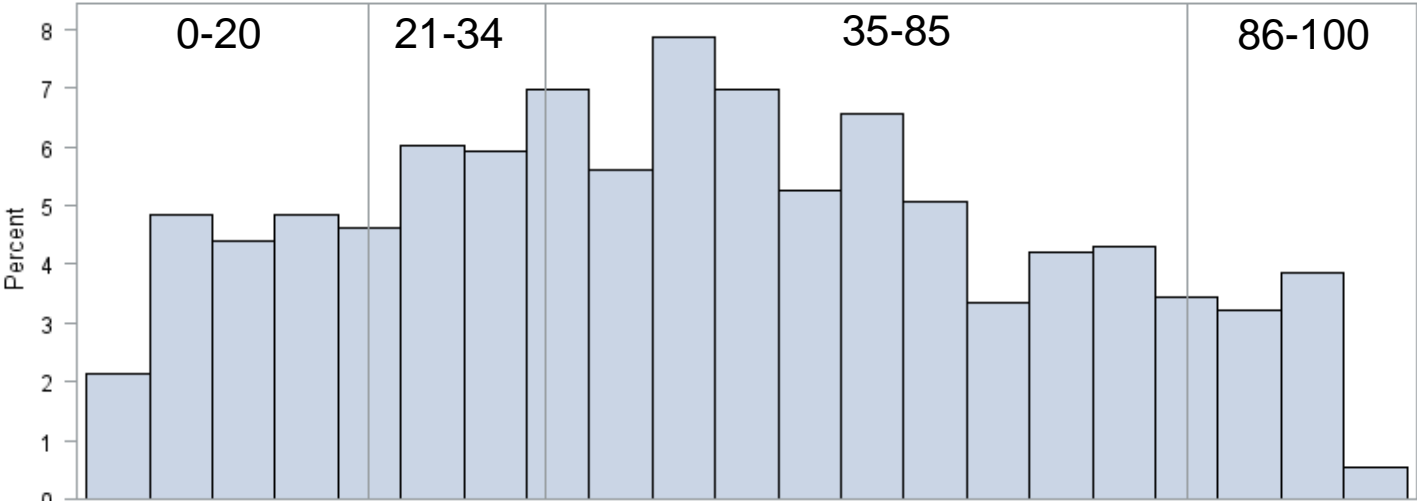
Incorrect KDPI Mapping Table

Background

- KDRI was incorrectly mapped to KDPI between April 20, 2016 – May 19, 2016
 - Start of problem: 2016-04-20 07:34:13.020
 - Problem fixed: 2016-05-19 11:31:34.640
- Source of problem: incorrect “mapping table” uploaded for converting KDRI to KDPI
- Impact:
 - All KDPI values* displayed in DonorNet and used for allocation were higher than they should have been.
 - On average, the displayed KDPI was 17 points higher than the correct value. The maximum deviation was 21 points.

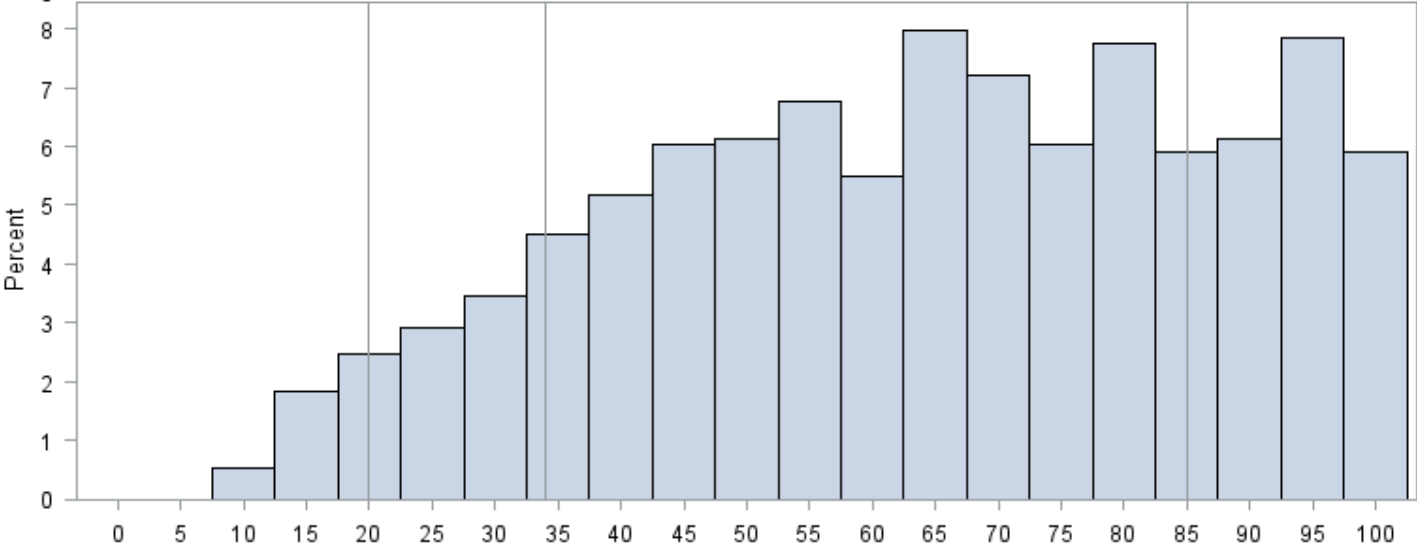
Shift in KDPI values due to incorrect mapping for 930 affected transplants

Actual KDPI's



Mean=46.4

Incorrectly mapped KDPI's



Mean=63.7

KAS sequences dependent upon KDPI

A: KDPI 0-20%

CPRA 98-100%
0 ABDR mismatch (EPTS 0-20%)
Local prior living donors
Local pediatrics
Local A2/A2B-->B (EPTS 0-20%)
Local EPTS 0-20%
0 ABDR mismatch (EPTS 21-100%)
Local A2/A2B-->B (EPTS 21-100%)
Local EPTS 21-100%
Regional pediatrics
Regional A2/A2B-->B (EPTS 0-20%)
Regional EPTS 0-20%
Regional A2/A2B-->B (EPTS 21-100%)
Regional EPTS 21-100%
National pediatrics
National A2/A2B-->B (EPTS Top 20%)
National EPTS 0-20%

B: KDPI 21-34%

CPRA 98-100%
0 ABDR mismatch
Local prior living donors
Local pediatrics
Local A2/A2B-->B
Local candidates
Regional pediatrics
Regional A2/A2B-->B
Regional candidates
National pediatrics
National A2/A2B-->B
National candidates

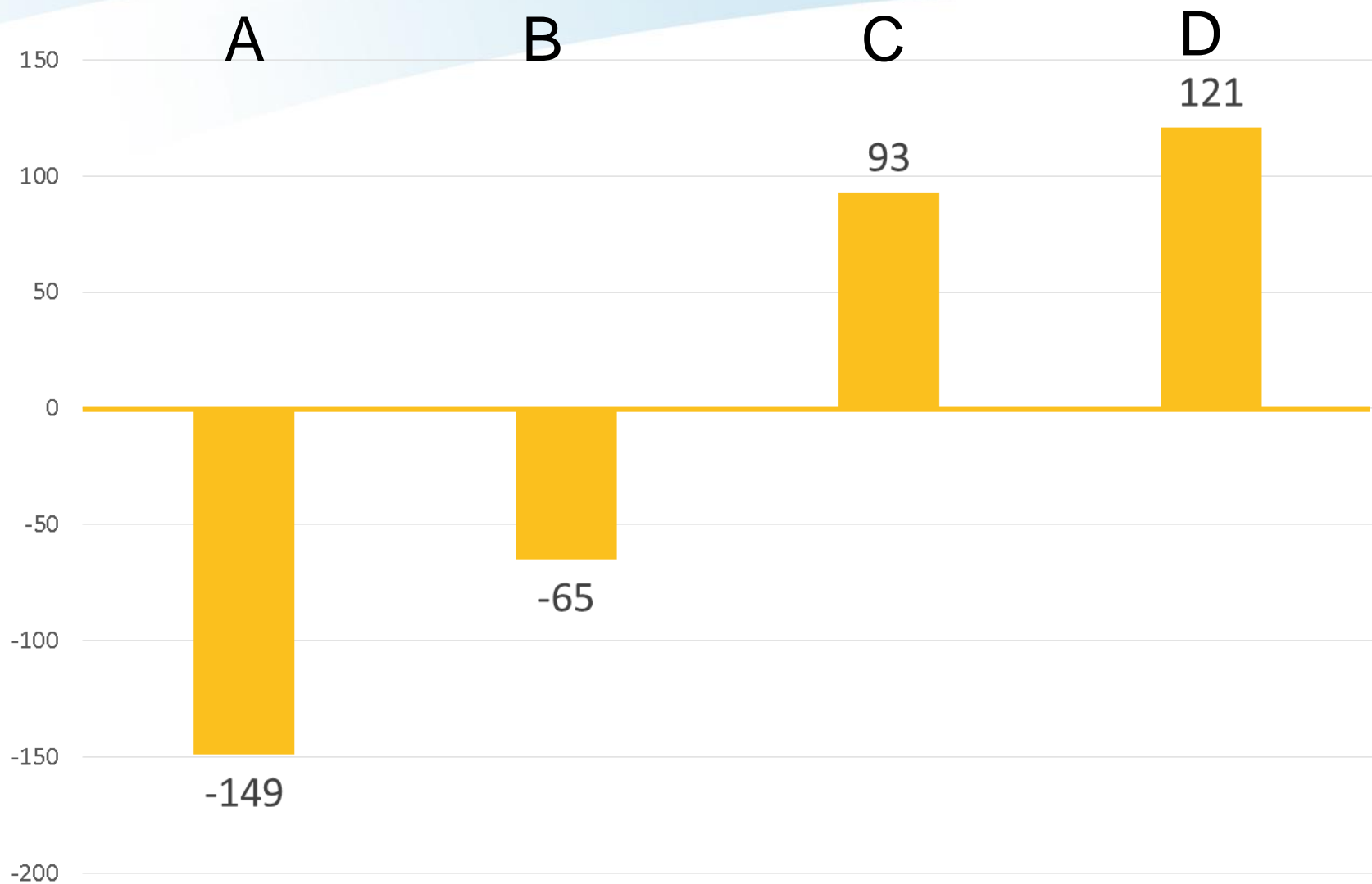
C: KDPI 35-85%

CPRA 98-100%
0 ABDR mismatch
Local prior living donors
Local A2/A2B-->B
Local candidates
Regional A2/A2B-->B
Regional candidates
National A2/A2B-->B
National candidates

D: KDPI 86-100%

CPRA 98-100%
0 ABDR mismatch
Local + regional A2/A2B-->B
Local + regional candidates
National A2/A2B-->B
National candidates

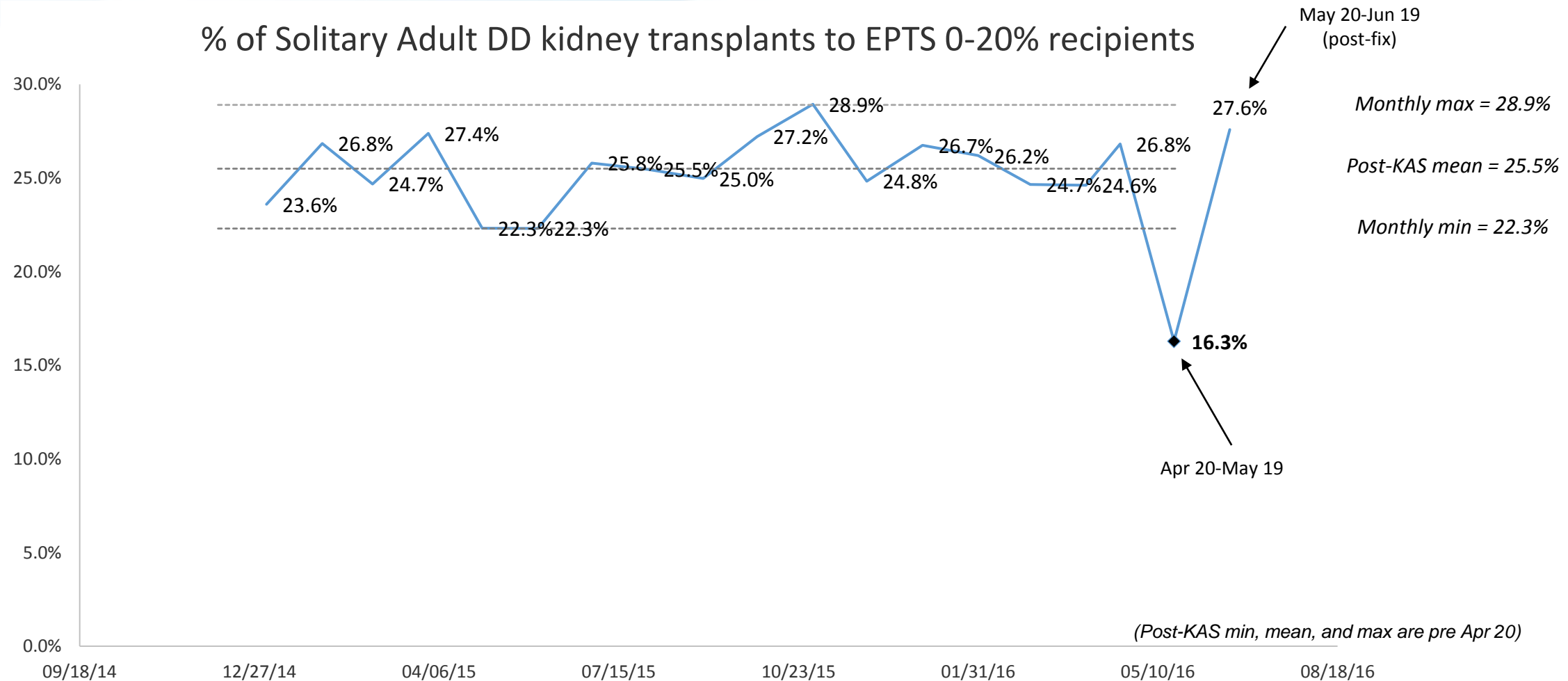
Differences in allocation sequence due to incorrect KDPI



149 fewer transplants were allocated per sequence A (KDPI 0-20).
121 more transplants were allocated per sequence D (KDPI 86-100).

Impact of incorrect KDPI mapping

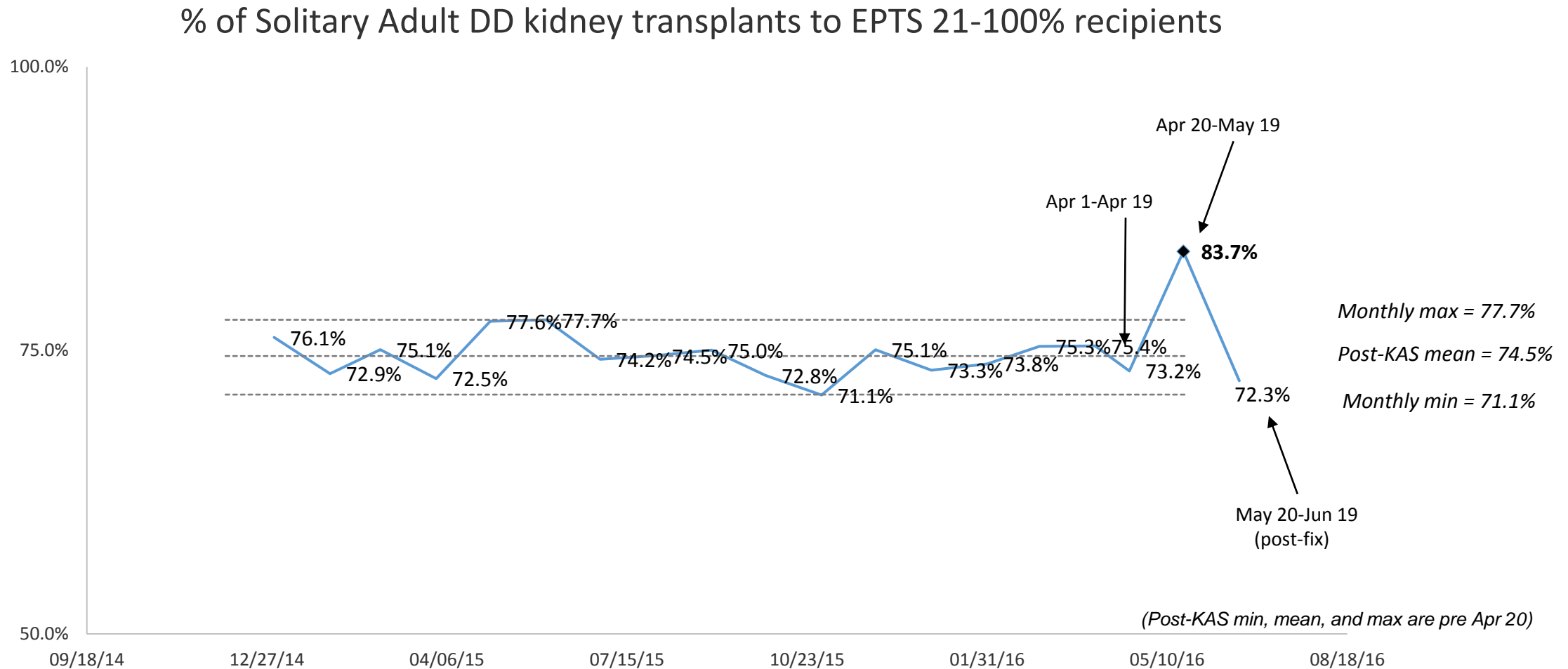
EPTS 0-20% recipients



Transplants to EPTS 0-20% adults dropped and rebounded after the system was fixed.

Impact of incorrect KDPI mapping

EPTS 21-100% recipients



Transplants to EPTS 21-100% adults increased then returned to previous levels after the fix.

Fixing the problem

- The correct table was uploaded on May 19th, 2016
- Tested by IT department and validated by Research department
- Working as expected since May 19th, 2016
- New processes put in place to prevent future problems of this nature
- All programs that performed a transplant during this period were informed of the correct (lower) KDPI value for each recipient.

Impact on distribution of deceased donor kidney transplants

% of transplants received by groups of recipients

Recipient characteristic	Pre-KAS (12/4/13- 12/3/14)	Post-KAS (12/4/14 – 4/19/16)	KDPI mapped incorrectly 4/20/16 – 5/19/16	After correction 5/20/16 – 6/19/16
EPTS 0-20%	(n/a)	25.5%	16.3%	27.6%
EPTS 21-100%	(n/a)	74.5%	83.7%	72.3%
Age 18-34	8.7%	12.7%	9.5%	12.0%
Age 65+	23.0%	18.3%	25.0%	17.8%
Pediatric recipients	4.2%	3.8%	2.4%	5.1%

The distribution of transplants shifted toward older recipients during this one month period but subsequently returned to previous levels.

Impact of KDPI mapping error: summary of findings

- Deceased donor kidney transplant volume remained on par with post-KAS average and was 9% above the pre-KAS average.
 - The kidney discard rate was slightly higher (22.9%, vs. 19.7% post-KAS average) but not outside normal, observed monthly variation
- For this one month period, the distribution of transplants resembled pre-KAS with respect to longevity matching and recipient ages.
- Pediatric transplants declined slightly but rebounded sharply post-fix.
- Transplants to highly sensitized and African American patients were unaffected.

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