



# Paired Exchange Results

## Quarterly Report

As of June 30, 2018

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## Message from the Founder and CEO

We are pleased to report a 57% increase in transplants facilitated in the first half of 2018 with 324 transplants completed in the first half of 2018, up from 207 transplants in the first half of 2017. If we sustain this strong growth rate, we will pass the 3,000 transplant milestone by the end of the year

We have updated our graft and patient survival numbers with the latest data available from the SRTR. In spite of transplanting much more difficult cases, the NKR death censored graft failure rate is 31% below the U.S. living donor transplant failure rate and the NKR patient mortality rate is 33% below the U.S. living donor transplant mortality rate. Centers are now including the

NKR outcomes in the informed consent process for compatible pairs to educate them on the potential for improved outcomes with a better matching donor by participating in an NKR swap.

In Q2 we reported the lowest swap failure rate (21%) in our history. We continue to look for ways to systematically remove potential points of failure. Some new initiatives that we are implementing include; uploading serology labs with automated communication of results to the recipient center, confirmatory enhanced resolution tissue typing for all donors which has already caught three HLA errors, virtual screening cross matching backstopped by the new confirmatory tissue typing process and the requirement that all donor charts are uploaded prior to pair activation.

The number of NKR chains started tripled in the past 2 years driven by the enormous generosity of donors, the impact of the Advanced Donation Program (which just crossed the 100 donor milestone) and our streamlined donor intake systems (DASH) which will manage nearly 20,000 donor contacts this year. The dramatic increase in chain starts has driven our median wait time to 1.7 months, the lowest in our history. In Q2 73% of transplanted patients went from activation to surgery in under 90 days and only 22 patients had a wait time > 12 months, our lowest level in over 5 years. Of these 22 patients, 5 had cPRAs < 99% and were at centers with negative CLC scores and 17 had cPRAs > 99%.

It is the ongoing dedication and effort of our Member Centers that enable us to continue breaking records and achieving new milestones. Thank you for your support and keep up the great work.

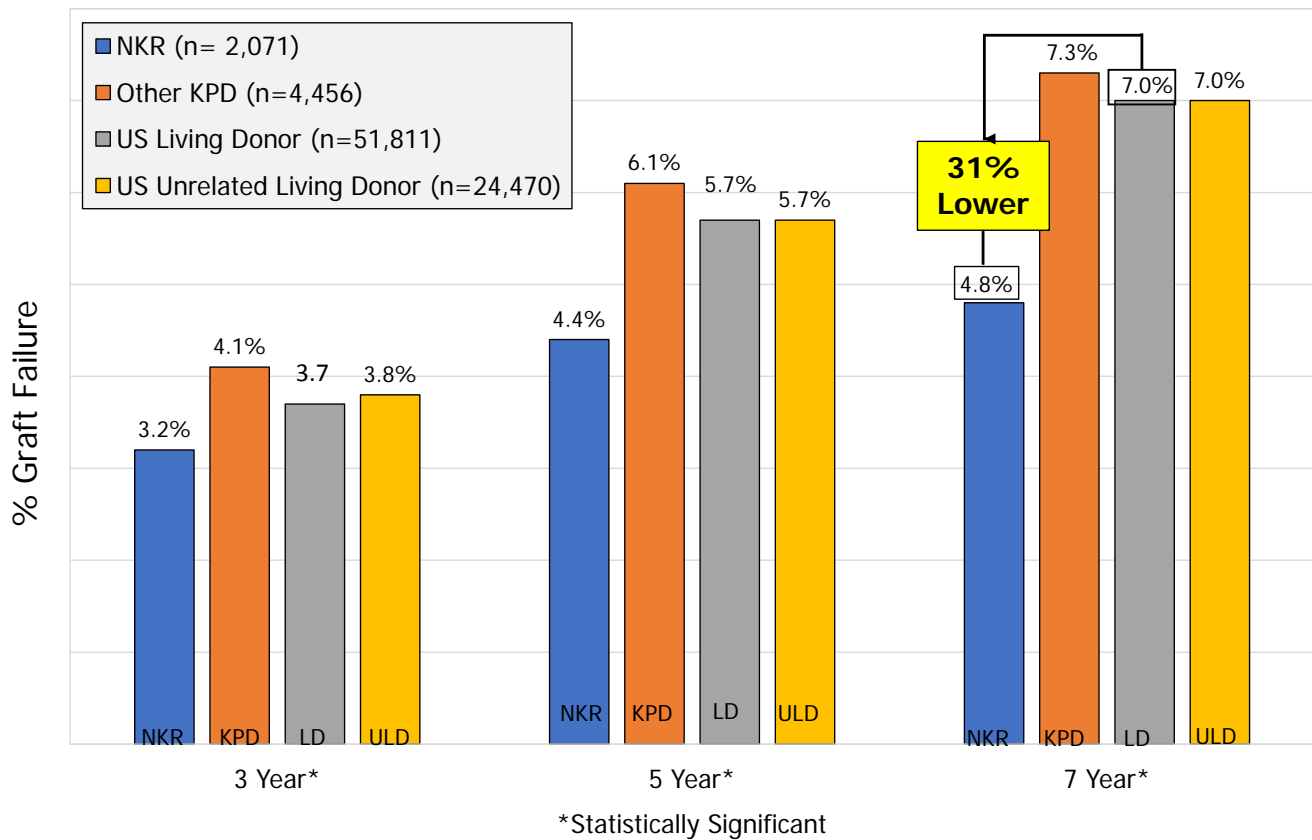
Sincerely,

A handwritten signature in blue ink, appearing to read 'G. Hil', with a stylized flourish extending to the right.

Garet Hil  
Founder & CEO  
National Kidney Registry

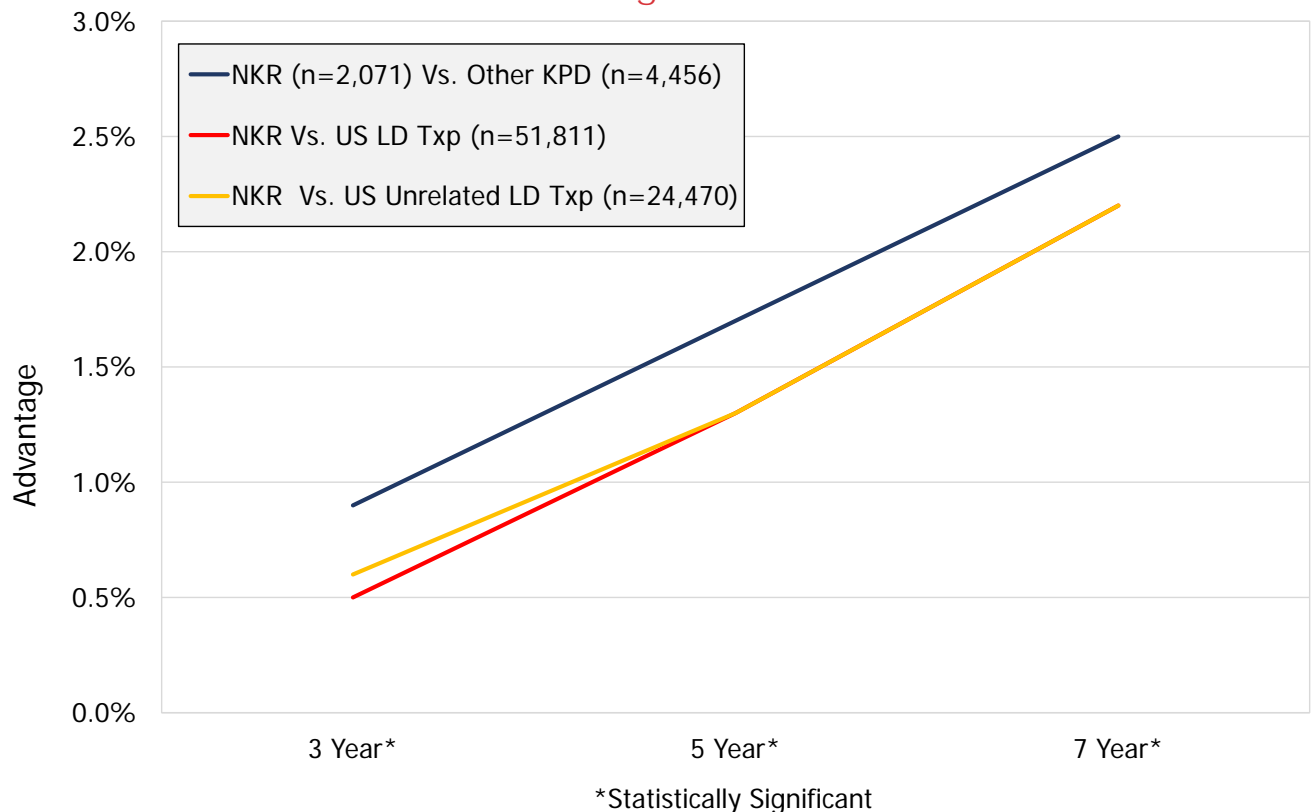


## 31% Lower Transplanted Kidney Failure



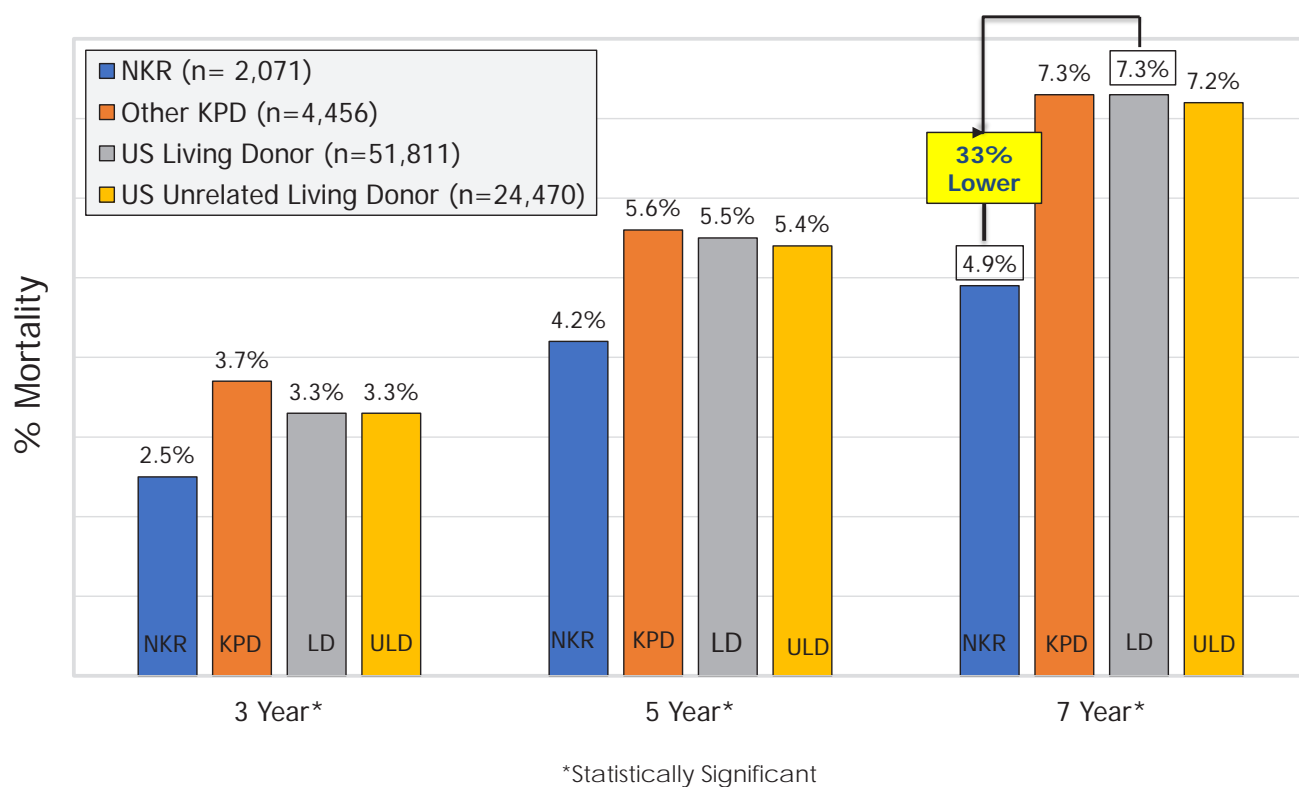
Provided courtesy of Johns Hopkins University School of Medicine, Department of Surgery \*Not including CHIP patients;  
Kaplan-Meier GS Rates for Transplants Performed: 02/2008-06/2017 with follow-up through 12/31/2017 <https://www.srtr.org/> SRTR data as of June, 2018

## NKR Death Censored Graft Survival Advantage Increasing Over Time



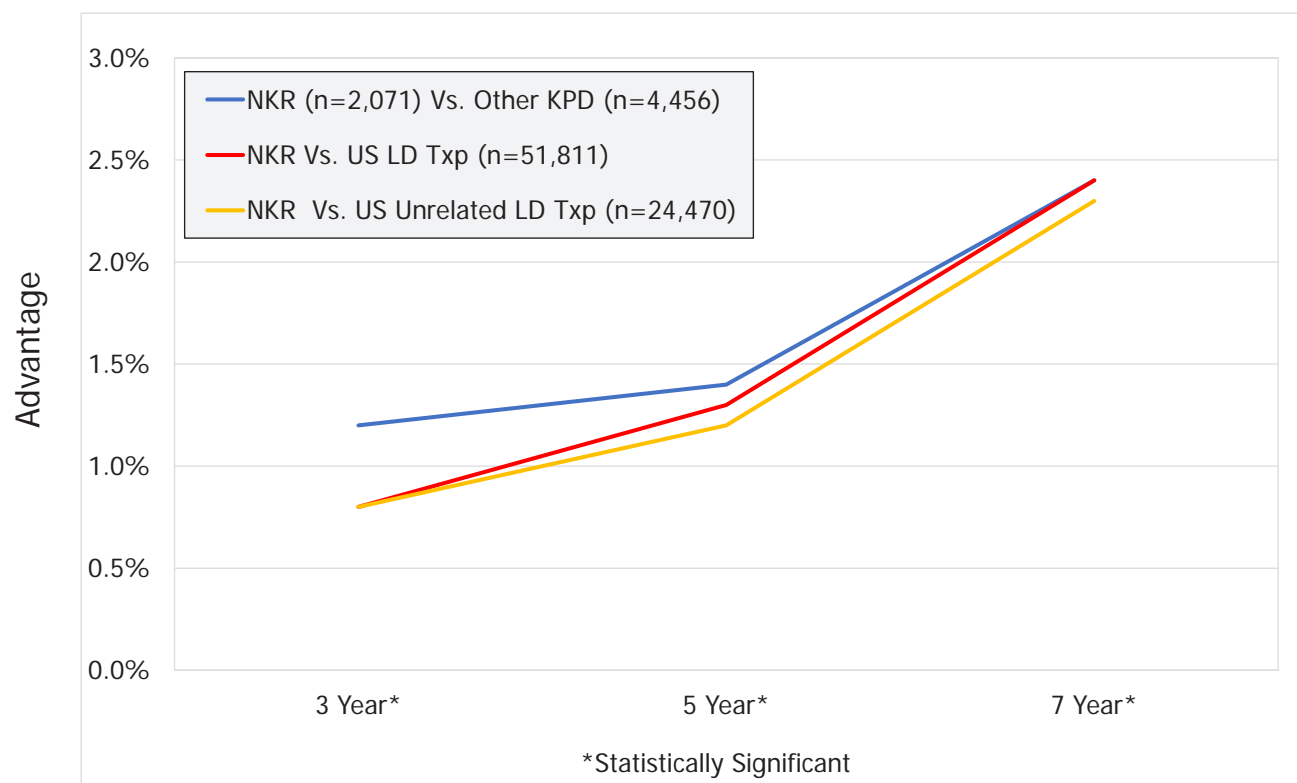
Provided courtesy of Johns Hopkins University School of Medicine, Department of Surgery \*Not including CHIP patients;  
Kaplan-Meier GS Rates for Transplants Performed: 02/2008-06/2017 with follow-up through 12/31/2017 <https://www.srtr.org/> SRTR data as of June, 2018

## 33% Lower Patient Mortality Rate



Provided courtesy of Johns Hopkins University School of Medicine, Department of Surgery \*Not including CHIP patients;  
Kaplan-Meier GS Rates for Transplants Performed: 02/2008-06/2017 with follow-up through 12/31/2017 <https://www.srtr.org/> SRTR data as of June, 2018

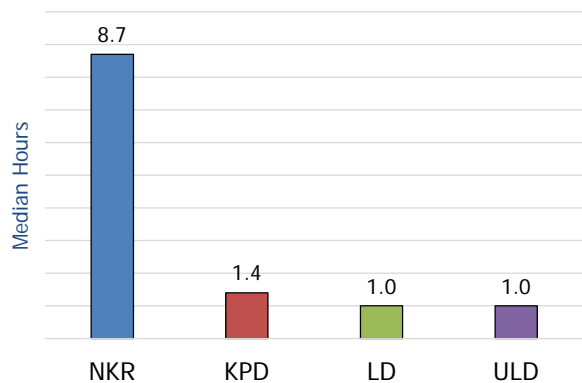
## NKR Patient Mortality Rate Advantage Increasing Over Time



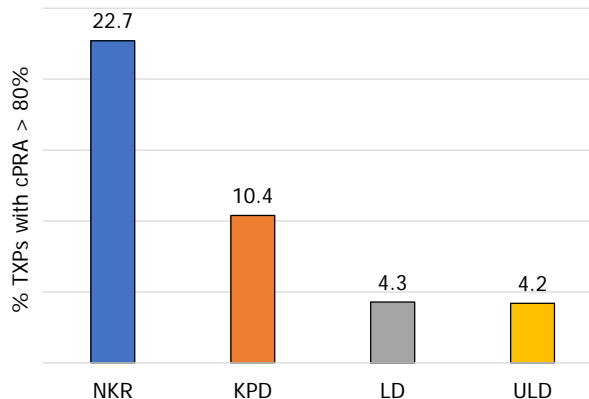
Provided courtesy of Johns Hopkins University School of Medicine, Department of Surgery \*Not including CHIP patients;  
Kaplan-Meier GS Rates for Transplants Performed: 02/2008-06/2017 with follow-up through 12/31/2017 <https://www.srtr.org/> SRTR data as of June, 2018

# NKR is Achieving Superior Outcomes While Transplanting Tougher Cases

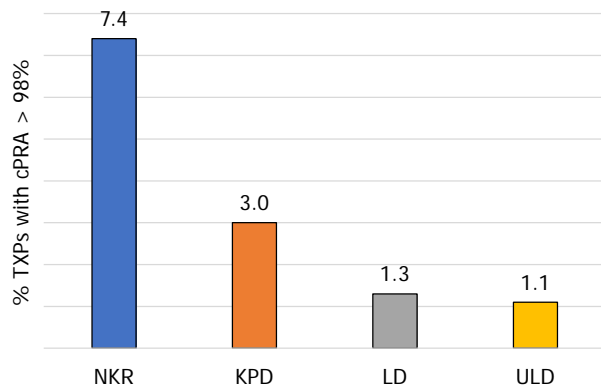
**More Cold Ischemic Time**



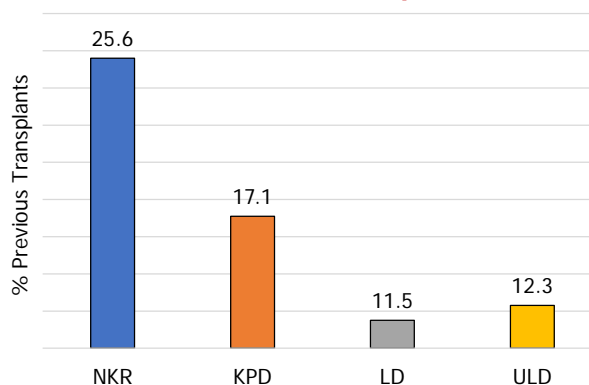
**More Highly Sensitized Patients**



**More Hyper Sensitized Patients**

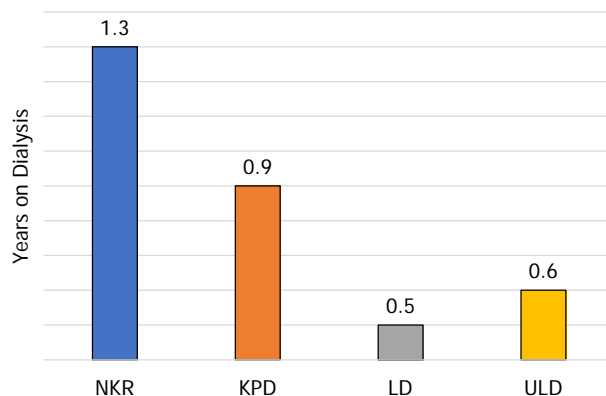


**More Re-Transplants**

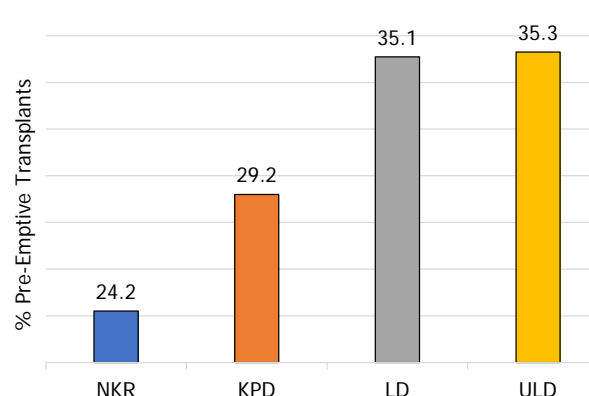


Provided courtesy of Johns Hopkins University School of Medicine, Department of Surgery \*Not including CHIP patients;  
Kaplan-Meier GS Rates for Transplants Performed: 02/2008-06/2017 with follow-up through 12/31/2017 <https://www.srtr.org/> SRTR data as of June, 2018

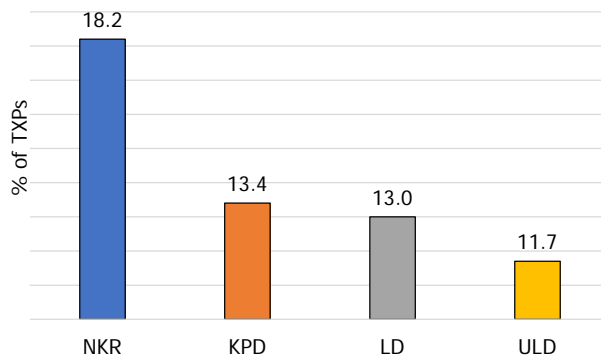
**More Time on Dialysis**



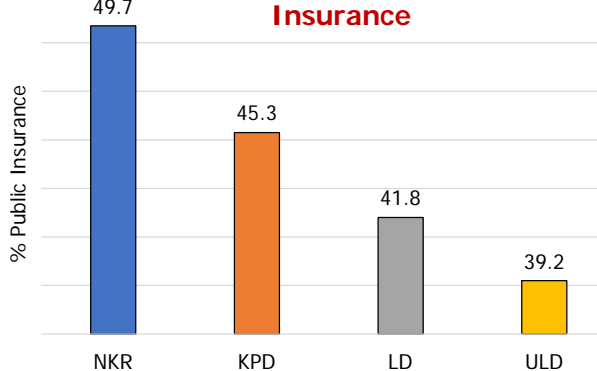
**Fewer Pre-Emptive Transplants**



**More African American Patients**

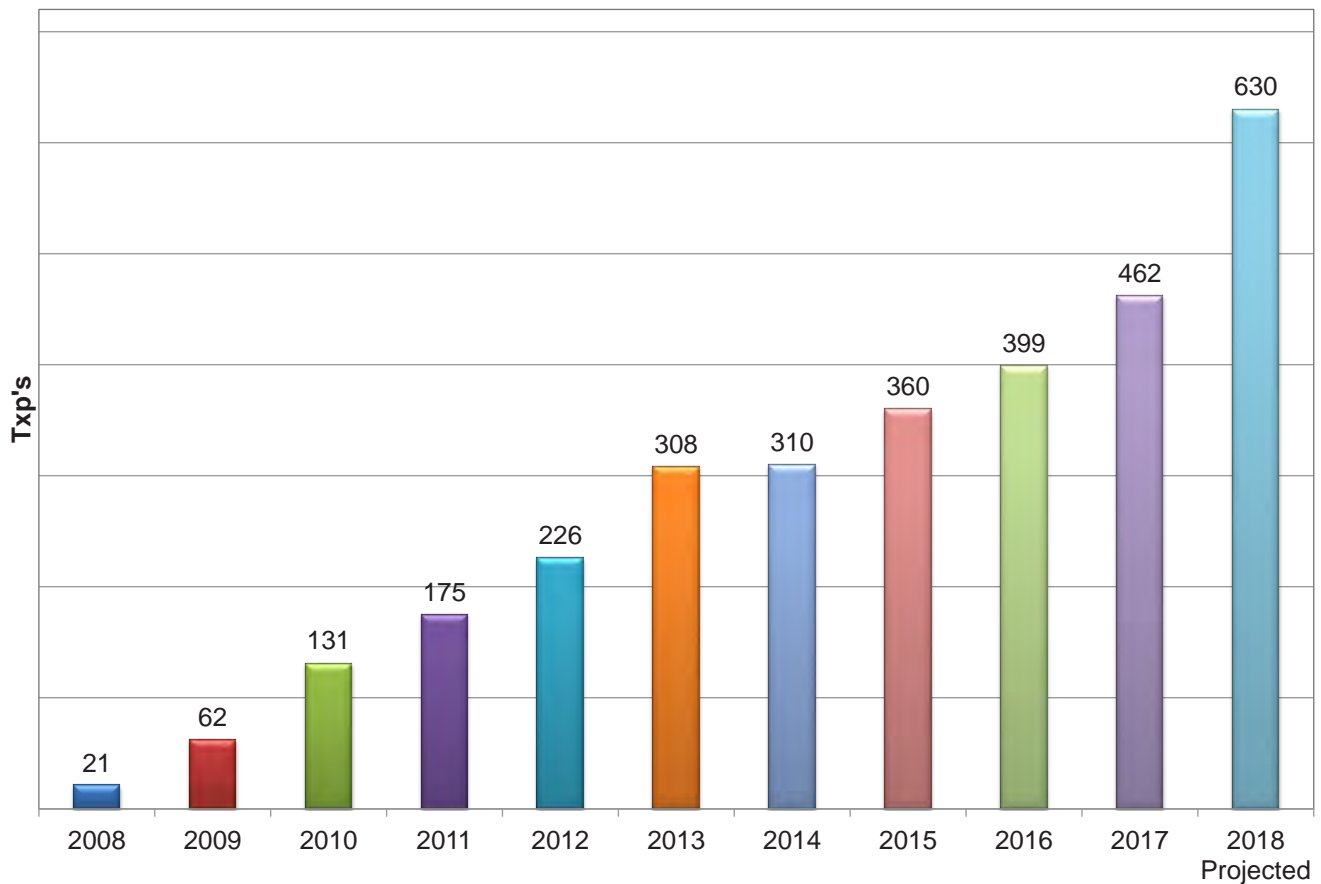


**More Patients with Public Insurance**



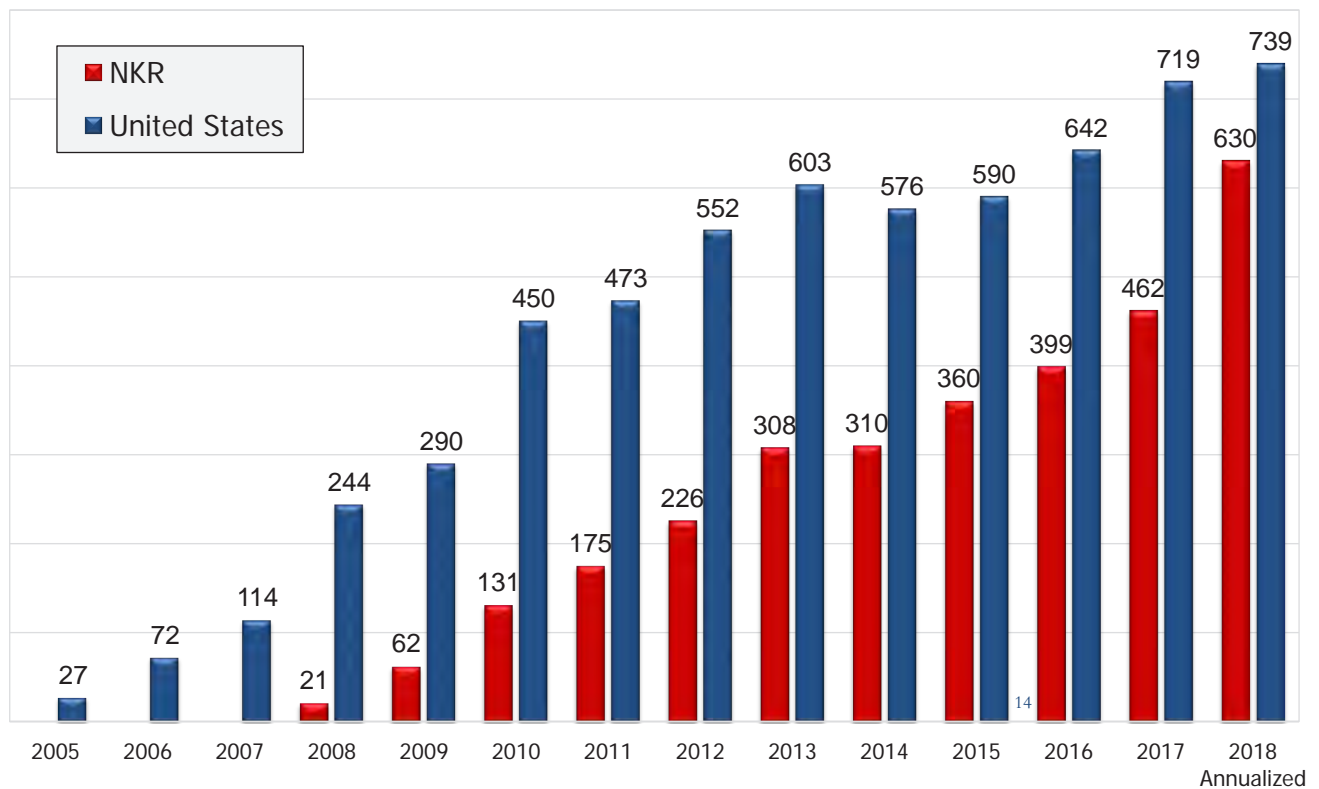
Provided courtesy of Johns Hopkins University School of Medicine, Department of Surgery \*Not including CHIP patients;  
Kaplan-Meier GS Rates for Transplants Performed: 02/2008-06/2017 with follow-up through 12/31/2017 <https://www.srtr.org/> SRTR data as of June, 2018

## Transplants Facilitated



## NKR Leading U.S. KPD Growth

Accounting for All U.S. KPD Growth Since 2007



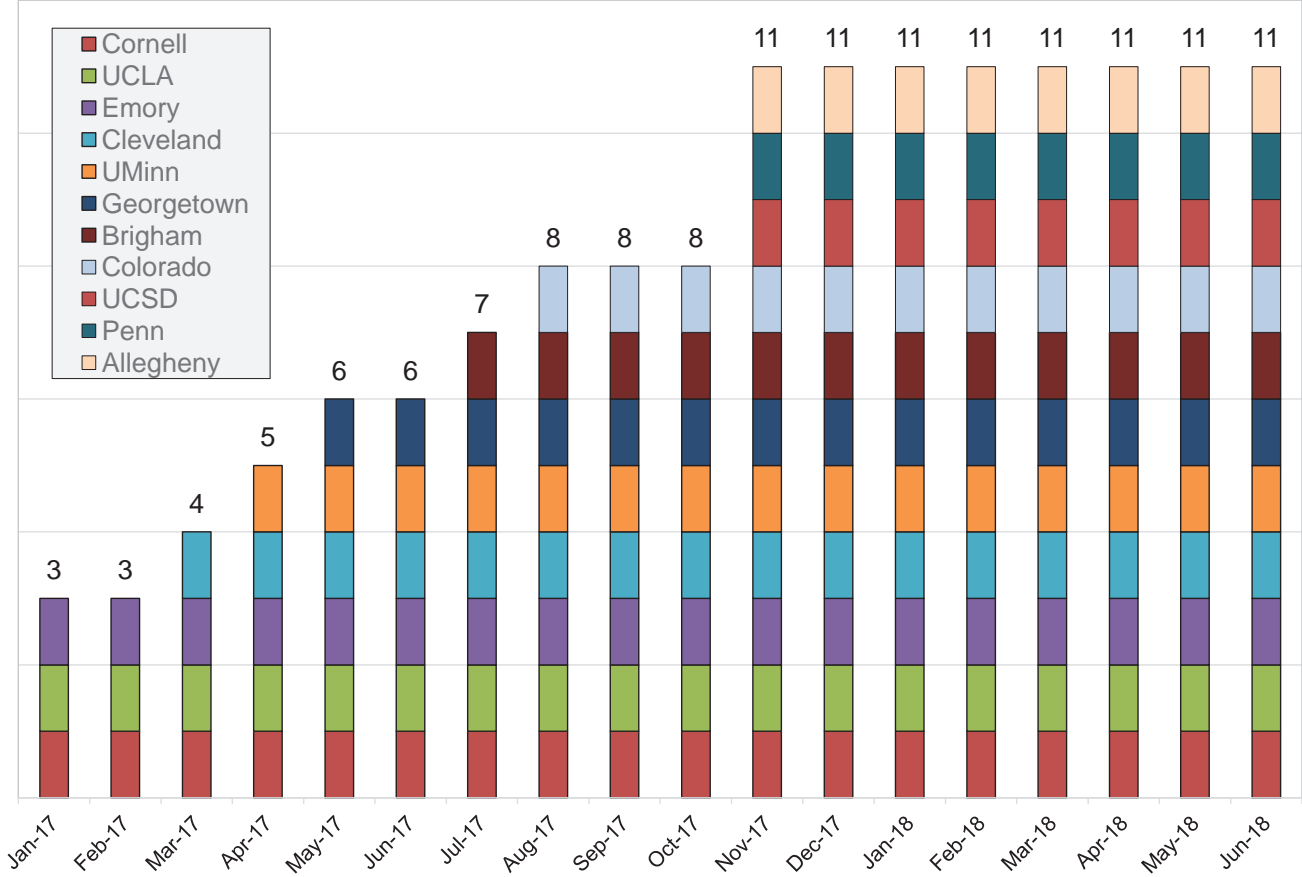
\*Organ Procurement and Transplantation Network. <https://optn.transplant.hrsa.gov/> Accessed 6/22/18



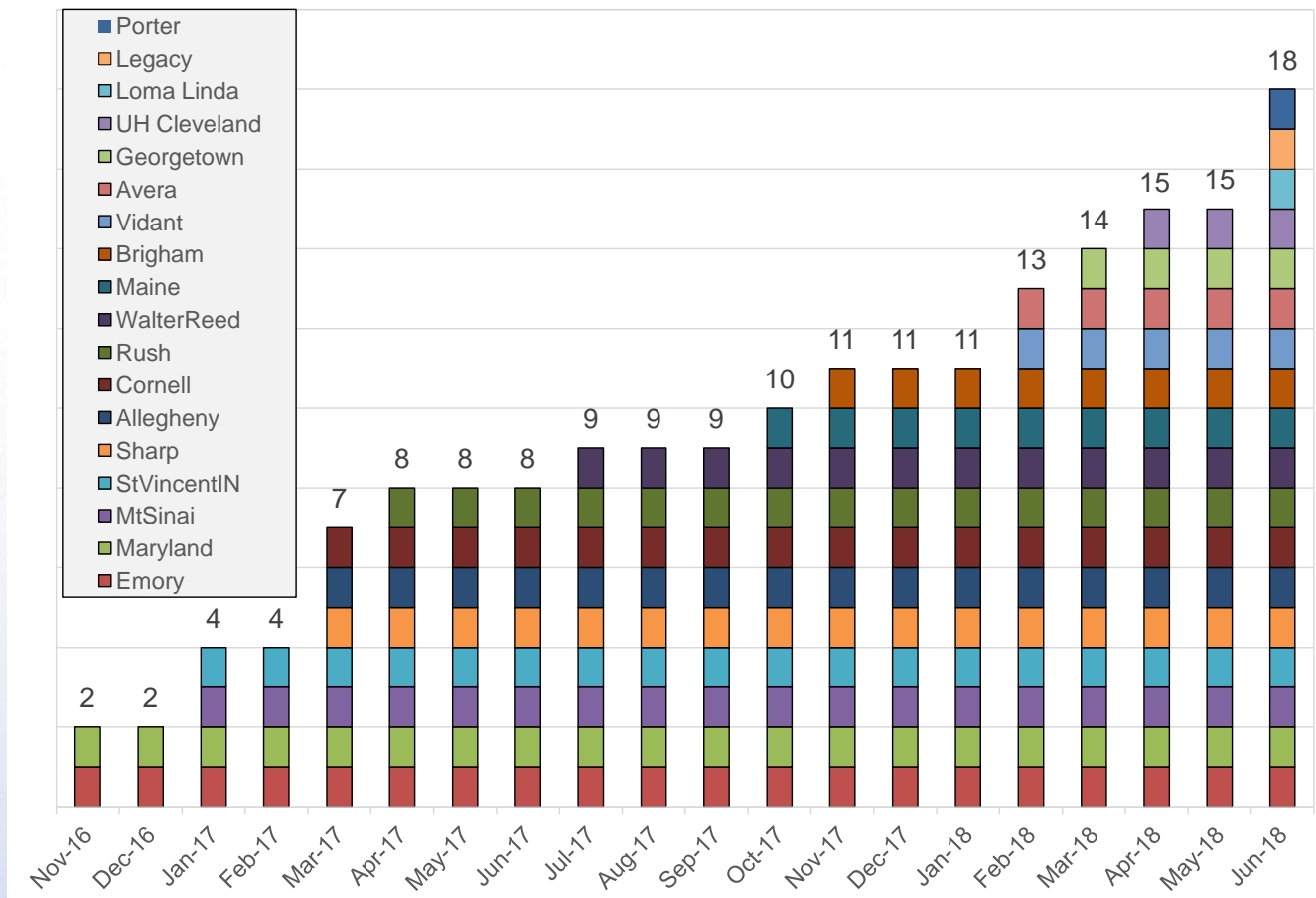




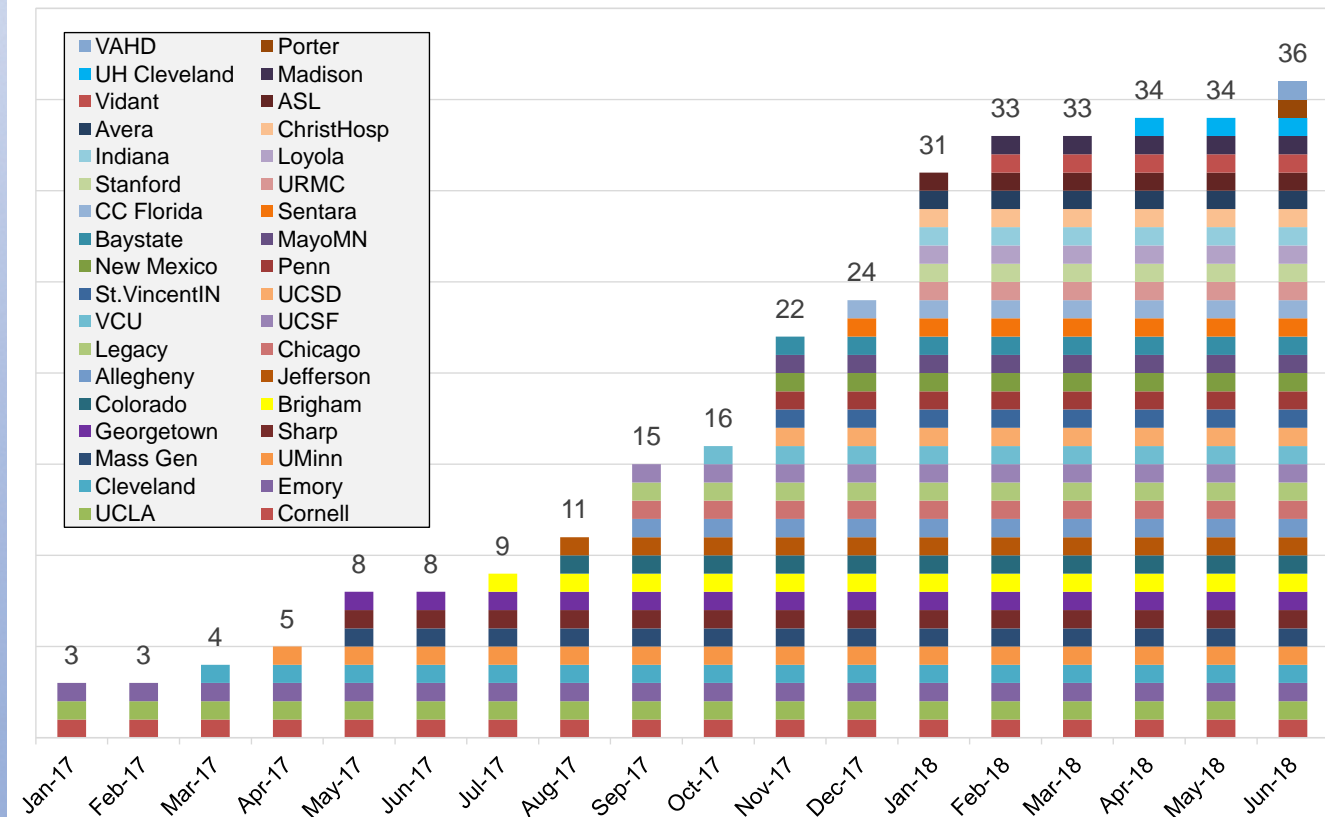
# Donor Care Network® Centers of Excellence



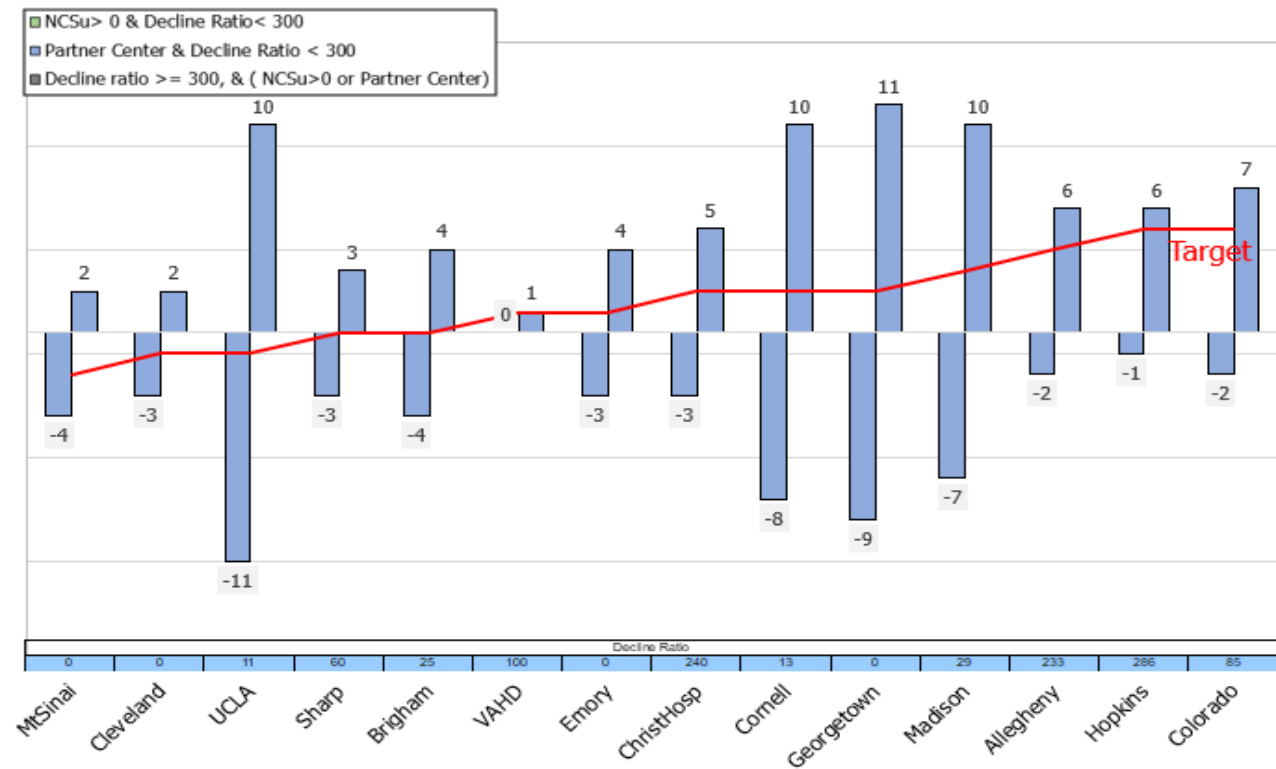
## Private Label DASH Installations



## Remote Donor Centers



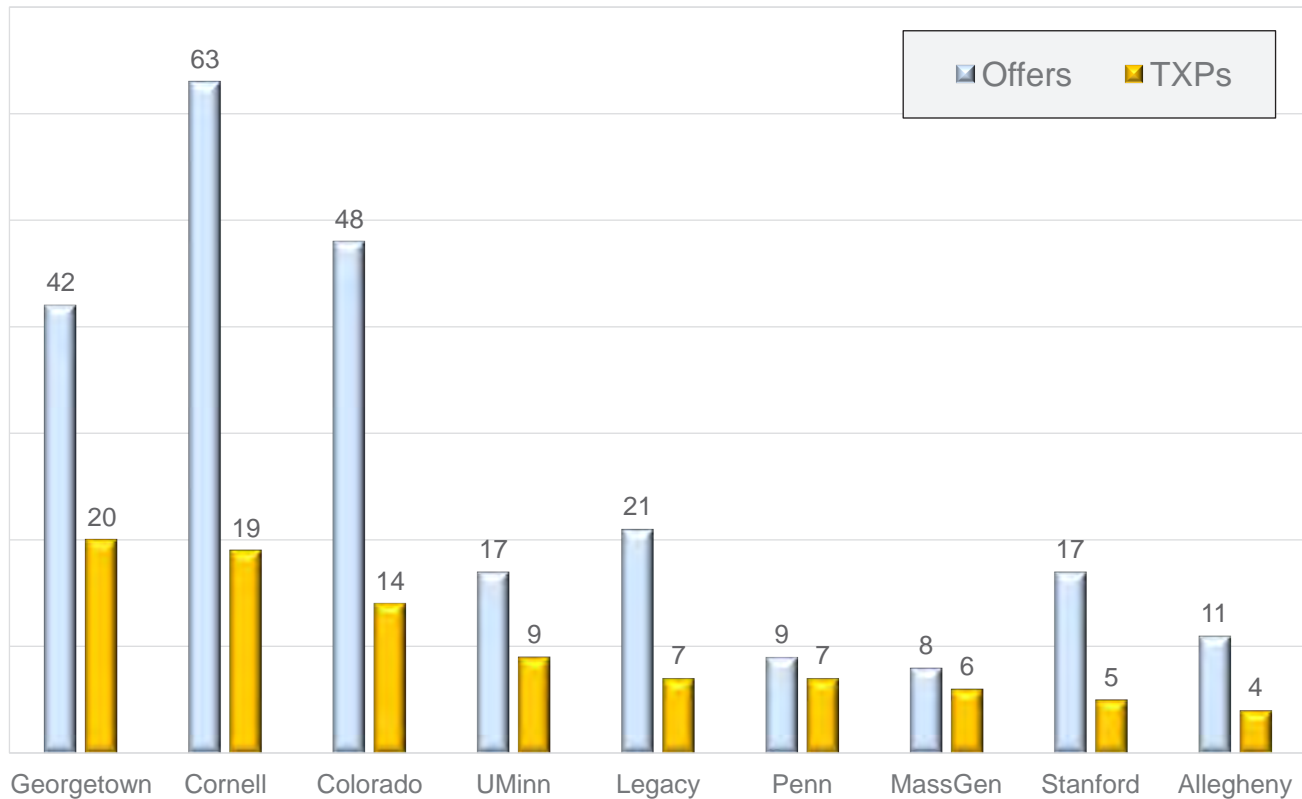
## Partner Center Chain End Targets



\* <https://clc.kidneyregistry.org/WebForm1.aspx?ReportKeyPass=ag5Ghnf76Tghd765GFtze&NcsSummary=1&Sort=DefaultSort&Supress=1> Accessed 7/13/18 at 15:29 ET

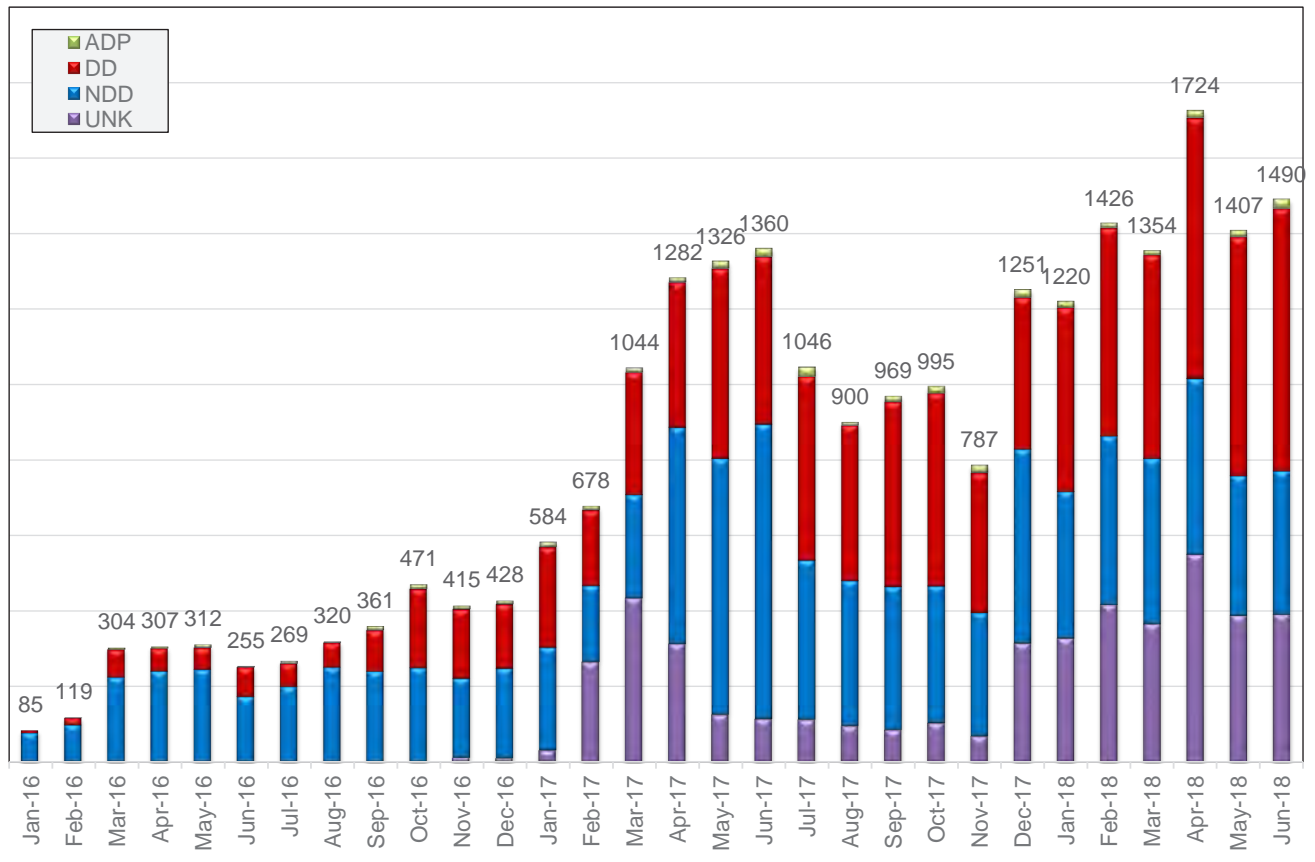
## Top Center Liquidity Contributors

CLC Driven Match Offers - 6/17 - 6/18



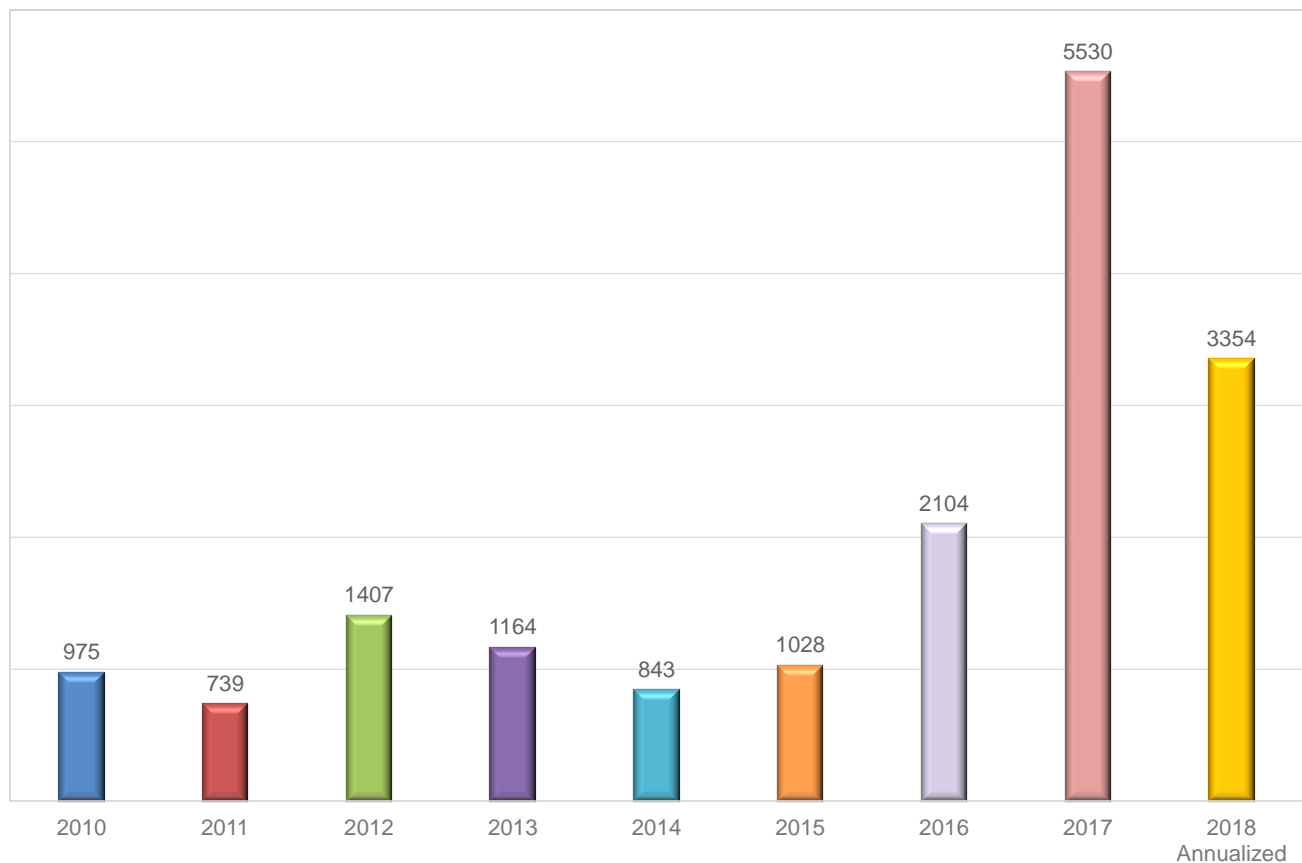
# Donor Contacts

## Across All Donor Intake Platforms



# Non-Directed Donor Contacts

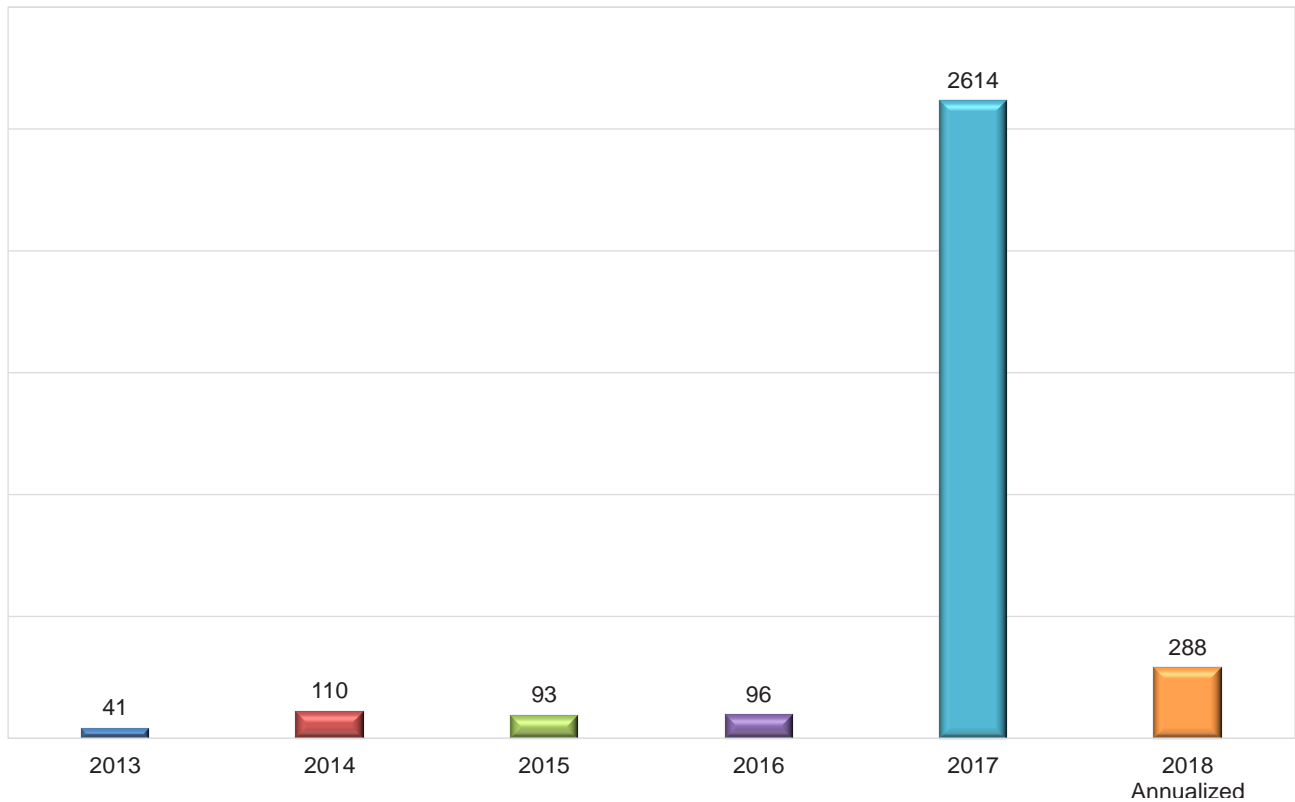
## Via NKR Donor Intake Platform





# Non-Directed Donor Referrals

Referred to NKR Member Centers

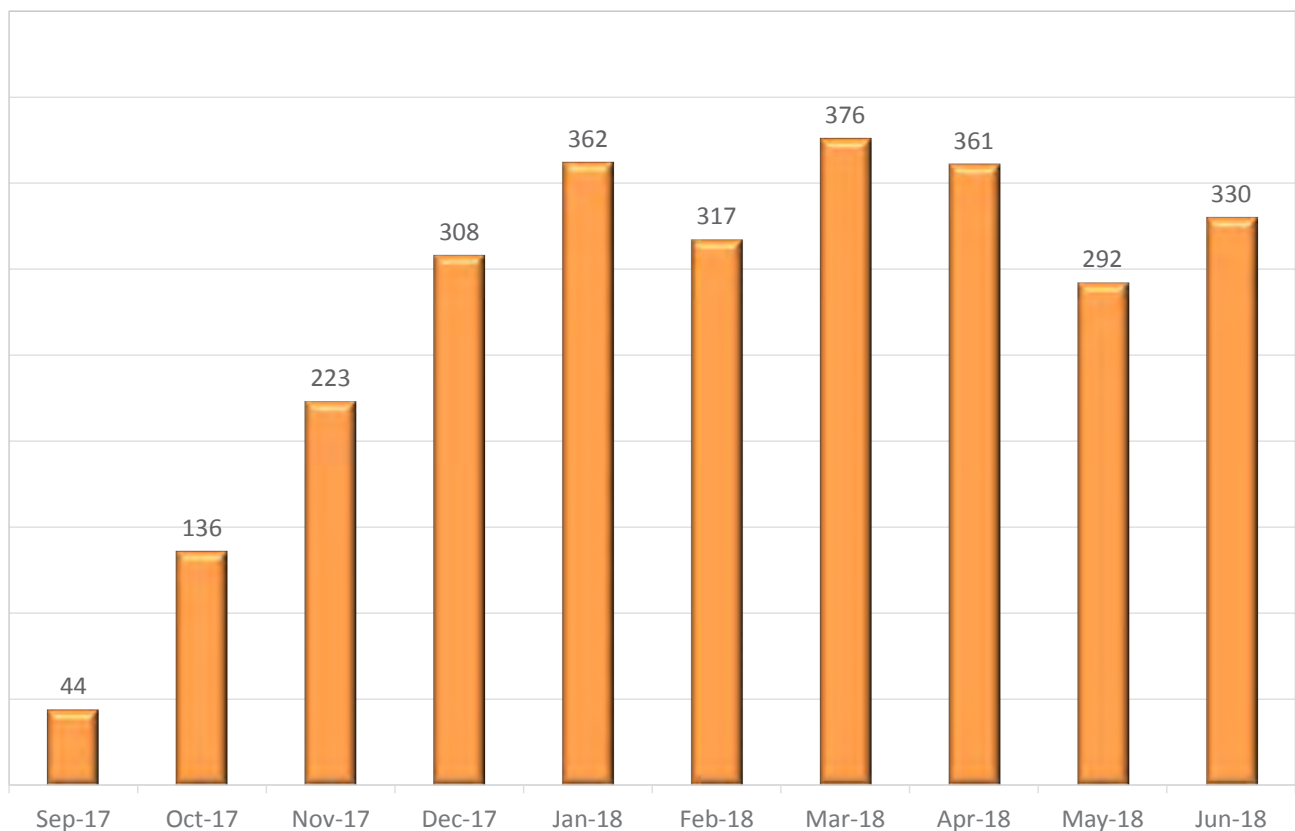


\*2017: Donor intake system was re-engineered and the donor certification form was removed

\*2018: Pre-workup labs were implemented which screened out candidates not willing to complete 24 hour urine test

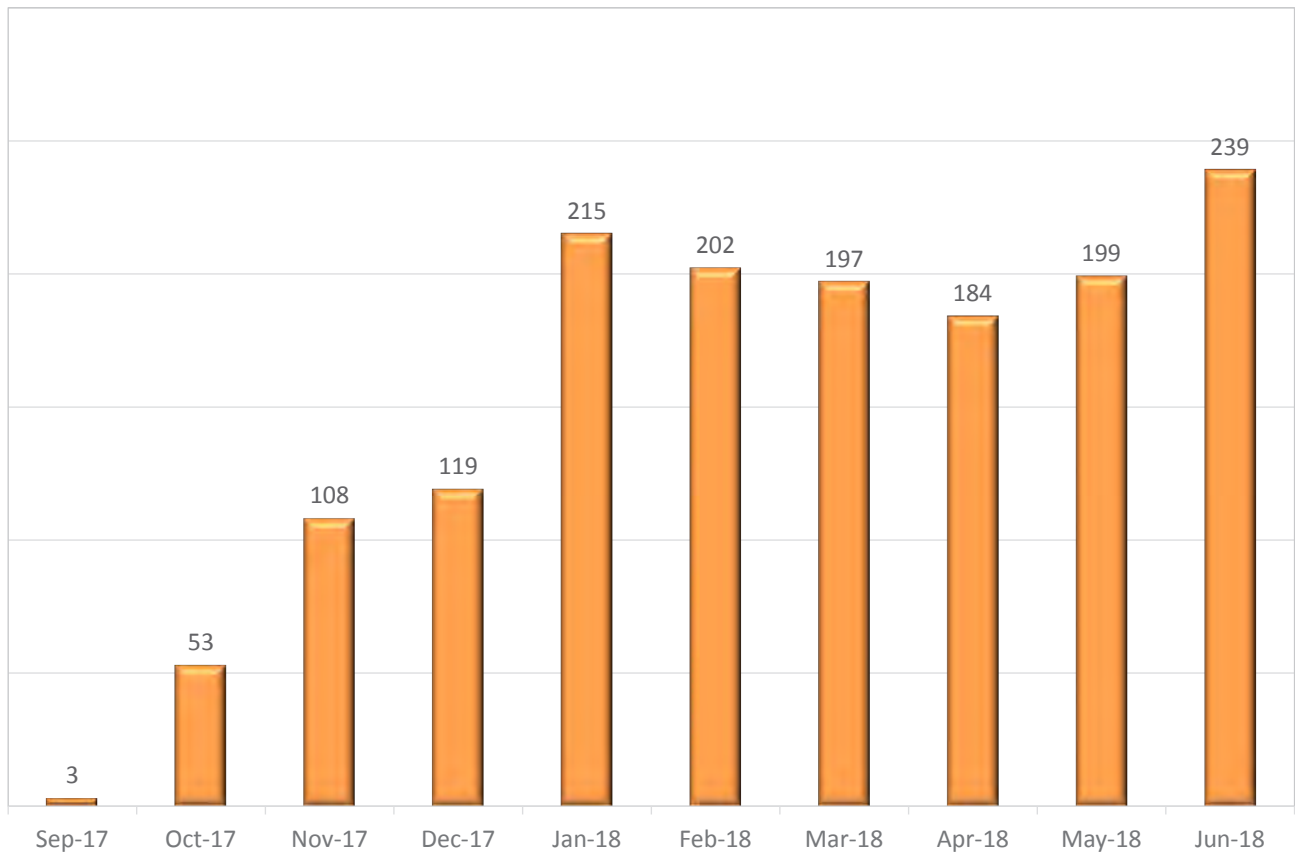
## Pre-Workup Labs

24-Hour Urine Jugs Shipped



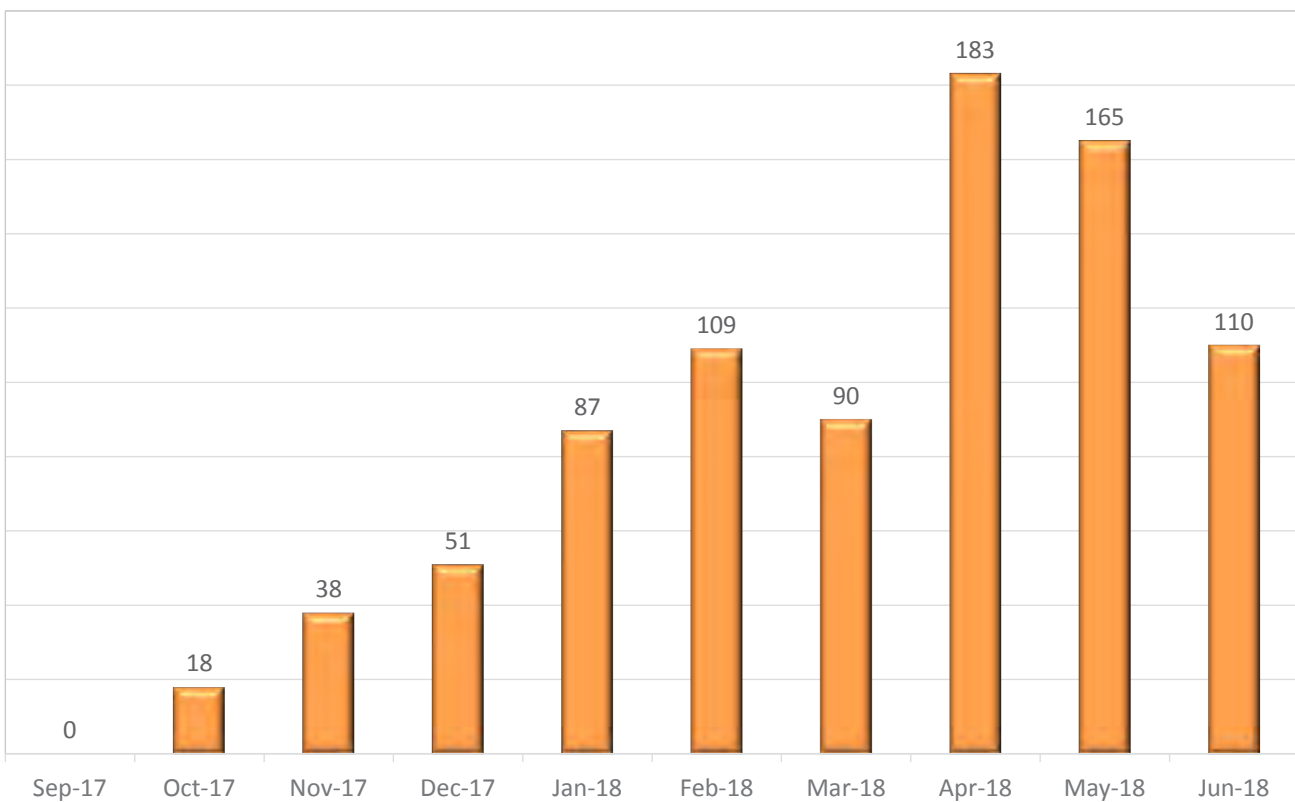
## Pre-Workup Labs

Scripts Uploaded



## Pre-Workup Labs

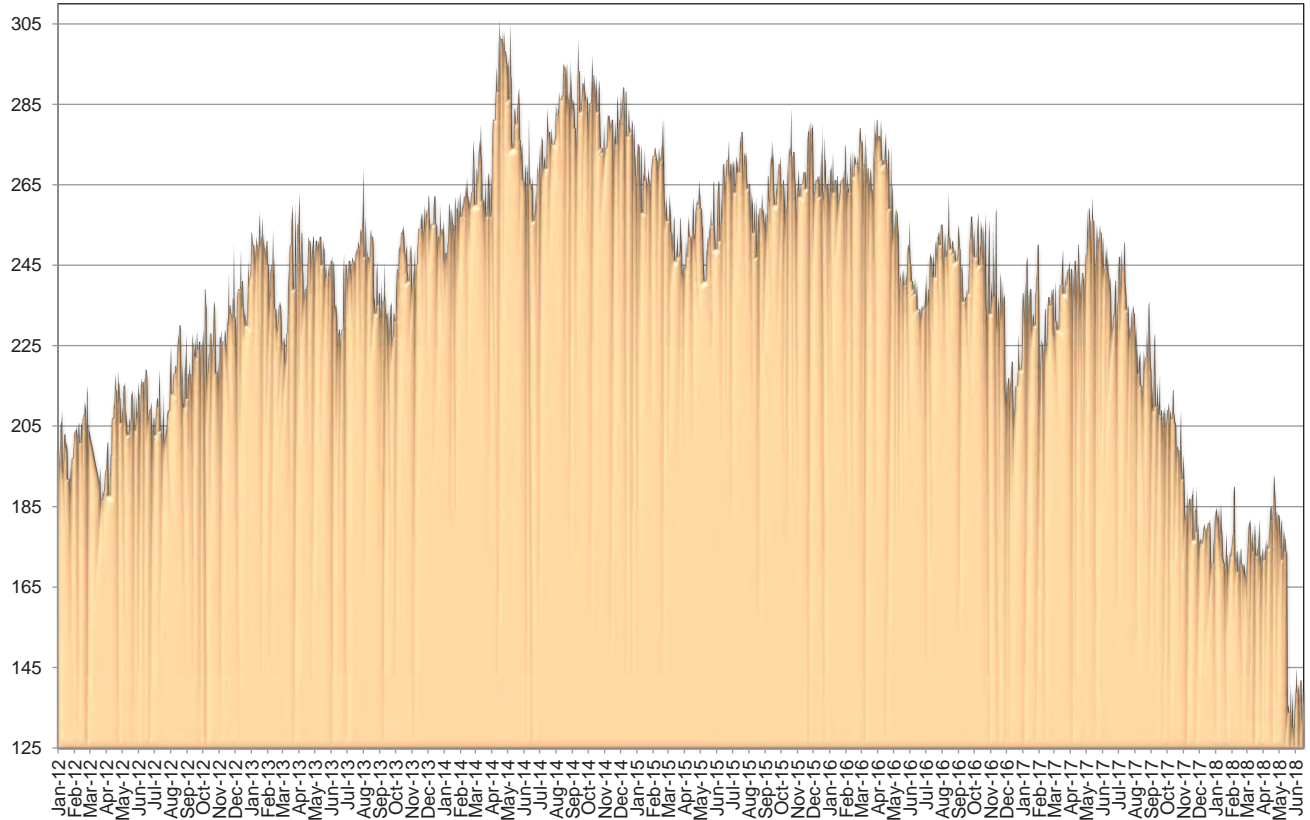
Results Uploaded



# Pool Size

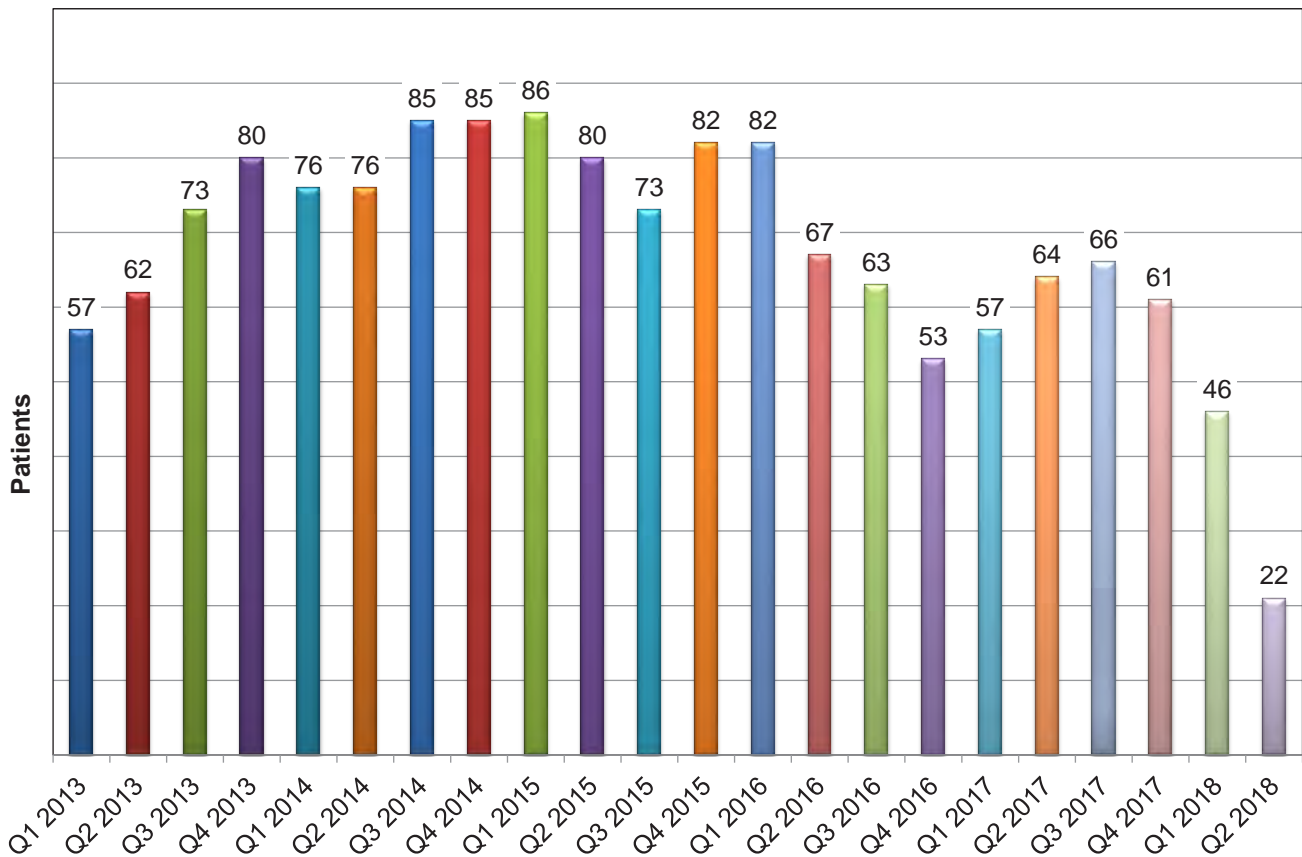
## Unmatched Patients by Day

1/14/2012 – 6/30/2018



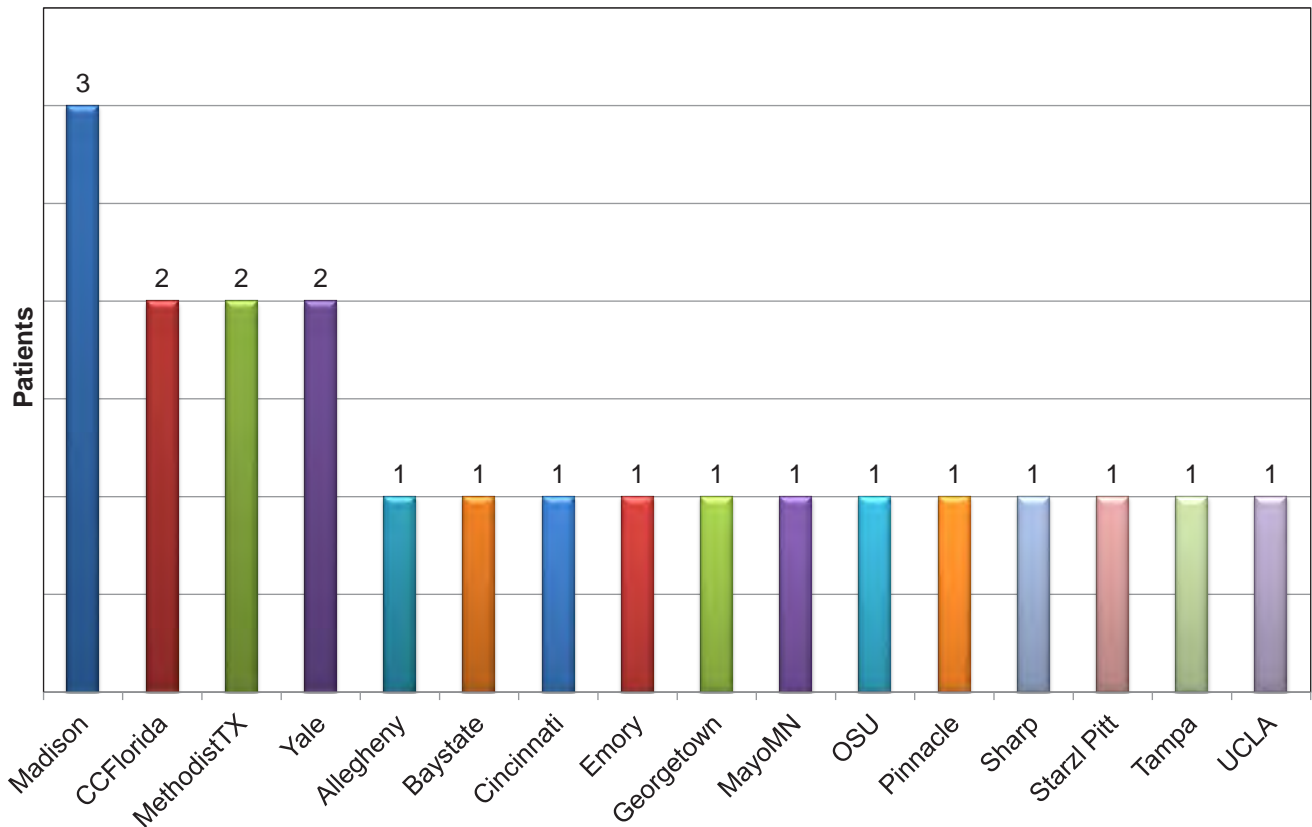
## Patients Waiting > 1 Year by Quarter

As of 6/30/2018



## Patients Waiting > 1 Year by Center

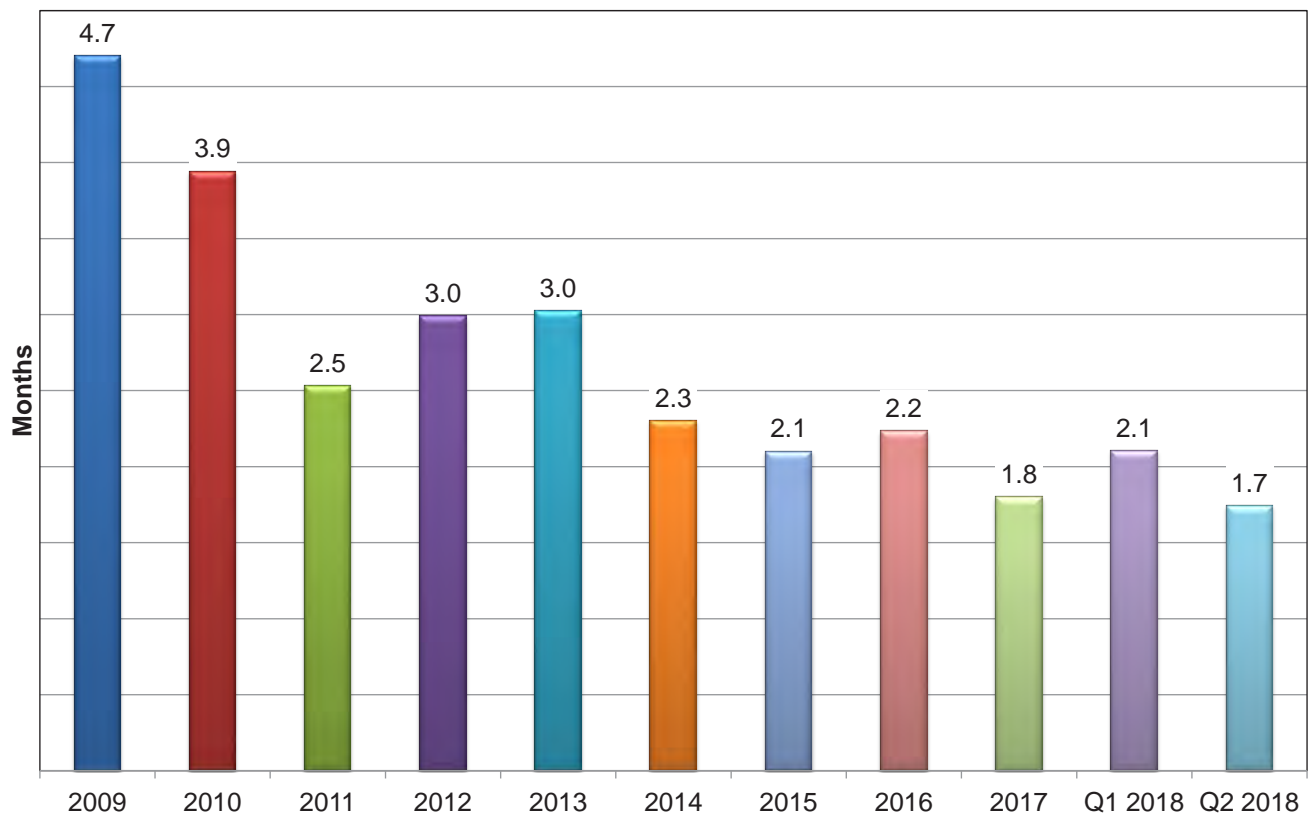
As of 6/30/2018



## Transplanted Patient Median Wait Time

Wait times of patients transplanted during prior 12 months

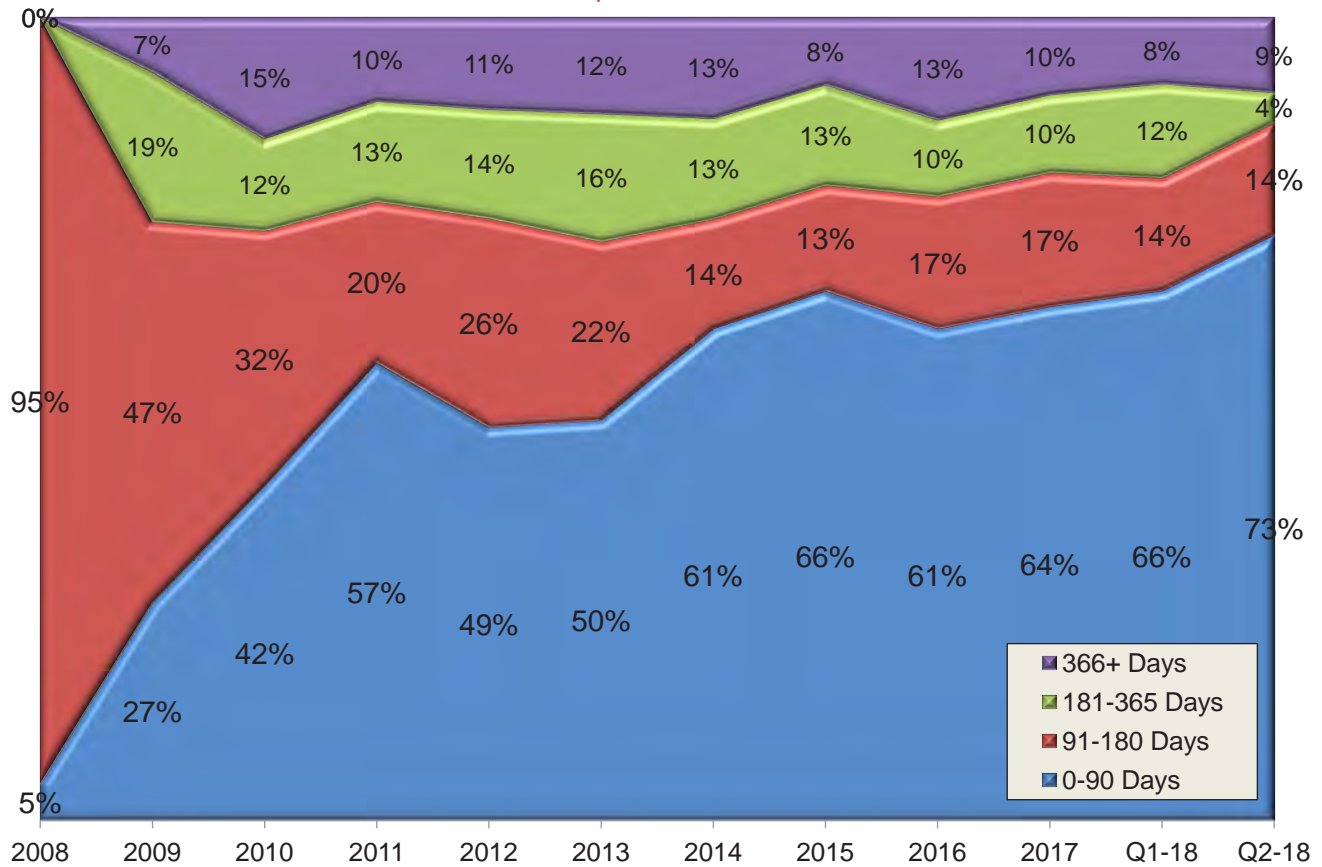
As of 6/30/2018





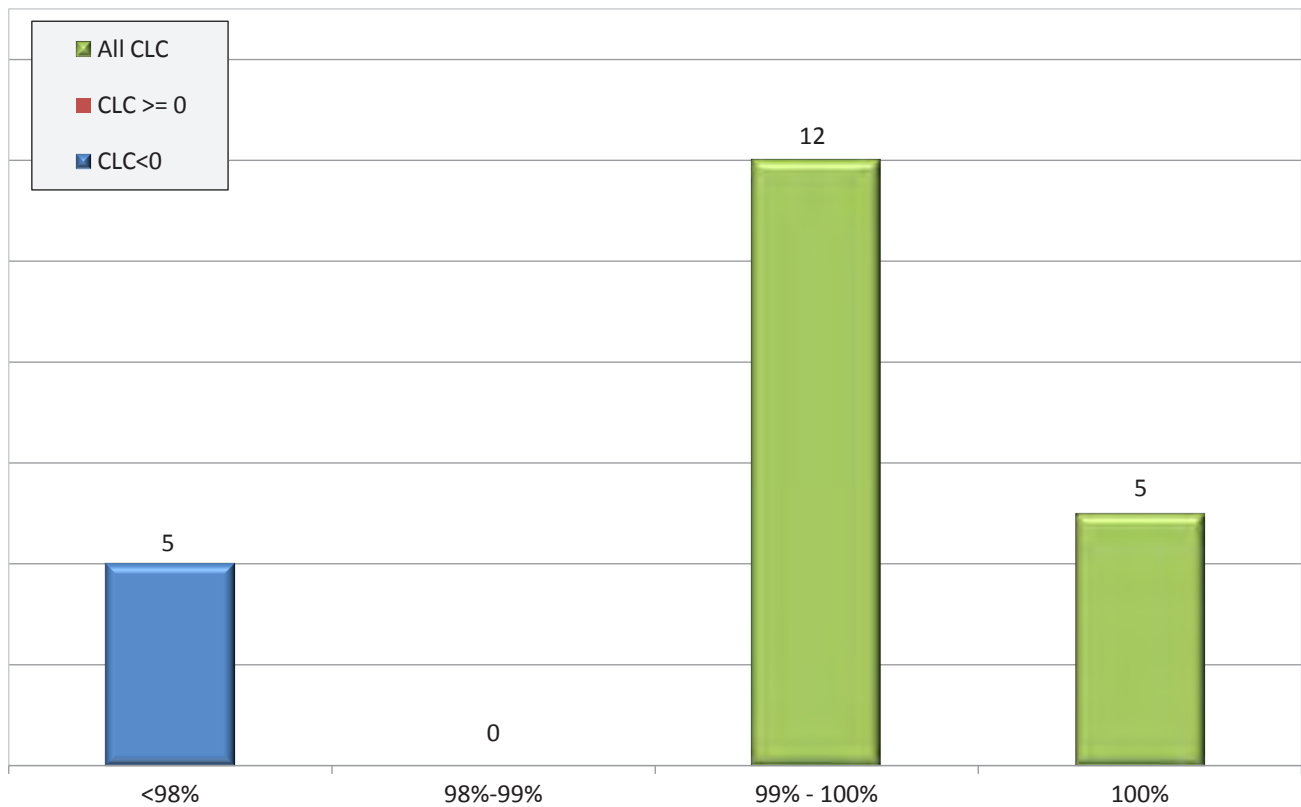
# Wait Time Distribution

Transplanted Pairs



# Unmatched Target Pairs

Waiting more than 12 Months



\*As of 7/11, 11:40am

## Pairs Waiting > 1 Year

Due to Unfavorable Blood Type Combination

#	R Alias	R ABO	D ABO	MHP	cPRA4	R Age	D Age	PMPc	Wait (Months)	CLCu
1	RFLCC14	O	A	0	2.5	39	67	137	15	-14040
2	UC03154184	O	A	0	95.77	25	27	5	20	-3800
3	RFLCC07	O	AB	0	0	52	44	151	16	-14040

\*As of 7/26/18, excludes patients matched since close of second quarter

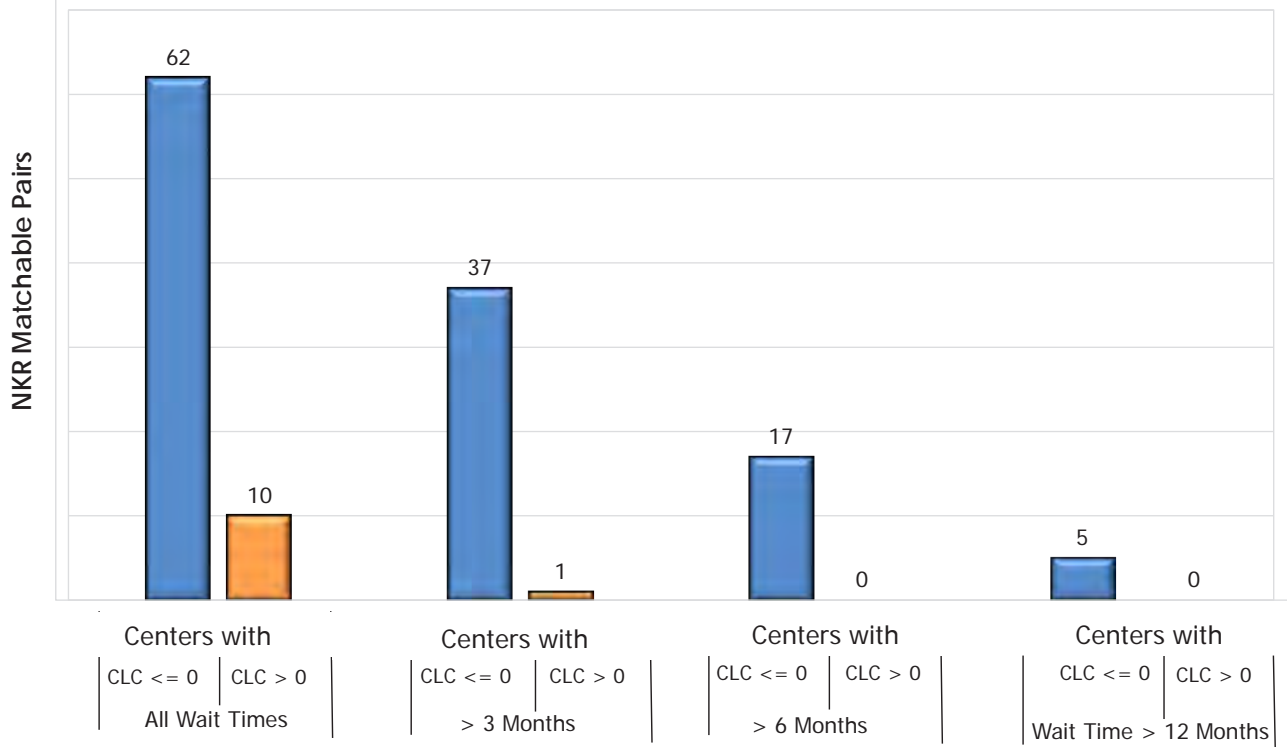
## Pairs Waiting > 1 Year

Due to High cPRA

#	R Alias	R ABO	D ABO	MHP	cPRA4	R Age	D Age	PMPc	Wait (Months)
1	STORB	O	A	0	100	61	66	0	67
2	R3148	A	AB	0	100	39	34	0	27
3	EGUE357	O	O	0	100	62	36	0	18
4	SCHNALRE	O	O	0	100	54	54	0	18
5	DEKEDRE	O	O	0	100	47	35	0	17
6	JAJO7378	B	O A O	0	99.97	39	47 37 36	0	59
7	GM8784	B	O	0	99.97	23	31	0	34
8	AGHRR1957	B	O	0	99.97	60	60	0	13
9	UC06142609	O	O	0	99.95	66	49	0	22
10	BURCHD77	B	B	0	99.9	40	38	0	32
11	JS966563	O	O	0	99.9	38	52	0	18
12	GISA510195	B	O	0	99.42	61	57	0	15
13	WDUR980	A	AB	0	99.35	48	55	0	18
14	SMHCOL	O	A	0	99.1	22	55	0	32

As of 7/26/18, excludes patients matched since close of second quarter

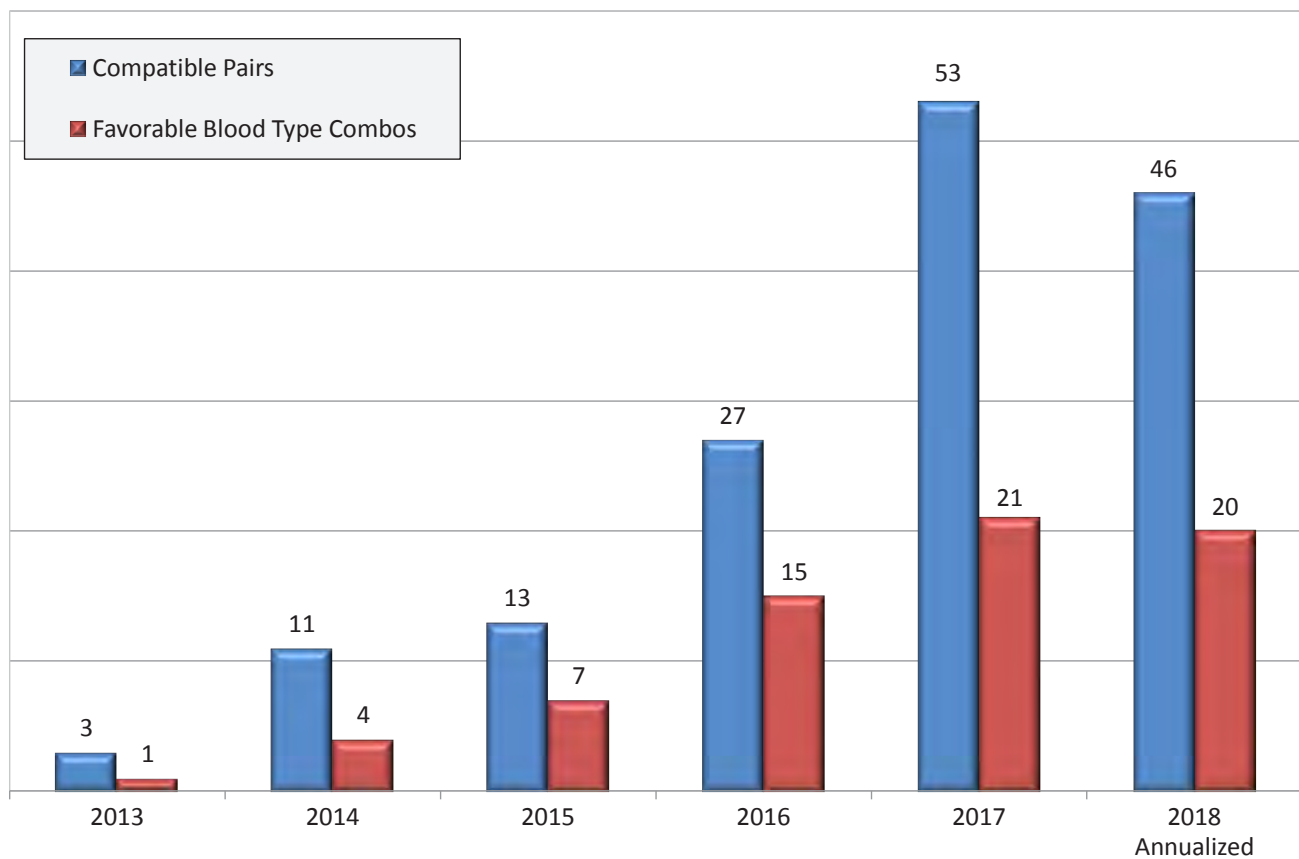
## Pair Wait Time Analysis



\* Data as of 7/11, 11:40am

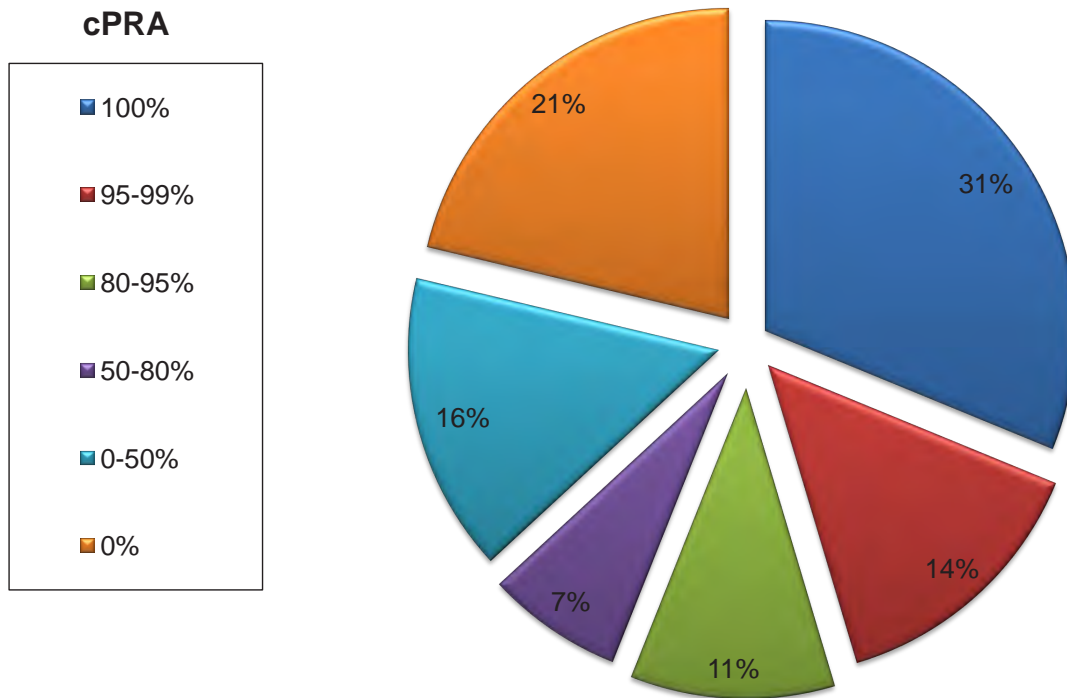
## Compatible Pairs Transplanted

As of 6/30/18

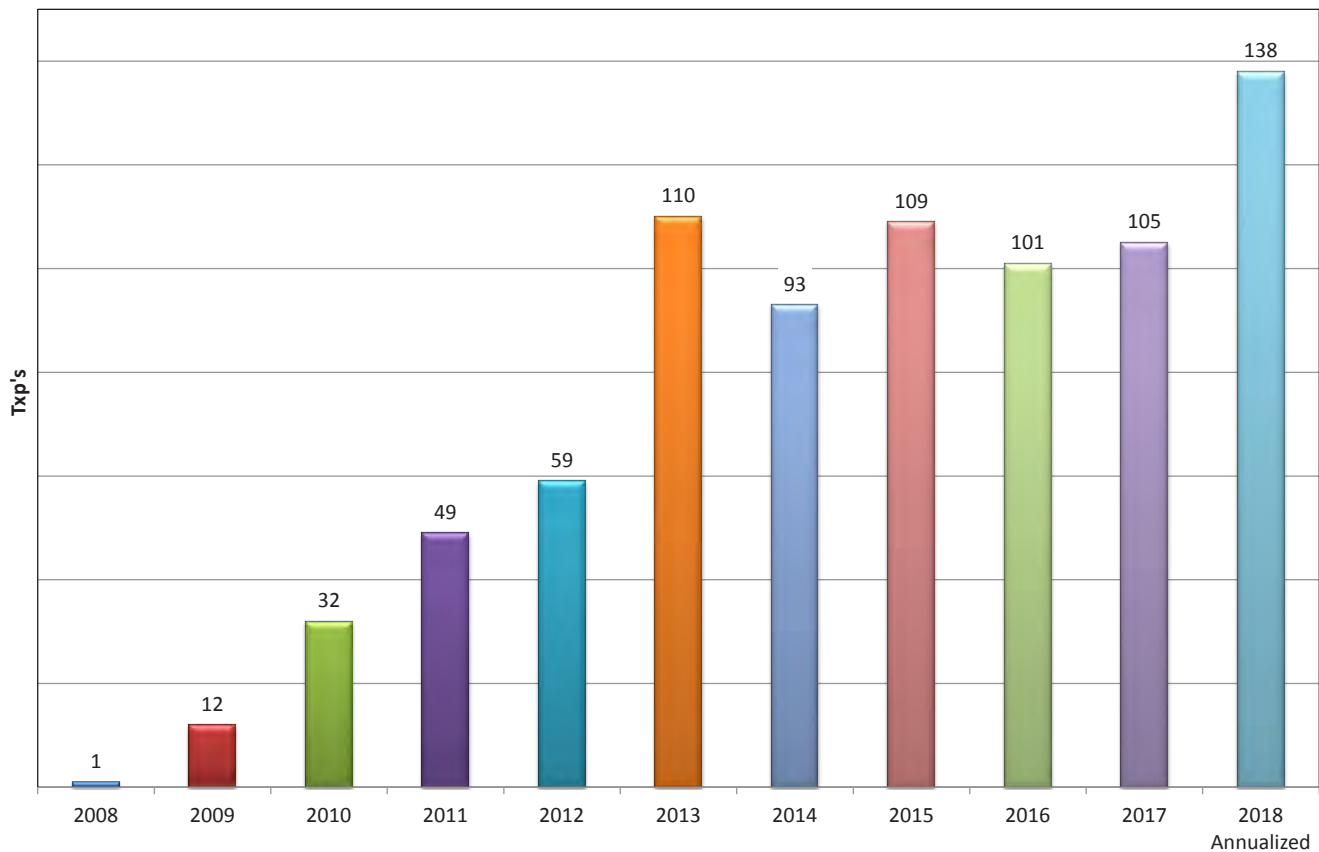


# Pool Composition by cPRA

As of 6/30/18

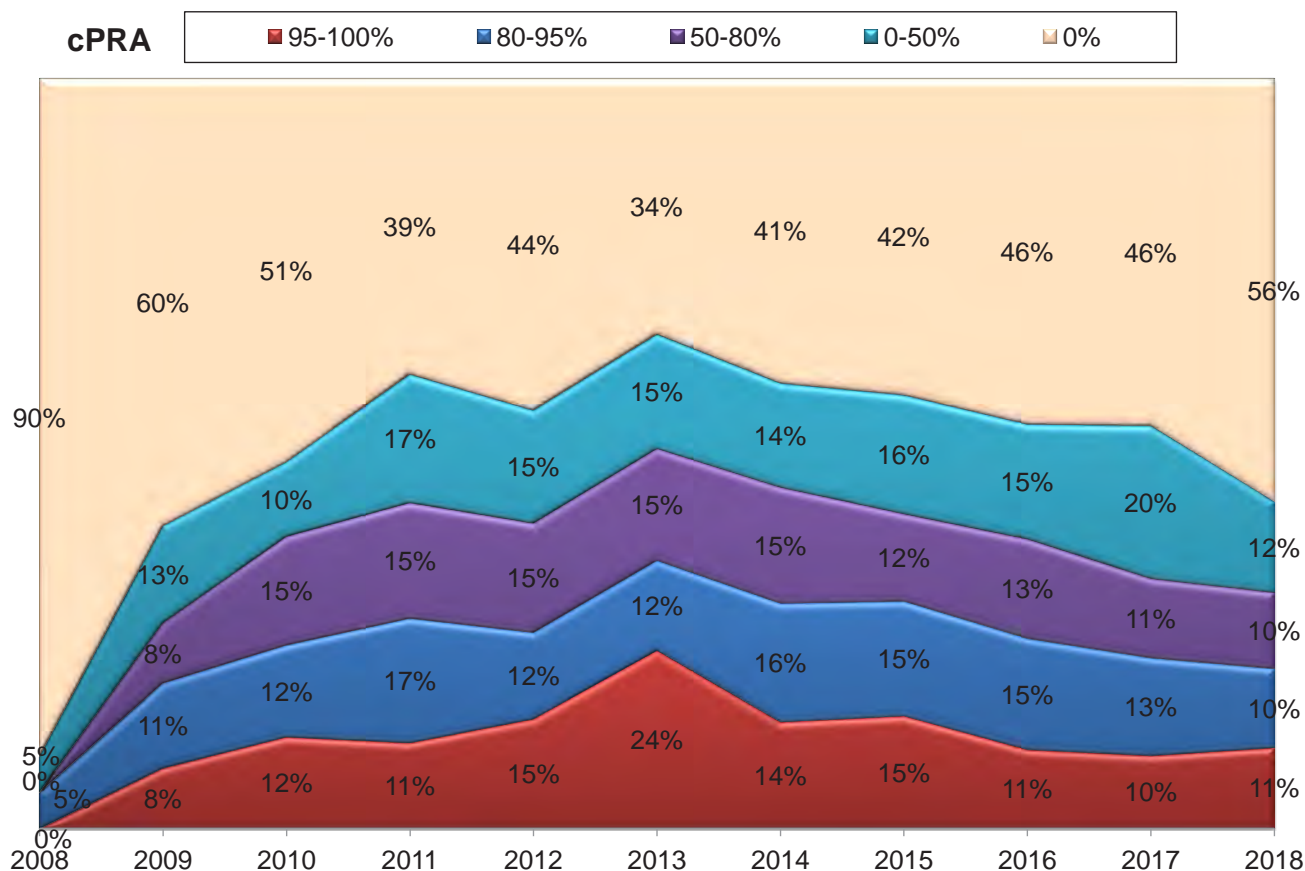


## Transplanted Patients with cPRA > 80%





## Transplanted Patients by cPRA

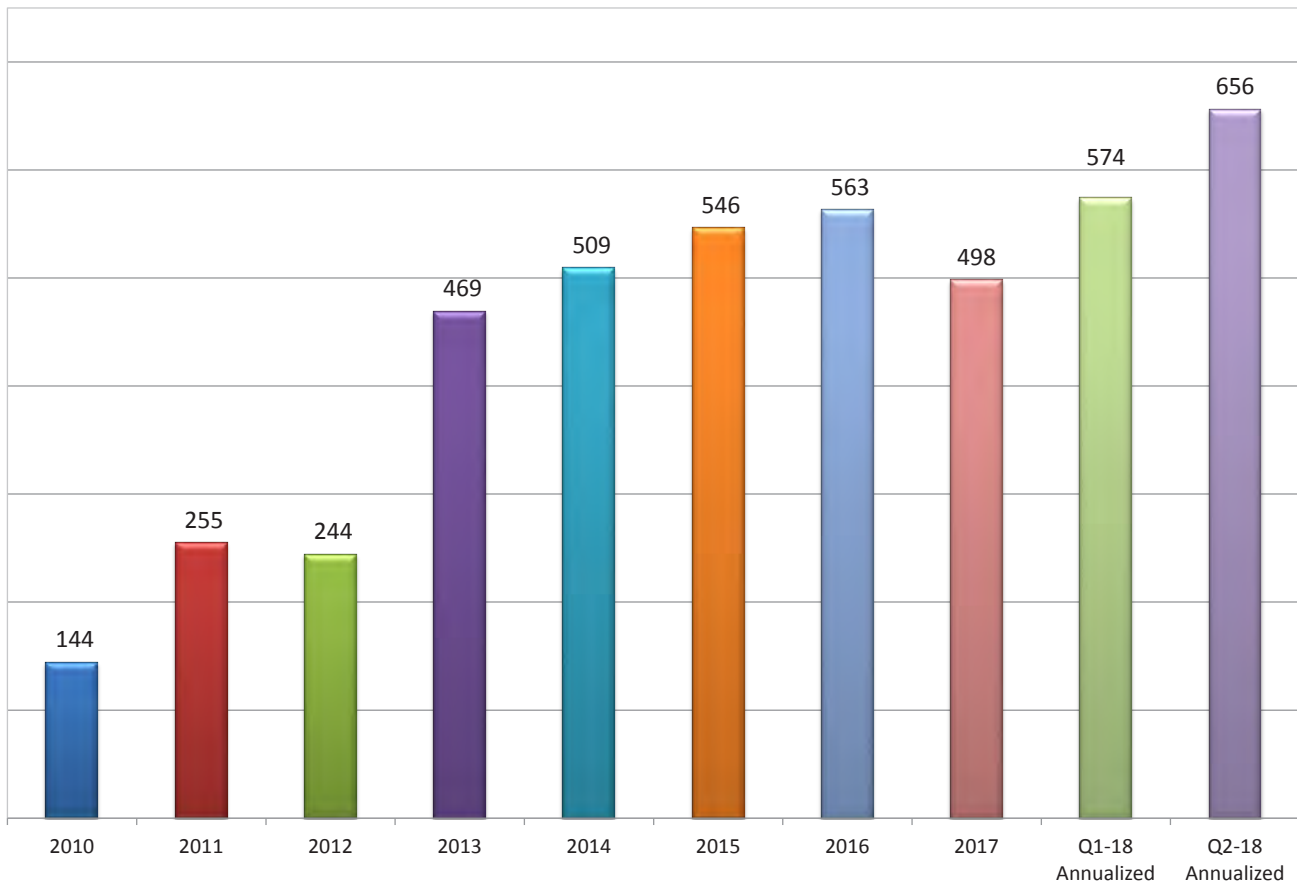


## Great HLA Matches

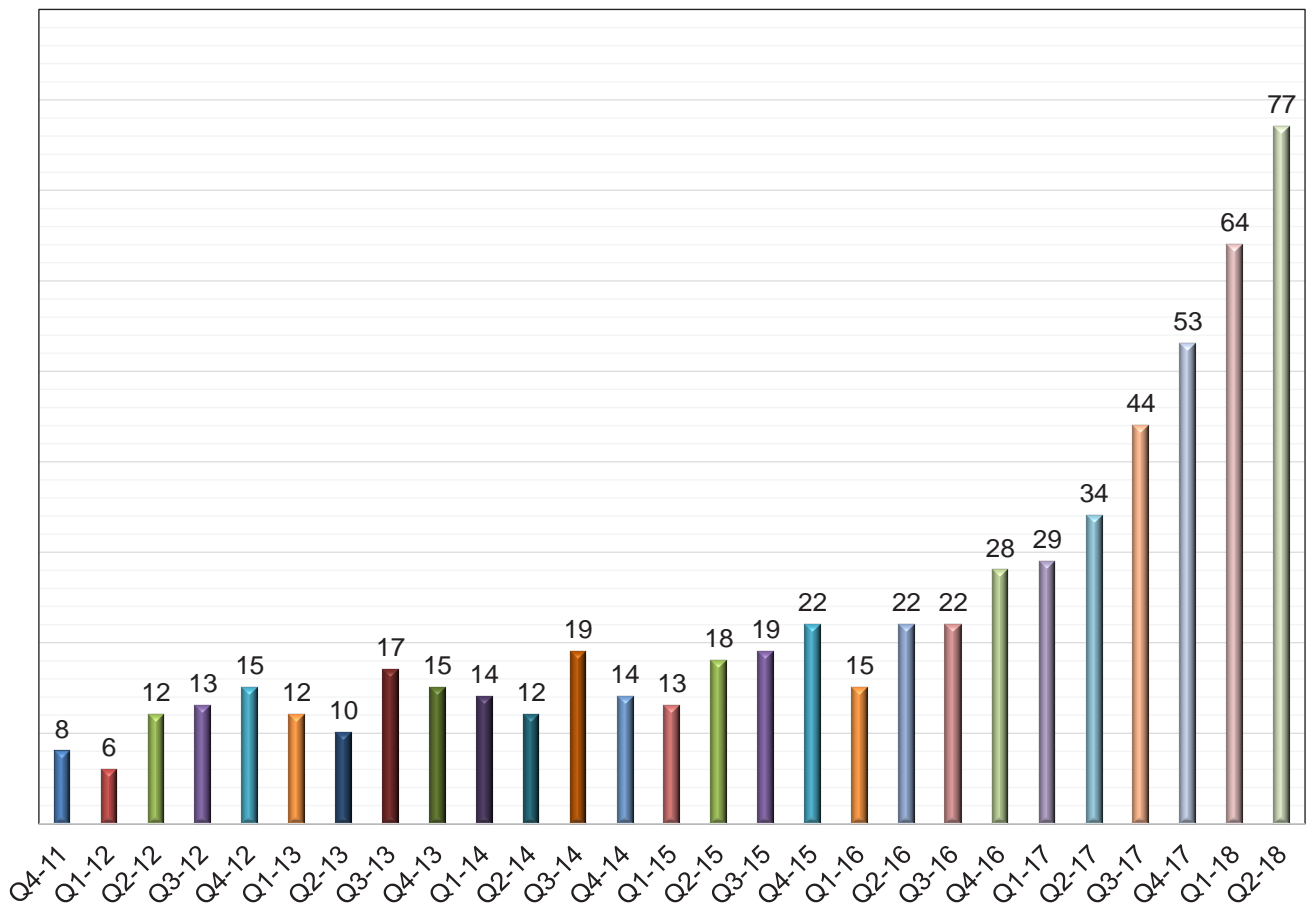
Zero Mismatch

Count	Recipient Center	Swap #	TXP Date	Donor ABO	Recipient ABO	NKR cPRA	Wait Time In Months	Donor Age ATOT	Recipient Age ATOT	HLA Points
1	Piedmont	1295	6/12/2018	O	O	100	2	29	61	100
2	Cornell	1266	4/4/2018	B	AB	0	1	68	63	100
3	Penn	1227	2/14/2018	O	O	7	3	58	26	100
4	Walter Reed	1203	2/8/2018	A	AB	100	5	61	40	100
5	Maine	1157	1/3/2018	A	A	100	9	54	52	100
6	Hartford	1191	1/3/2018	O	O	0	9	46	59	100
7	Hopkins	1019	6/1/2017	A	AB	0	2	40	55	100
8	Brigham	1026	5/24/2017	A	A	95	2	58	33	100
9	ChristHosp	952	1/18/2017	A	A	99	1	57	34	100
10	UMinn	928	11/8/2016	A	A	100	4	66	12	100
11	Cincinnati	884	8/31/2016	A	A	73	1	28	40	100
12	OSU	509	8/30/2016	A	A	91	1	38	67	100
13	SCarolina	459	2/11/2016	A	A	100	3	64	53	100
14	Madison	442	12/22/2015	A	A	97	6	22	63	100
15	UMinn	440	11/19/2015	O	O	100	5	23	20	100
16	UCLA	357	2/17/2015	A	A	100	34	39	52	100
17	Emory	351	12/11/2014	A	A	100	5	25	33	100
18	Hopkins	330	11/13/2014	A	O	96	1	41	38	100
19	Loyola	324	8/5/2014	A	A	100	1	37	55	100
20	Madison	674	1/9/2014	O	A	99	5	29	33	100
21	Barnabas	182	10/3/2012	A	A	92	4	51	50	100
22	Barnes	105	3/31/2011	A	A	100	7	60	32	100
23	UCSF	58	6/15/2010	A	A	100	6	47	58	100

## New Exportable Pairs



## Chains Started



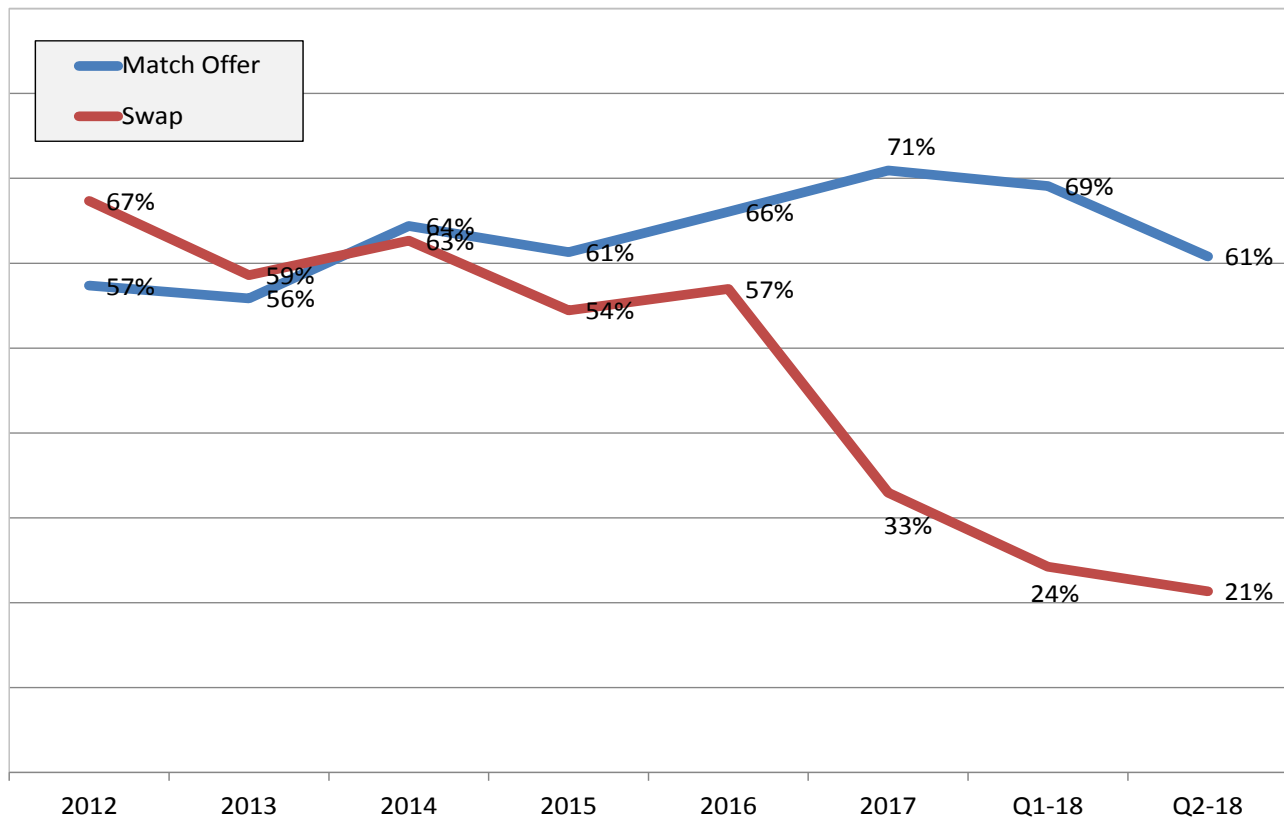
## Chain and Loop Statistics

Category	Count	Mean Length	Transplants
Ended	660	3.71	2451
Broken	25	4.04	101
Active	1	2	2
Chain Total	686	3.72	2554
Loops	112	2.34	262
Total	798	3.53	2816

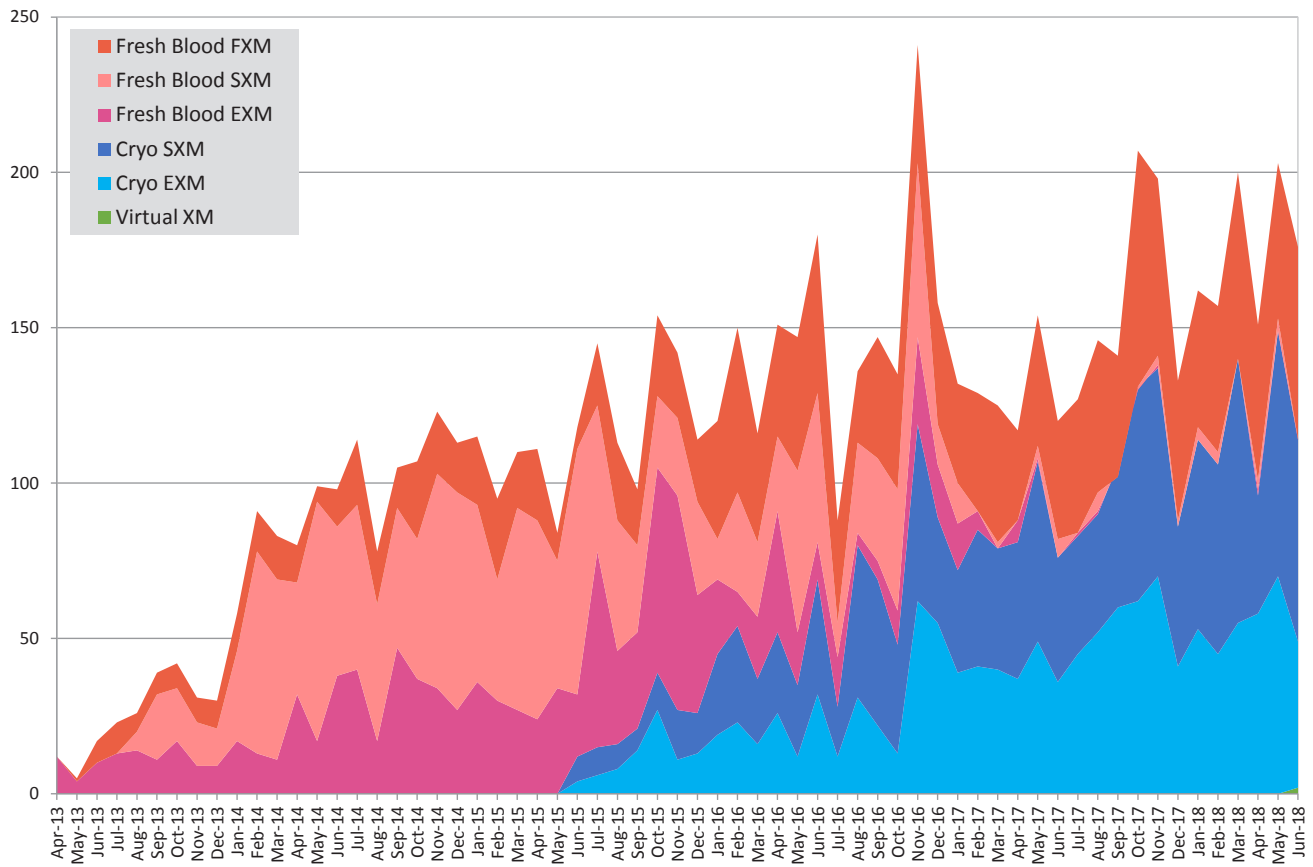
\*\*Updates as of 7/25/18

## Failure Rates

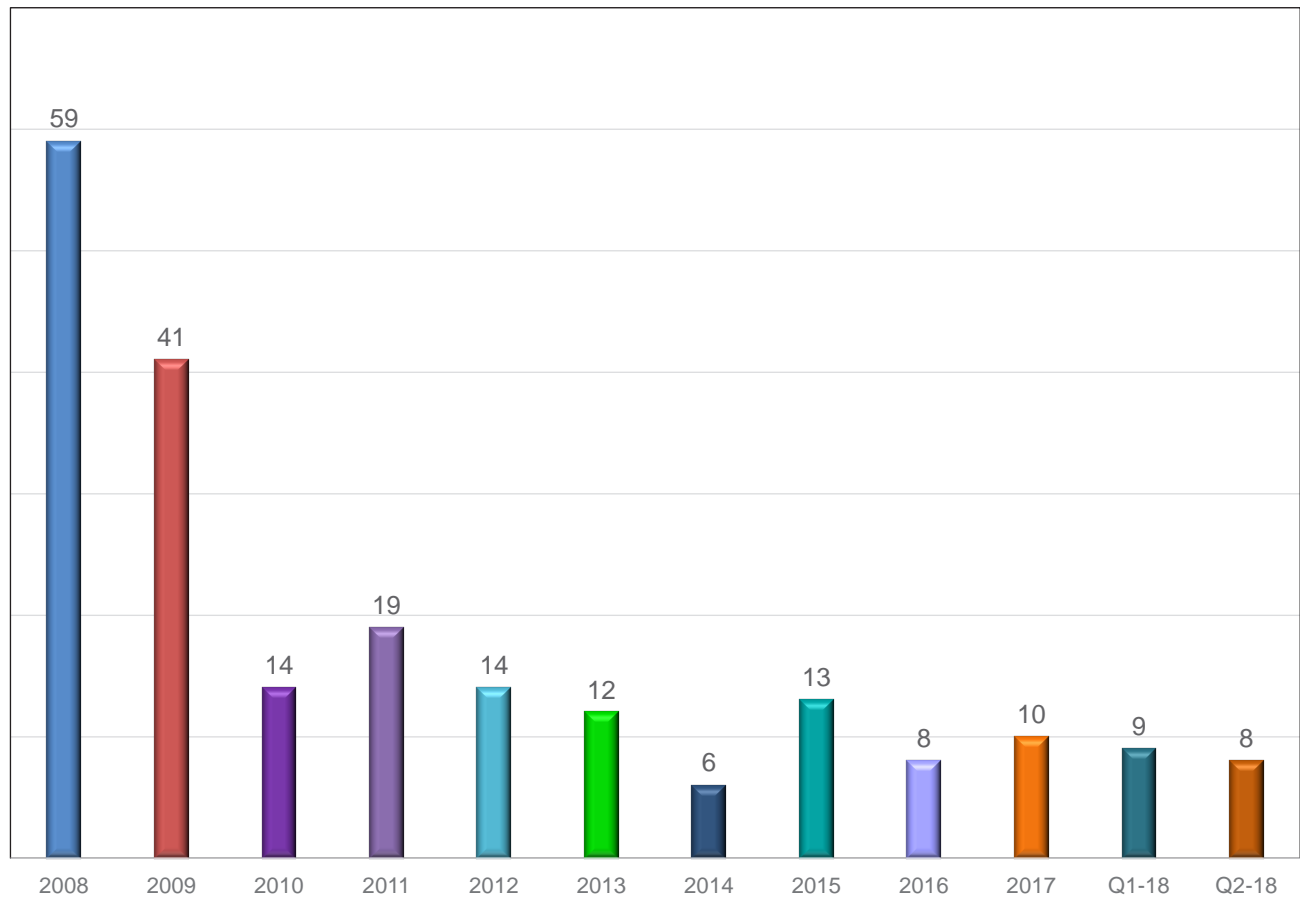
MO Rate =  $1 - (XM/MO)$   
 Swap Rate =  $1 - (TXP/XM)$



## Streamlined XMs Requested



## Bridge Donor Median Wait Times in Days

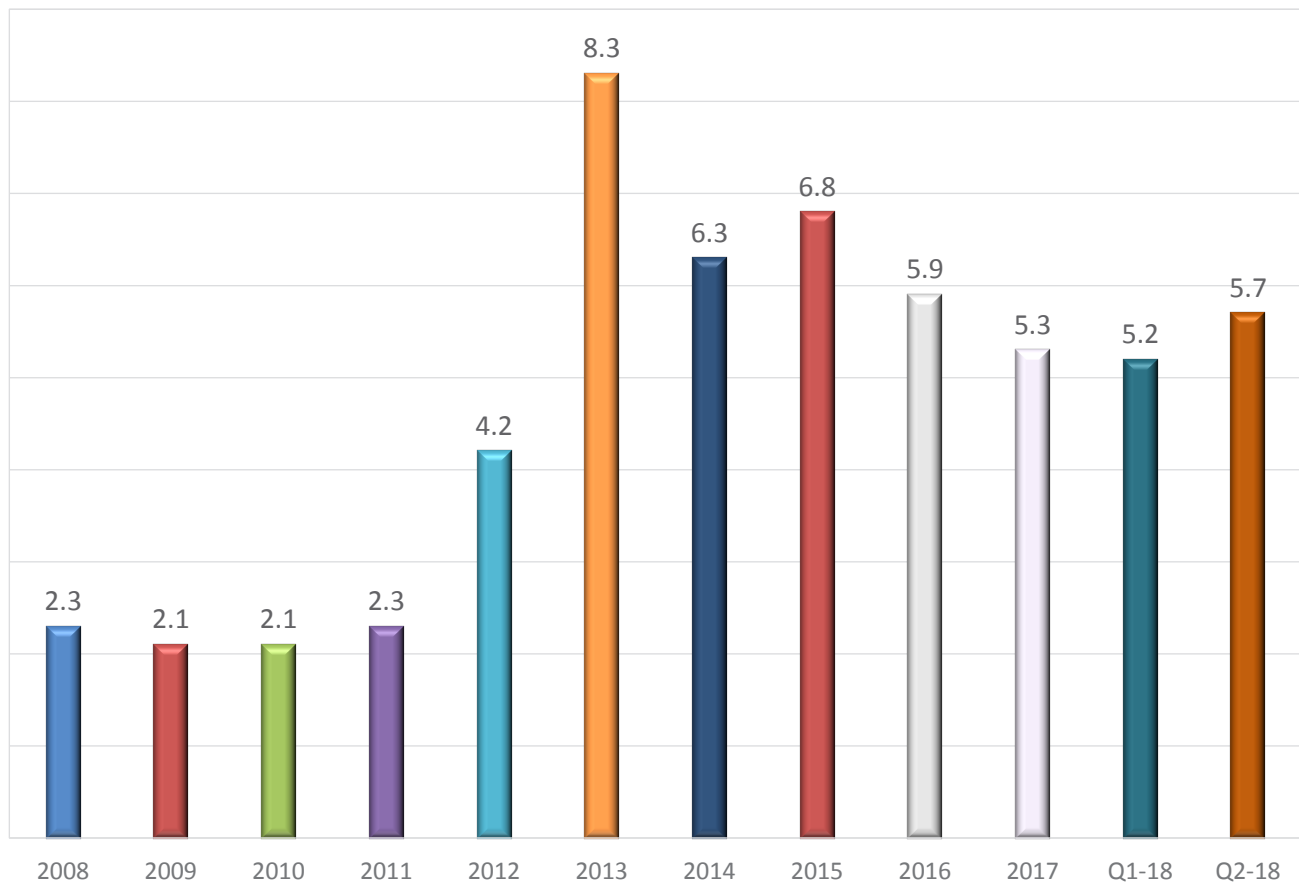




## Bridge Donor Wait Times

Year	Median	Mean	Max	Min
2008	59	53	77	16
2009	41	59	187	3
2010	14	51	385	2
2011	19	23	68	4
2012	14	29	314	2
2013	12	20	92	2
2014	6	11	97	2
2015	13	26	175	2
2016	8	14	71	2
2017	10	16	114	2
Q1-18	9	12	44	2
Q2-18	8	12	47	2

## NKR Transplants per Bridge Donor



## Summary Report

### Broken Chains & Real Time Swap Failures

<b>Year</b>	<b># Bridge Donors</b>	<b># Real Time Swap Failures</b>	<b># Broken Chains</b>	<b>% Broken Per Year</b>
2008	9	--	3	<b>33%</b>
2009	29	1	2	<b>7%</b>
2010	61	--	2	<b>3%</b>
2011	75	--	0	<b>0%</b>
2012	54	--	4	<b>7%</b>
2013	37	3	3	<b>8%</b>
2014	49	2	4	<b>8%</b>
2015	53	1	1	<b>2%</b>
2016	68	1	1	<b>3%</b>
2017	62	1	3	<b>5%</b>
2018	*68	1	2	<b>3%</b>
<b>Total</b>	<b>532</b>	<b>10</b>	<b>25</b>	

*\*annualized*

# Detail Report

## Broken Chains & Real Time Swap Failures

#	Reason Given	Real Time Swap Failures	Broken Chains	Center	Date
1	Job Issues/ long wait time/ many failed XMs		✓	Cornell	5/1/2008
2	No Reason		✓	Cornell	8/21/2008
3	No Reason		✓	CPMC	11/19/2008
4	Donor sick for swap then reneged later	✓	✓	UTMC	6/9/2009
5	Medical		✓	UCSF	11/10/2009
6	Medical		✓	UCLA	3/16/2010
7	Second nuclear GFR test < 80 (79 down from 82)		✓	AGH	9/16/2010
8	No Reason		✓	MethodistTX	2/3/2012
9	No Reason		✓	UCSF	4/4/2012
10	Medical		✓	UCLA	6/28/2012
11	Medical/Surgical		✓	Washington	11/5/2012
12	Aborted donor surgery	✓	✓	CPMC	6/27/2013
13	Kidney declined by recipient surgeon	✓	✓	RWJ/UPenn	7/23/2013
14	Recipient Medical Issue	✓	✓	Porter	10/16/13
15	Kidney Declined by Recipient Surgeon	✓	✓	Porter/Jefferson	1/9/14
16	Medical		✓	UCLA	3/4/14
17	Recipient Medical Issue	✓	Loop	ChristHosp	3/11/14
18	Medical		✓	Hopkins	7/15/14
19	Medical		✓	Hopkins	10/9/14
20	Kidney Declined by Recipient Surgeon	✓	✓	Tampa/Hopkins	7/7/15
21	Kidney Declined by Recipient Surgeon	✓	--	Porter/Aurora St Lukes	3/17/16
22	Donor reneged		✓	Maryland	8/8/16
23	Donor reneged		✓	SCarolina	1/10/17
24	Kidney Declined by Recipient Surgeon	✓	✓	Indiana/UNC	9/27/2017
25	Donor Ruled Out- Medical Issue		✓	UMinn	8/23/2017
26	Donor reneged		✓	CC Florida	4/4/2018
27	Recipient became too sick for transplant	✓	✓	Loyola	6/19/2018
	<b>Total</b>	<b>10</b>	<b>25</b>		

## Advanced Donation Program (ADP)

Summary  
As of 6/30/2018

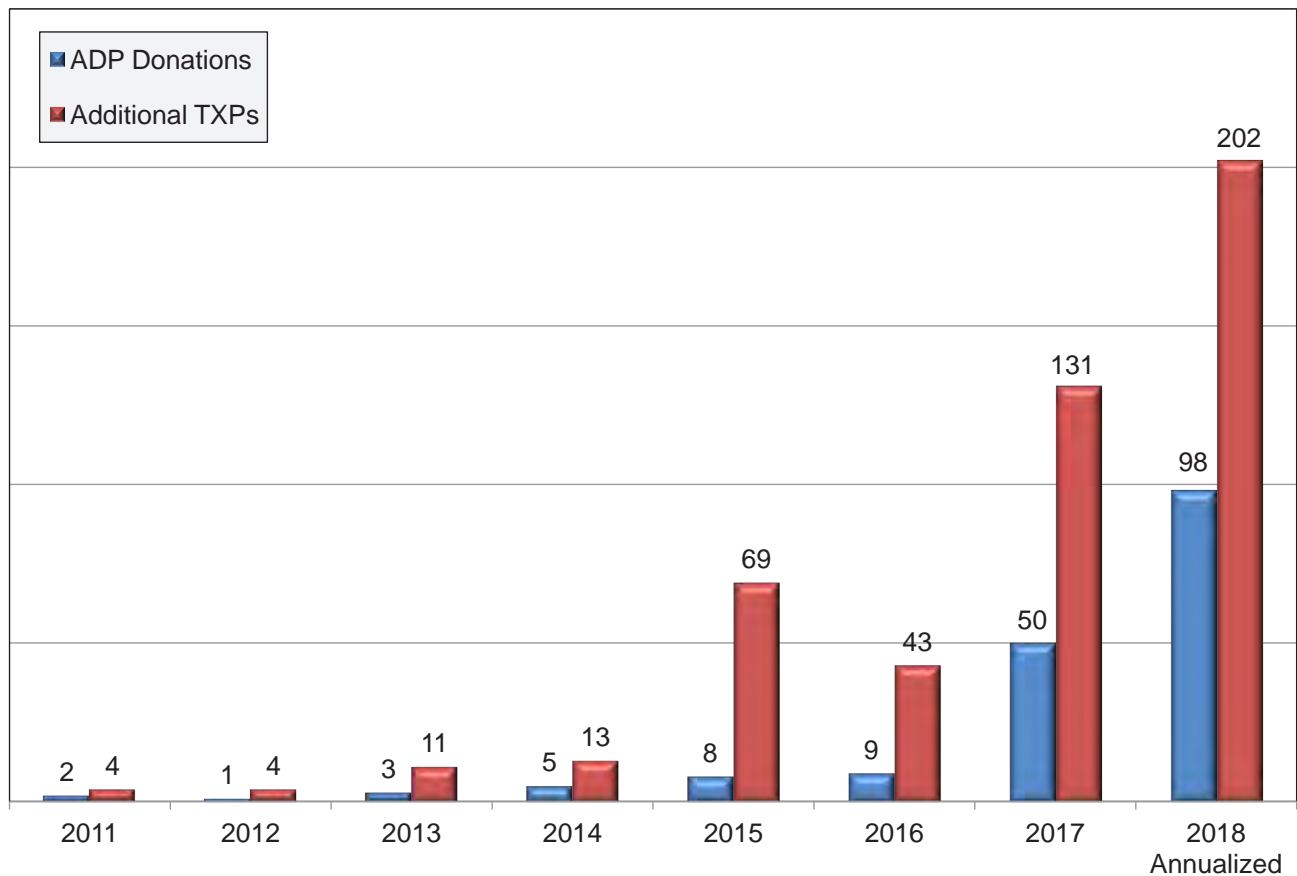
Type	Cases	Add'l TXPs Facilitated	80%+ cPRA TXPs Facilitated	95%+ cPRA TXPs Facilitated
Short-Term*	92	284	84	43
Voucher**	36	94	18	8
<b>Total</b>	<b>128</b>	<b>378</b>	<b>102</b>	<b>51</b>

\*Short-Term– At time of advanced donation the intended ADP Recipient is in need of transplant.

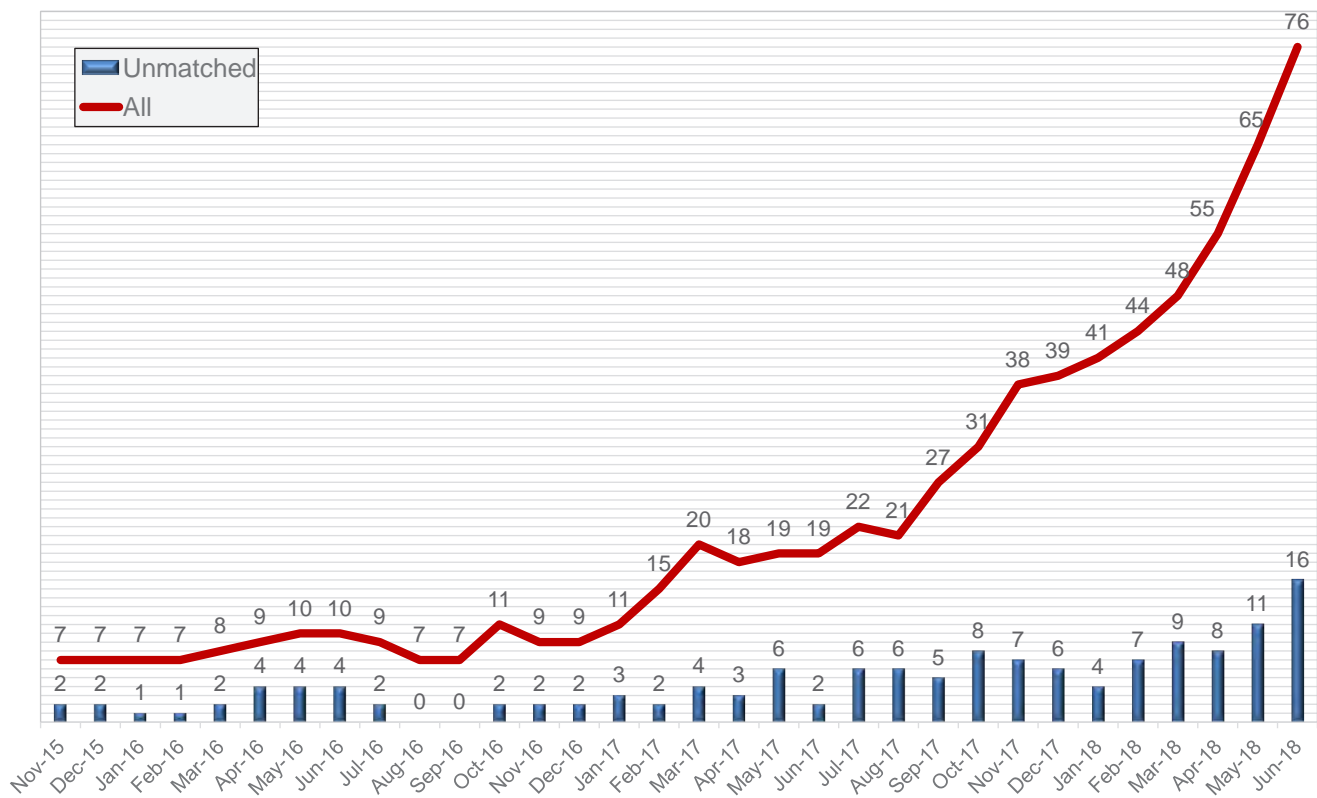
\*\*Voucher - At time of advanced donation the intended ADP Recipient is not in need and may never be in need of transplant.



## ADP Donations & Additional TXPs Facilitated

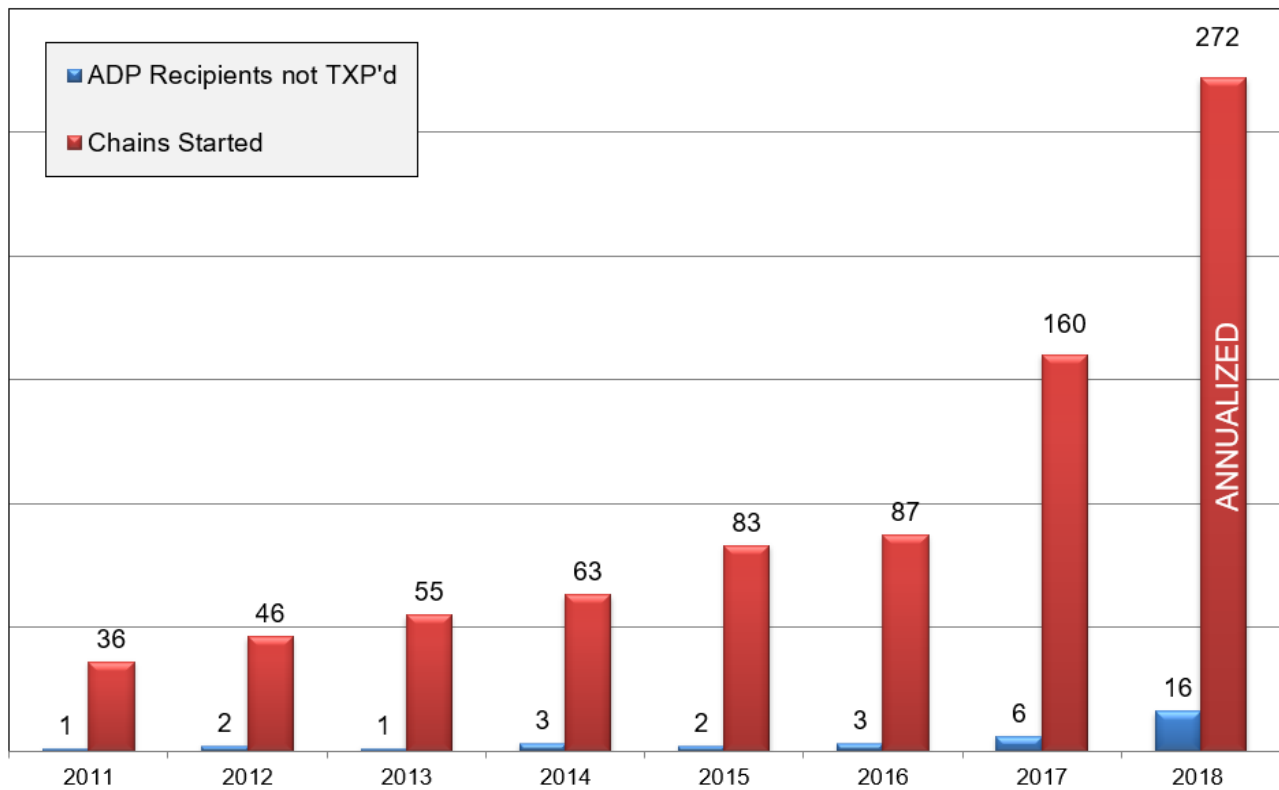


## ADP Recipient Pool



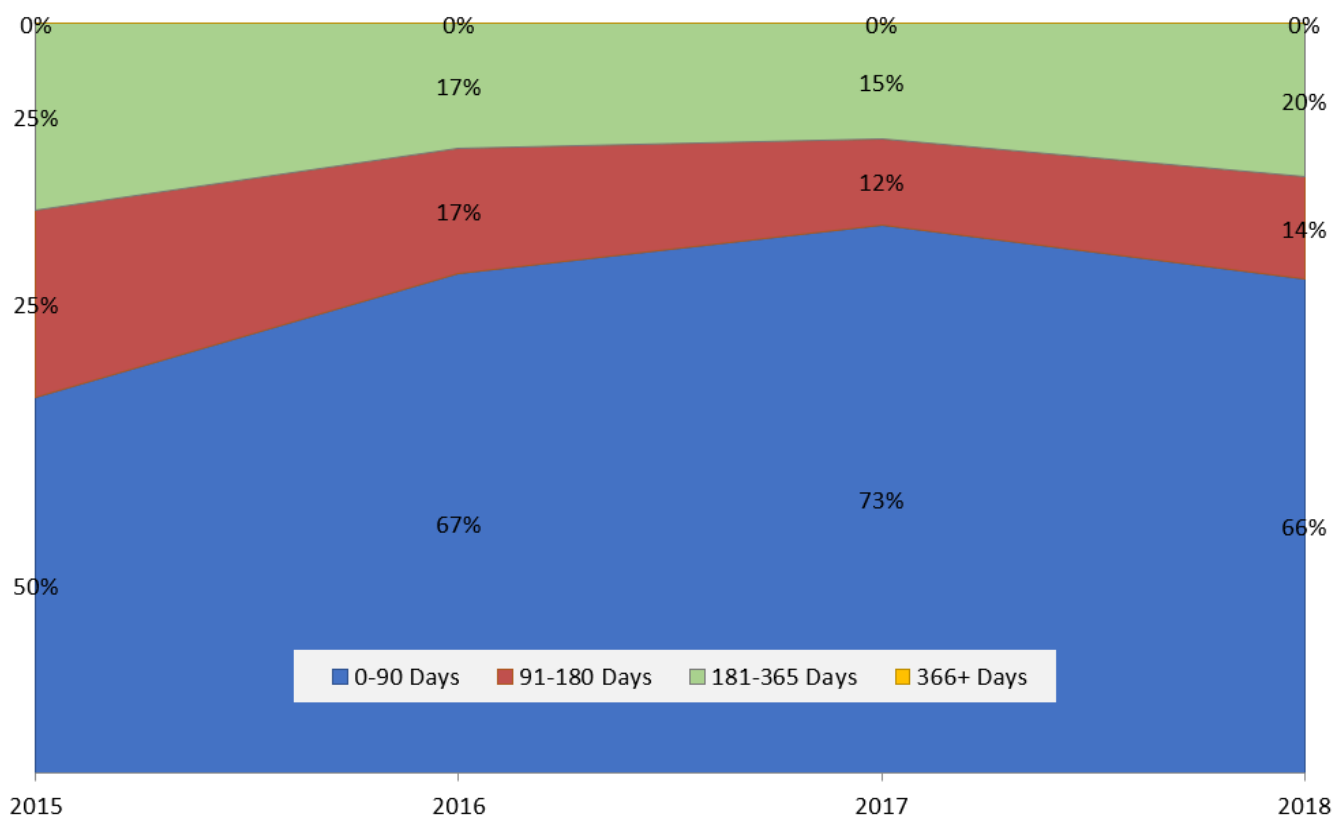
\*As of 7/12, 2:02pm, "Unmatched" recipients are "Active" and "Need Match"

## ADP Recipients Outstanding vs. Overall Chains Started



\*ADP Recipients not transplanted are recipients whose donor has donated and they are "Active" and "Need Match."

## ADP Recipient Wait Time Distribution



\*Wait time count begins after the ADP donor has donated and recipient has been activated.

# Program Statistics

As of 6/30/2018

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	Transplants Facilitated	21	62	131	175	226	308	310	360	399	462	324
2	Paired Transplants Facilitated	21	39	91	131	164	252	255	288	315	318	193
3	Chip Transplants Facilitated	0	23	40	44	62	56	55	72	84	144	131
4	Ending Unmatched Patient Pool	80	127	120	201	241	255	279	280	215	181	141
5	Cumulative Transplants	21	83	214	389	615	923	1233	1593	1992	2454	2778
6	Cumulative Paired Transplants	21	60	150	280	526	777	1030	1316	1630	1946	2139
7	Cumulative Chip Transplants	0	23	64	109	89	146	203	277	362	508	639
8	Cumulative Paired Patient Pool	101	210	334	590	805	1062	1351	1615	1877	2152	2318
9	Percent of Pool Transplanted (Paired Recipients)	21%	40%	64%	66%	71%	76%	79%	84%	89%	92%	94%
10	Enrolled Patient Mean Wait Time (years)	3.8	2.0	0.9	1.1	1.1	1.0	0.9	0.9	0.9	0.9	0.6
11	Transplanted Patient Mean Wait Time (months)	5.1	5.3	6.0	5.0	5.1	5.4	4.8	4.1	4.7	4.0	3.8
12	Transplanted Patient Median Wait Time (months)	5.3	5.3	3.9	2.5	3.0	3.0	2.3	2.1	2.2	1.8	1.7
13	Mean cPRA of Transplanted Patients	4.1%	25.9%	34.5%	40.3%	44.1%	54.0%	48.3%	48.9%	42.8%	41.9%	40.2%
14	Number of Transplants Completed by cPRA											
15	100%	0	1	4	10	4	5	3	7	3	4	3
16	95-100%	0	4	12	10	29	68	41	47	39	41	32
17	80-95%	1	7	16	29	26	37	49	55	59	60	34
18	50-80%	0	5	19	27	33	46	48	42	53	49	33
19	0-50%	1	8	13	30	34	47	43	57	61	94	39
20	0%	19	37	67	69	100	105	126	152	184	214	183
21	Sub-total	21	62	131	175	226	308	310	360	399	462	324
22	Percent of Transplants Completed by cPRA											
23	100%	0%	2%	3%	6%	2%	2%	1%	2%	1%	1%	1%
24	95-100%	0%	6%	9%	6%	13%	22%	13%	13%	10%	9%	10%
25	80-95%	5%	11%	12%	17%	12%	12%	16%	15%	15%	13%	10%
26	50-80%	0%	8%	15%	15%	15%	15%	15%	12%	13%	11%	10%
27	0-50%	5%	13%	10%	17%	15%	15%	14%	16%	15%	20%	12%
28	0%	90%	60%	51%	39%	44%	34%	41%	42%	46%	46%	56%
29	Sub-total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30	Number of Transplanted Patients with cPRA >80%	1	12	32	49	59	110	93	109	101	105	69
31	Percent of Transplanted Patients with cPRA >80%	5%	19%	24%	28%	26%	36%	30%	30%	26%	23%	21%

# Program Statistics

As of 6/30/2018

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
32	Number of Unmatched Patients by cPRA											
33	100%				79	73	83	81	80	80	63	44
34	95-99%				73	73	61	61	53	37	32	20
35	80-95%				15	15	24	19	22	12	14	15
36	50-80%				14	11	14	13	25	13	8	10
37	0-50%				14	10	22	37	35	28	16	22
38	0%				50	59	51	68	65	45	48	30
39	Sub-total				245	241	255	279	280	215	181	141
40	Percent of Unmatched Patients by cPRA											
41	100%				32%	30%	33%	29%	29%	37%	35%	31%
42	95-99%				30%	30%	24%	22%	19%	17%	18%	14%
43	80-95%				6%	6%	9%	7%	8%	6%	8%	11%
44	50-80%				6%	5%	5%	5%	9%	6%	4%	7%
45	0-50%				6%	4%	9%	13%	13%	13%	9%	16%
46	0%				20%	24%	20%	24%	23%	21%	27%	21%
47	Sub-total				100%	100%	100%	100%	100%	100%	100%	100%
48	Number of Transplants Completed by Wait Time											
49	< 6 months	21	42	74	106	180	232	243	298	327	392	284
50	6-12 months	0	10	14	19	24	44	35	38	30	37	19
51	1-2 years	0	4	15	14	20	25	27	22	32	29	18
52	2+ years	0	0	2	2	2	7	5	2	10	4	3
53	Sub-total	21	56	105	141	226	308	310	360	399	462	324
54	Percent of Transplants Completed by Wait Time											
55	< 6 months	100%	75.0%	70.5%	75.2%	79.6%	75.3%	78.4%	82.8%	82.0%	84.8%	87.7%
56	6-12 months	0.0%	17.9%	13.3%	13.5%	10.6%	14.3%	11.3%	10.6%	7.5%	8.0%	5.9%
57	1-2 years	0.0%	7.1%	14.3%	9.9%	8.8%	8.1%	8.7%	6.1%	8.0%	6.3%	5.6%
58	2+ years	0.0%	0.0%	1.9%	1.4%	0.9%	2.3%	1.6%	0.6%	2.5%	0.9%	0.9%
59	Sub-total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
60	Total Chains Started	4	9	28	36	46	55	63	83	99	160	143
61	Total Loops Completed	0	3	2	3	12	24	17	15	7	15	5
62	Number of broken chains	3	2	2	0	4	3	4	1	2	2	2
63	Bridge Donors Held (2018 Annualized)	9	29	61	75	54	37	49	53	68	62	68
64	Percent of broken chains	33%	7%	3%	0%	7%	8%	8%	2%	3%	3%	3%