



**NATIONAL KIDNEY REGISTRY**  
FACILITATING LIVING DONOR TRANSPLANTS

# Paired Exchange Results Quarterly Report

Q3 Results 2019

# Table of Contents

- Message from the Founder & CEO
- NKR Leading U.S. Paired Exchange Growth
- Death Censored Graft Failure Comparisons
- Donors Protected
- Direct Donor Shield Utilization
- A2 to O Transplants Facilitated
- Top Centers NKR Transplants Last 12 Months
- NKR Member Centers
- Donor Care Network® Centers of Excellence
- Private Label DASH Users
- Remote Donor Centers
- Partner Center Chain End Targets
- Top Center Liquidity Contributors CLC Driven Matches 10/2018 – 09/2019
- Donor Contacts Across All Donor Intake Platforms
- Non-Directed Donor Contacts Across All DASH platforms
- Non-Directed Donor Referrals Referred to NKR Member Centers
- Pre-Workup Labs 24 Hour Urine Jugs Shipped
- Pre-Workup Labs Scripts Uploaded
- Pre-Workup Labs Results Uploaded
- Pool Size Unmatched patients
- Patients Waiting > 1 Year
- Patients Waiting > 1 Year by Center
- Transplanted Patient Median Wait Time  
Wait times of patients transplanted during prior 12 months
- Wait Time Distribution Transplanted Pairs
- Unmatched Patient Mean Wait Time
- Unmatched Target Pairs Waiting more than 12 Months
- Pairs waiting > 1 Year Due to Unfavorable Blood Type Combination
- Paired recipients waiting > 1 Year Due to High cPRA
- Pair Wait Time Analysis
- Compatible Pair Transplanted
- Pool Composition by cPRA
- Transplanted Patients with cPRA > 80%
- Transplanted Patients by cPRA
- Great HLA Matches Zero Mismatch
- New Exportable Pairs
- Chains Started
- Chain and Loop Statistics
- Failure Rates
- Streamlined Cross Matches Requested
- Virtual Screening Crossmatches
- Centers Utilizing Virtual Screening Cross Matching
- Summary Report: Broken Chains & Real Time Swap Failures
- Detail Report: Broken Chains & Real Time Swap Failures
- Detail Report: Broken Chains & Real Time Swap Failures Continued
- Advanced Donation Program (ADP) Summary
- Advanced Donation Program (ADP)
- ADP Donations & Additional TXPs Facilitated
- ADP Recipients Pool
- ADP Recipients Outstanding vs. Overall Chains Started
- ADP Recipient Wait Time Distribution
- Program Stats
- Program Stats, Continued



# Message from the Founder & CEO



We are pleased to report that 559 KPD transplants have been facilitated through the National Kidney Registry in the first three quarters of 2019. This is up 18% over the same time period last year and puts us on track to facilitate 750 transplants by the end of this year. September was the largest month in our history, with 83 transplants facilitated. Our donor intake platform volume is also setting new records, with a current run rate of over 40,000 donor registrations annually.

The adoption of our Champion Microsite module is accelerating and now has over 60 patient sites live across 20 centers. These microsites enable patients to set up a free personalized website to help them find a living donor. We recently launched a new feature that supports mass mailings to all the patients on a center's deceased donor waitlist, inviting them to set up microsites. This feature dramatically decreases the amount of work coordinators must do to register patients and extends the microsite opportunity to all patients on a center's waitlist.

After the recent presidential executive order calling for the support of living kidney donors, we began providing Donor Shield protections for all donors participating in NKR swaps, which now includes lost wage reimbursement for all donors who qualify. We also removed the income cap for donor travel and lodging reimbursement, allowing all donors to access this protection. We expect that over 1,000 donors will be covered by our Donor Shield protections in 2019.

To improve matching and transplant outcomes, we have added an enhancement to the preselect screens to allow for easy review of antigen matches, mismatches, and avoid conflicts. During the preselect process, users may now click the value in the 'HLA Points' column to see a quick summary of the HLA matching details for each potential donor matching your patient.

As always, we thank our Member Centers for their ongoing dedication and effort, which has enabled us to continue breaking records and achieving new milestones.

Thank you for your support and keep up the great work!

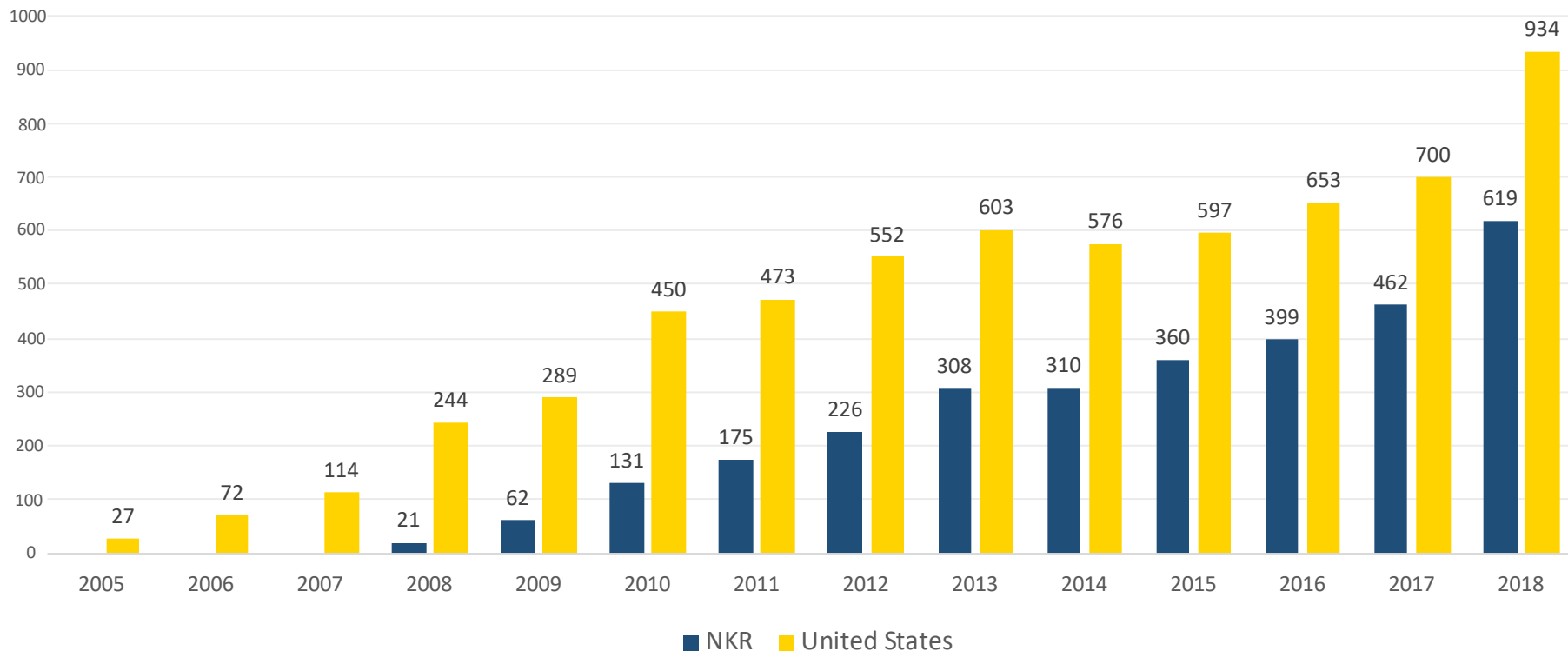
Sincerely,

A handwritten signature in blue ink, appearing to read 'G Hil'.

**Garet Hil**  
Founder & CEO  
National Kidney Registry



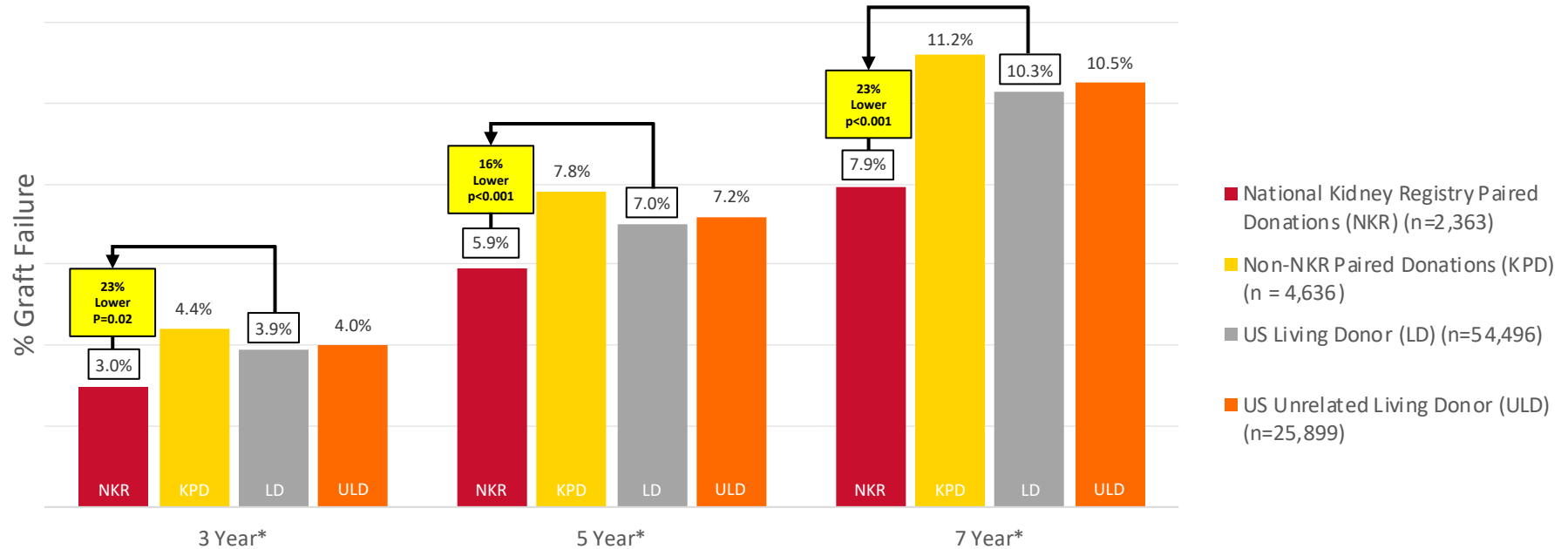
# NKR Leading U.S. Paired Exchange Growth



\*Organ Procurement and Transplantation Network. <https://optn.transplant.hrsa.gov/> Accessed 2/11/19



# Death Censored Graft Failure Comparisons

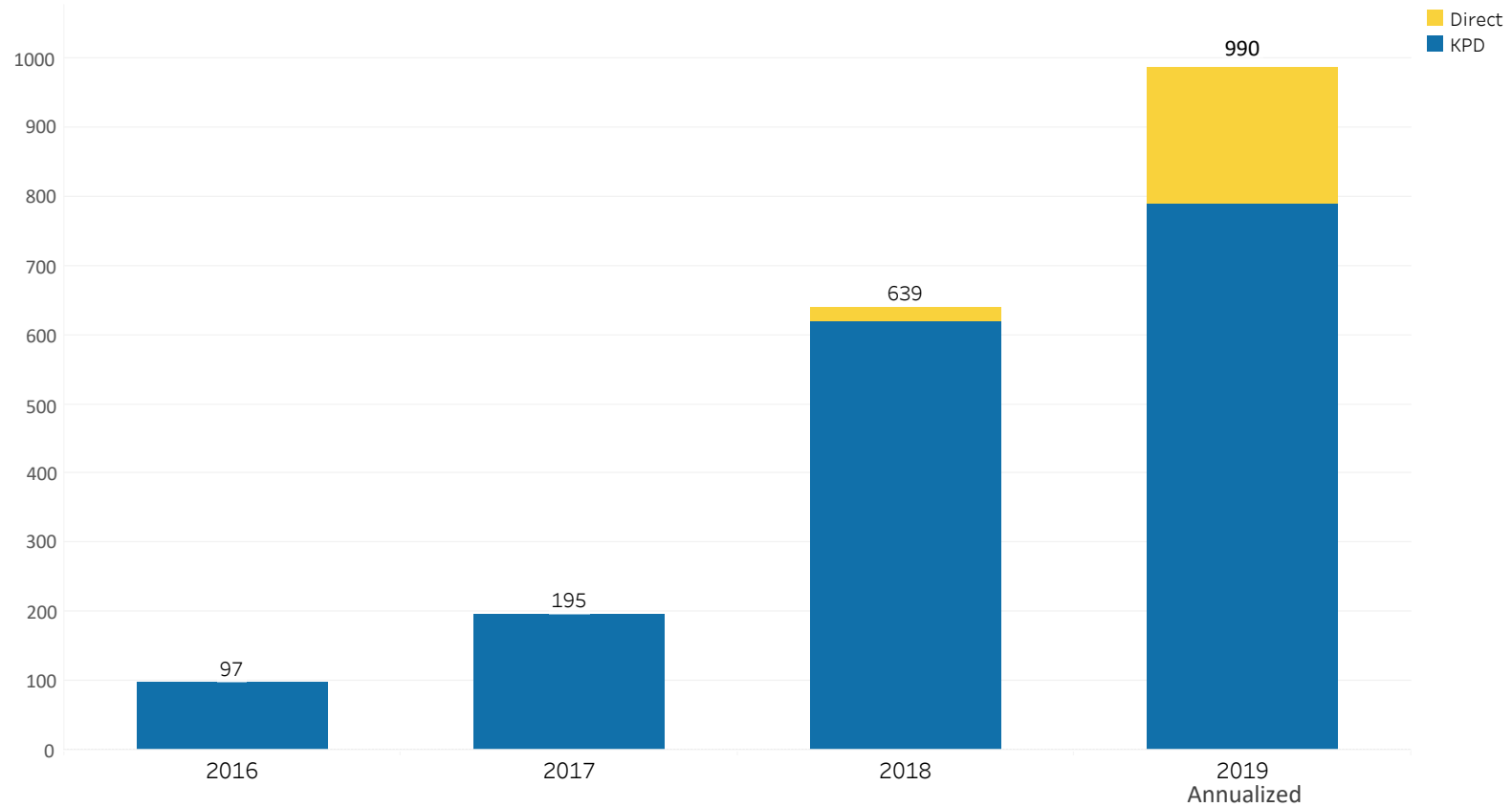


\*Statistically Significant

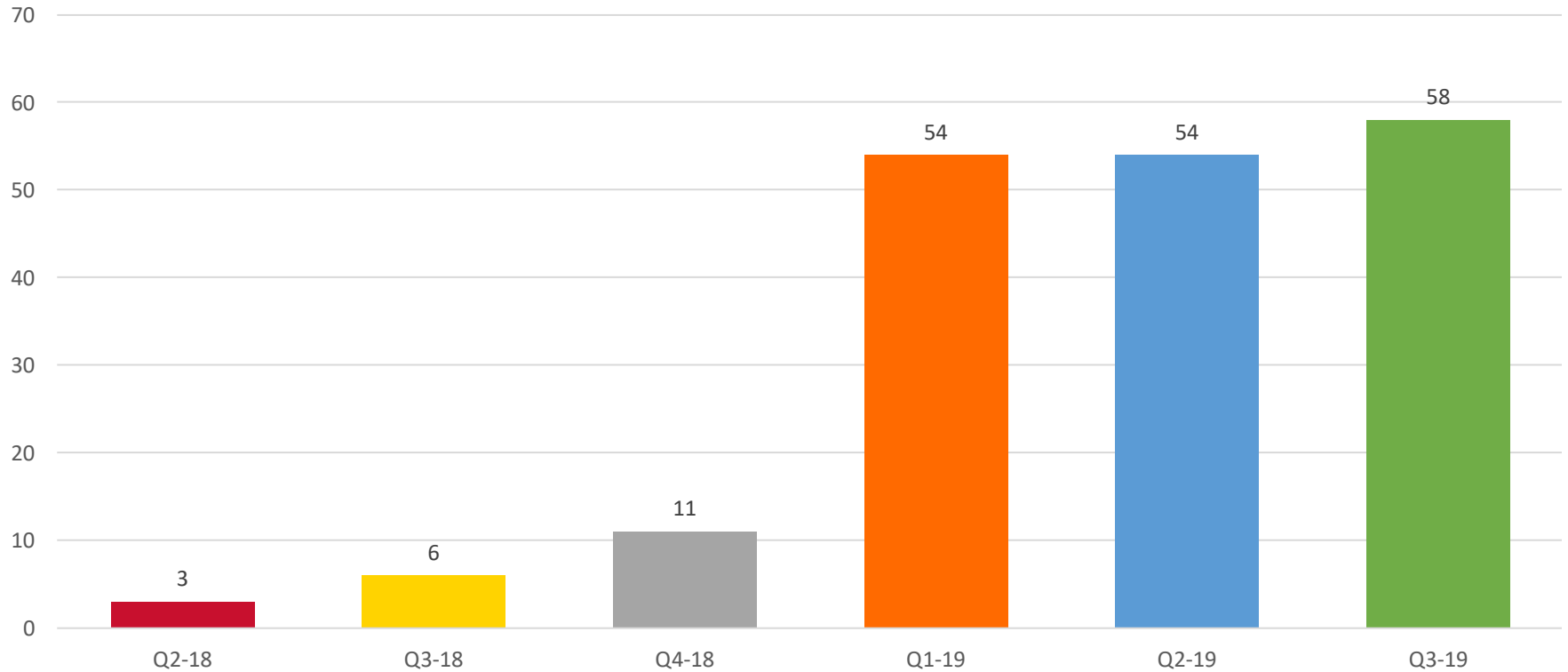
Provided courtesy of Johns Hopkins University School of Medicine, Department of Surgery \*Not including CHIP patients;  
Kaplan-Meier GS Rates for Transplants Performed: 02/2008-06/2018 with follow-up through 2/28/2019 <https://www.srtr.org/> SRTR data as of March, 2019  
If you would like to see the full outcomes report click [here](#).



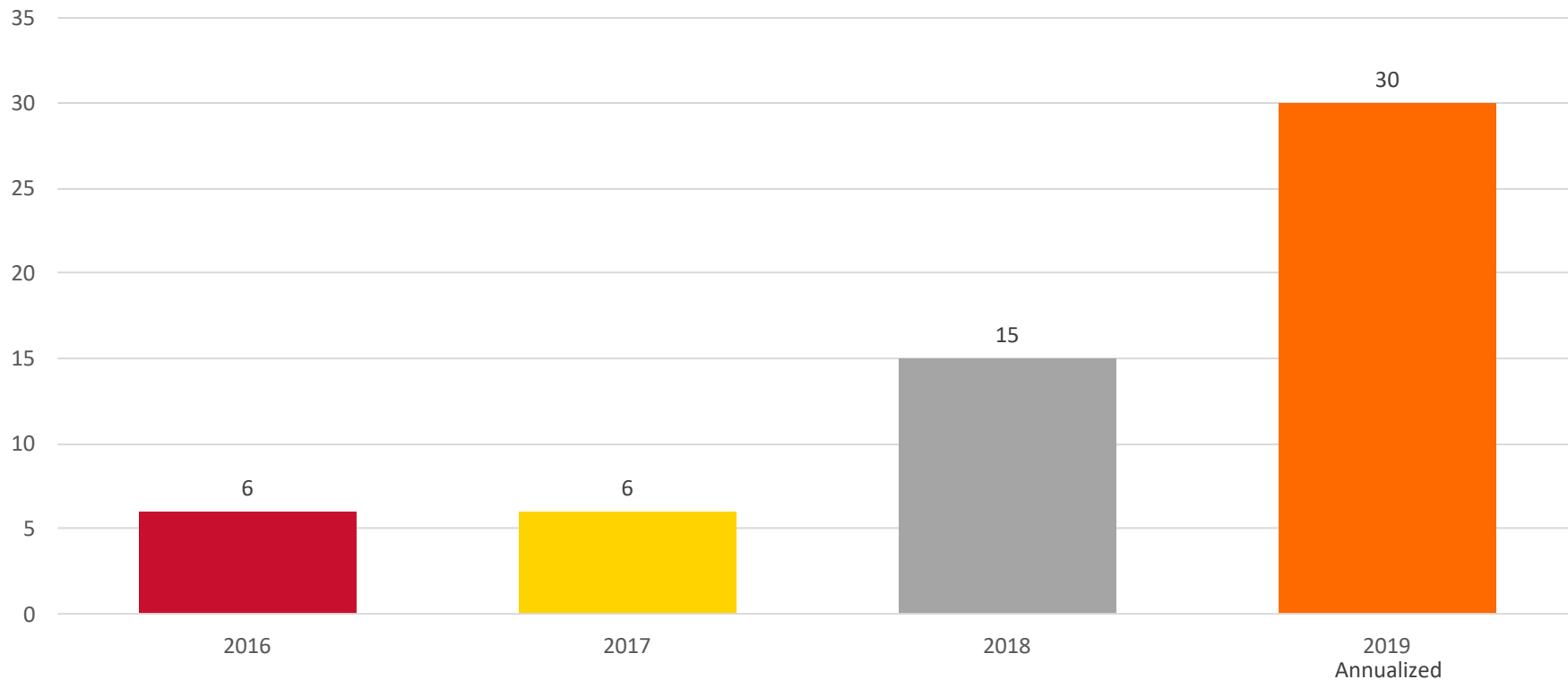
# Donors Protected



# Direct Donor Shield Utilization



# A2 to O Transplants Facilitated



*\*As of 10/28/2019 15:41:22*

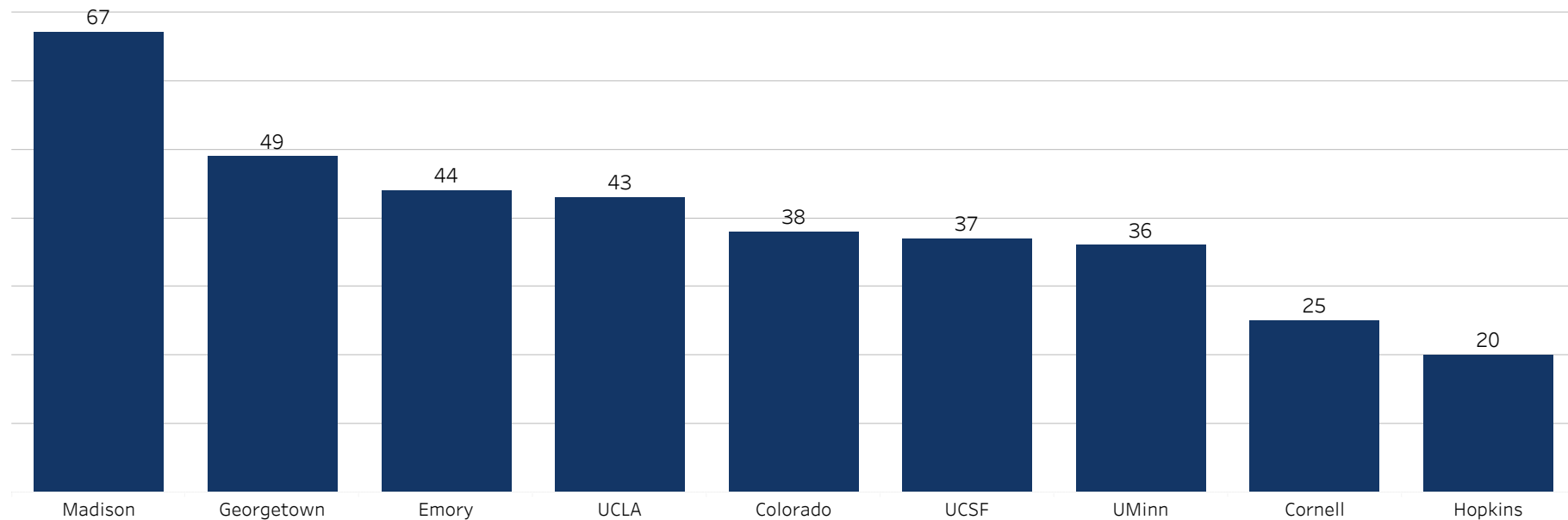
*\*This can be A2-O, A2-B and A2B - B transplants*





# Top Centers

## NKR Transplants Last 12 Months



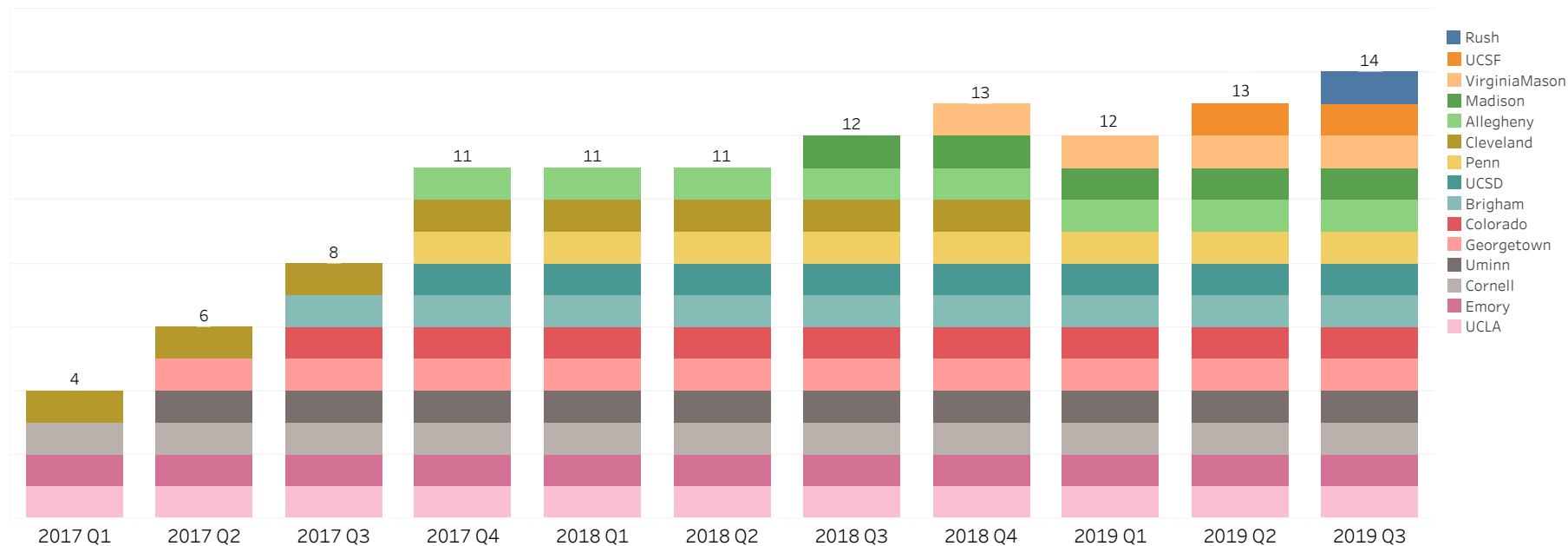
As of 11/4/2019 10:11:79



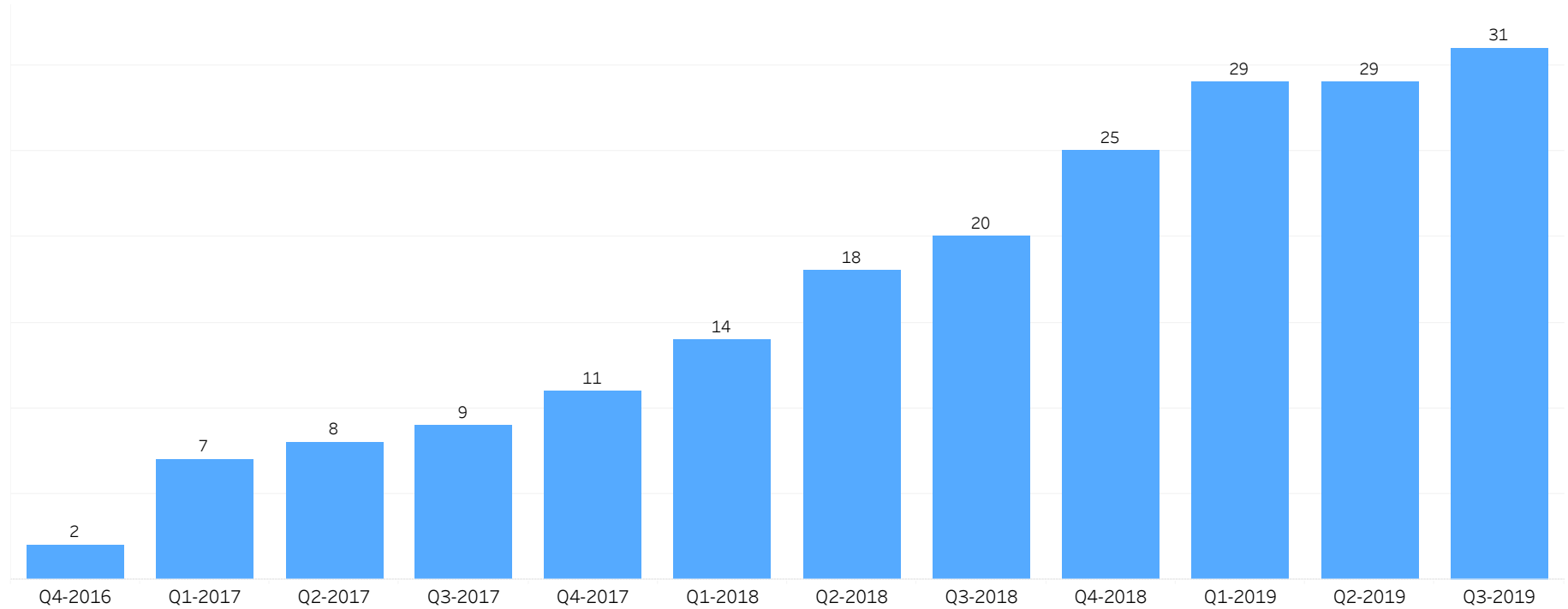
# NKR Member Centers



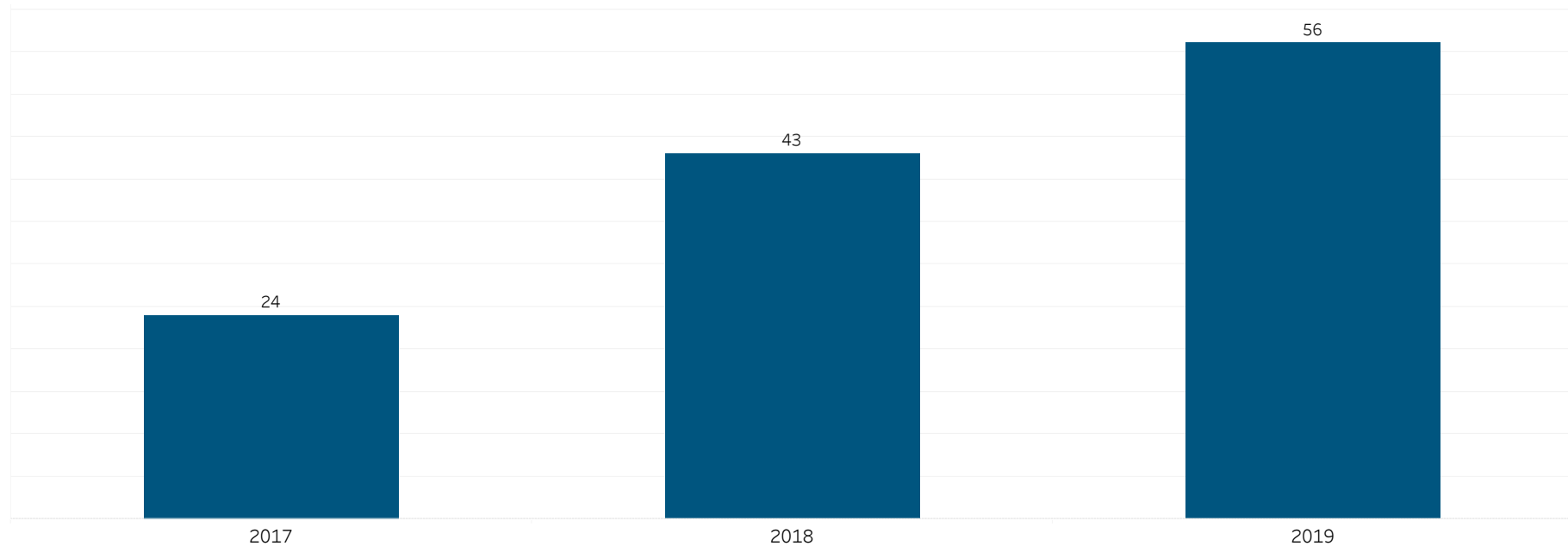
# Donor Care Network® Centers of Excellence



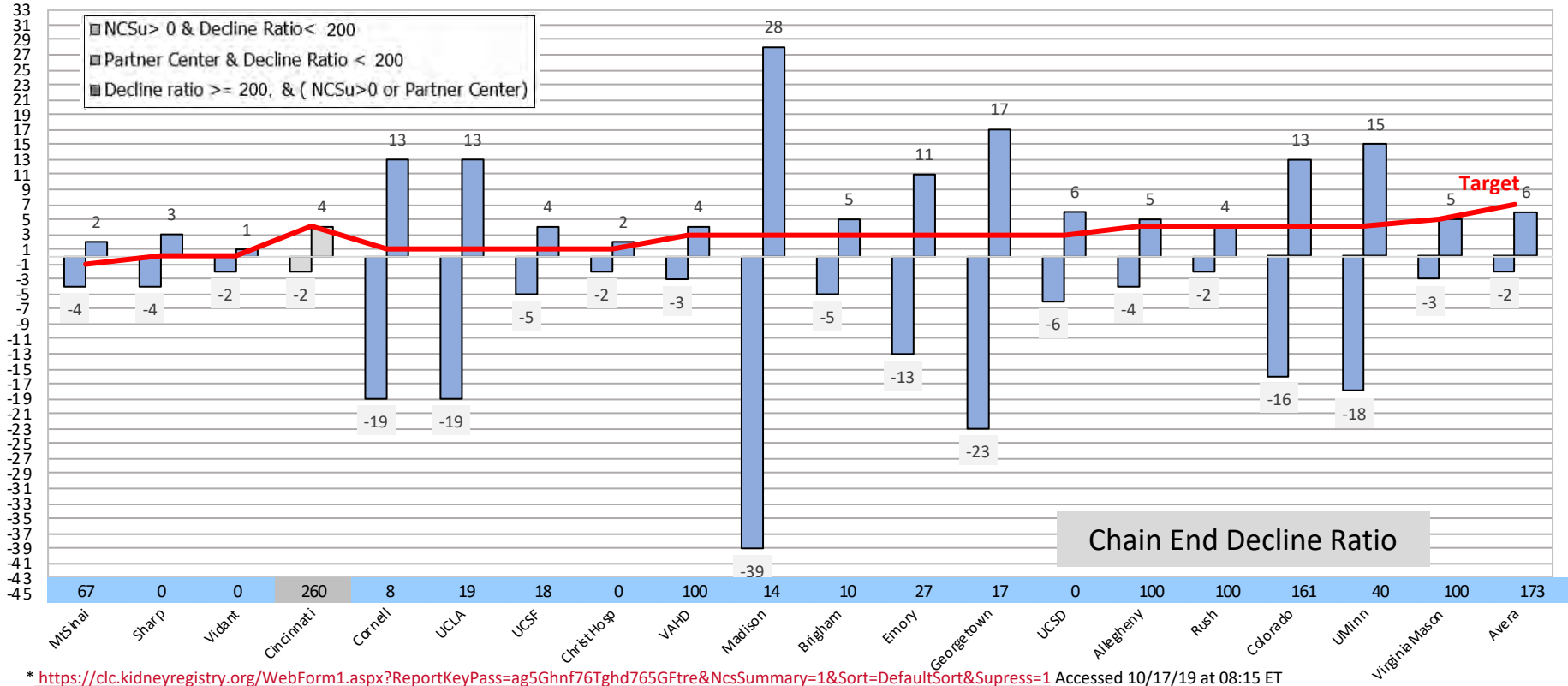
# Private Label DASH Users



# Remote Donor Centers



# Partner Center Chain End Targets

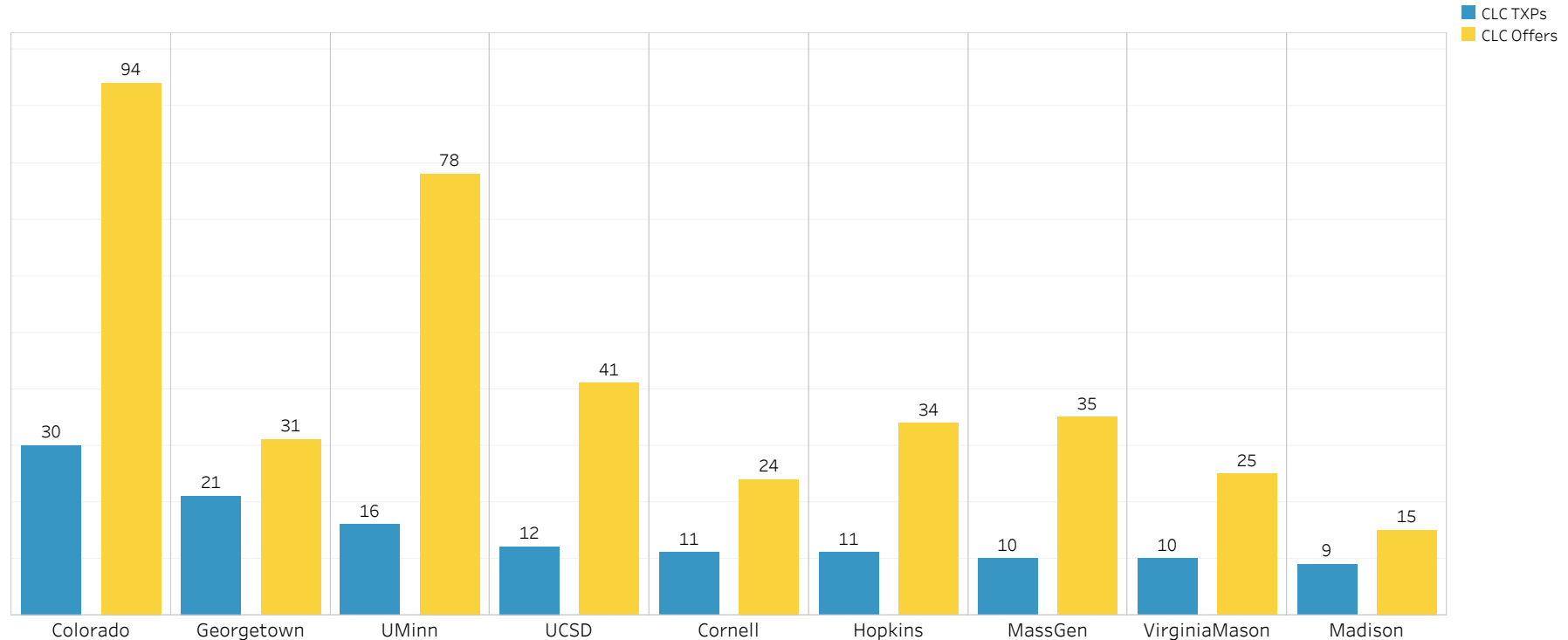


\* <https://clc.kidneyregistry.org/WebForm1.aspx?ReportKeyPass=ag5Ghnf76Tghd765GFtre&NcsSummary=1&Sort=DefaultSort&Supress=1> Accessed 10/17/19 at 08:15 ET



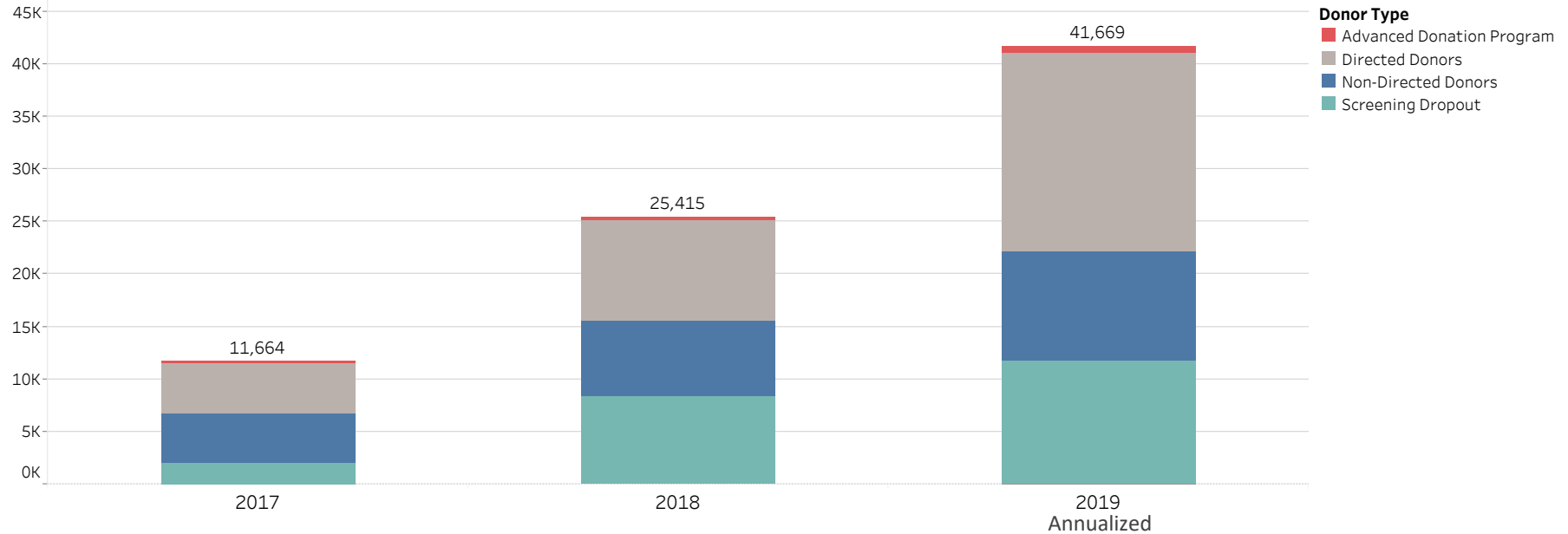
# Top Center Liquidity Contributors

CLC Driven Matches 10/2018 – 09/2019



# Donor Contacts

## Across All Donor Intake Platforms



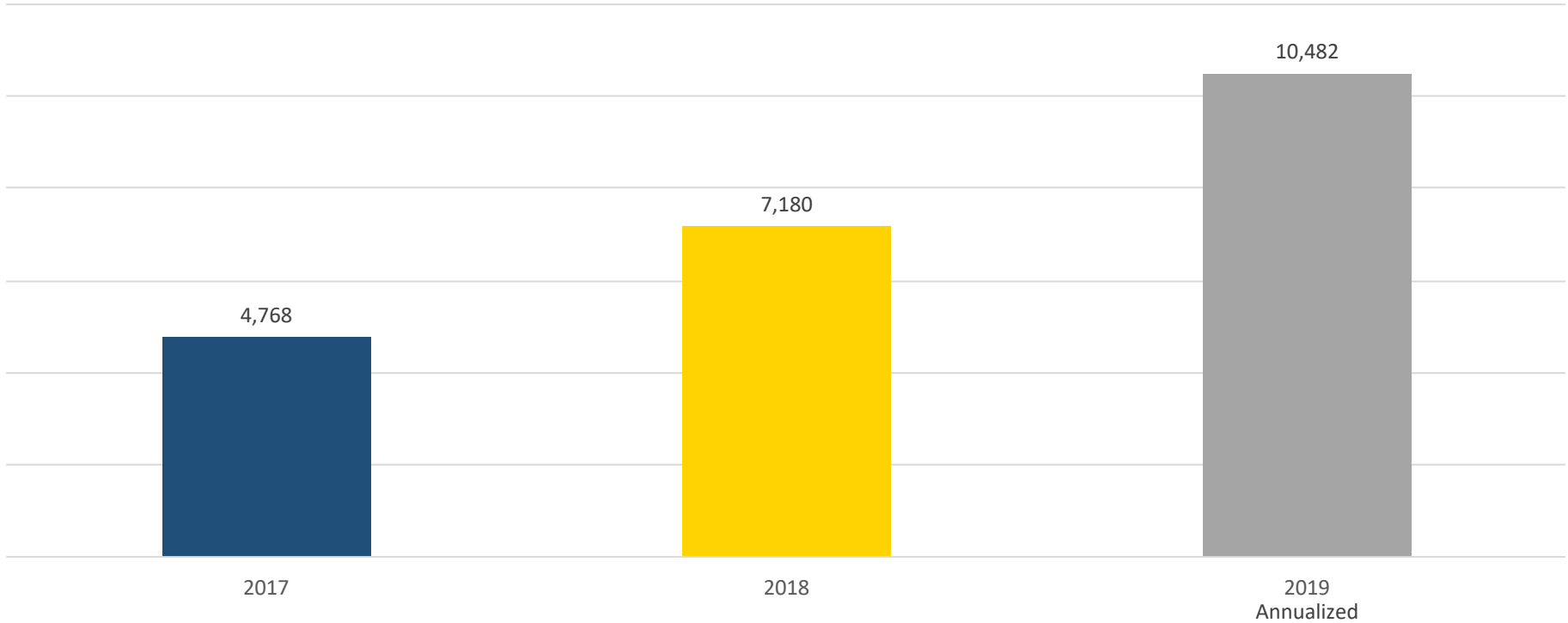
*\*Year 2017 Restated due to database update/changes affecting calculations*





# Non-Directed Donor Contacts

Across All DASH platforms

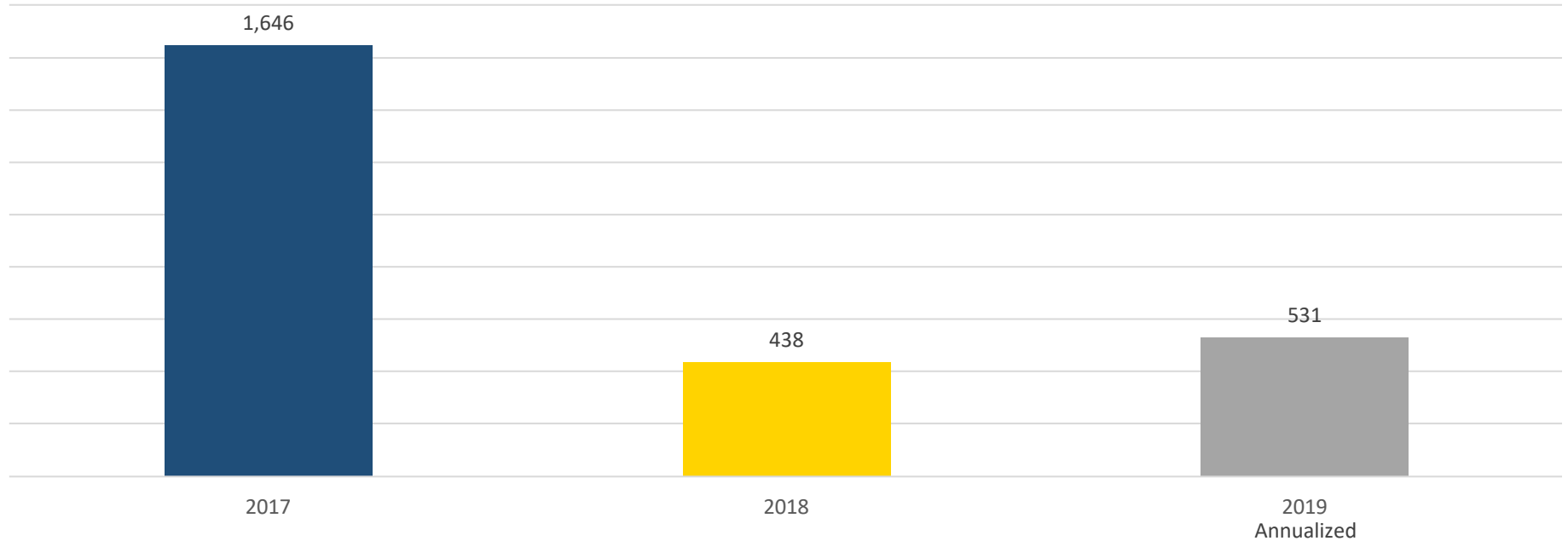


*\*Restated due to database update/changes affecting calculations*



# Non-Directed Donor Referrals

Referred to NKR Member Centers



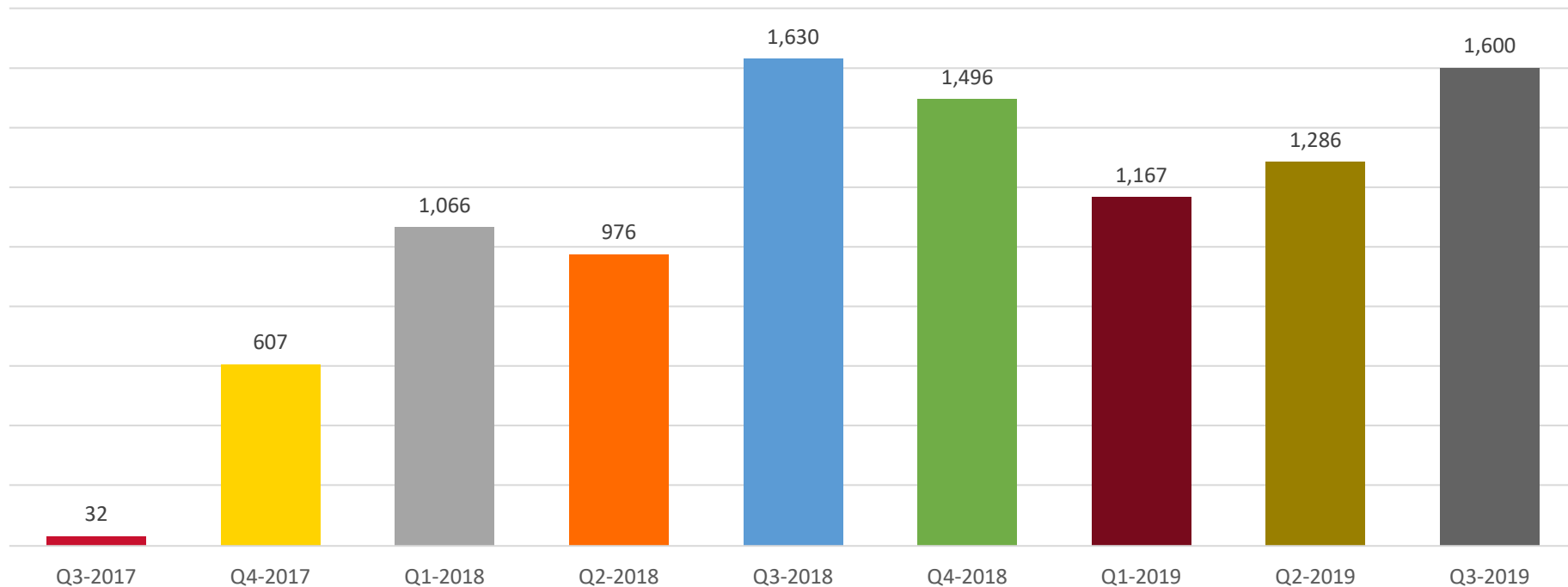
*\*2017: Donor intake system was re-engineered and the donor certification form was removed*

*\*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

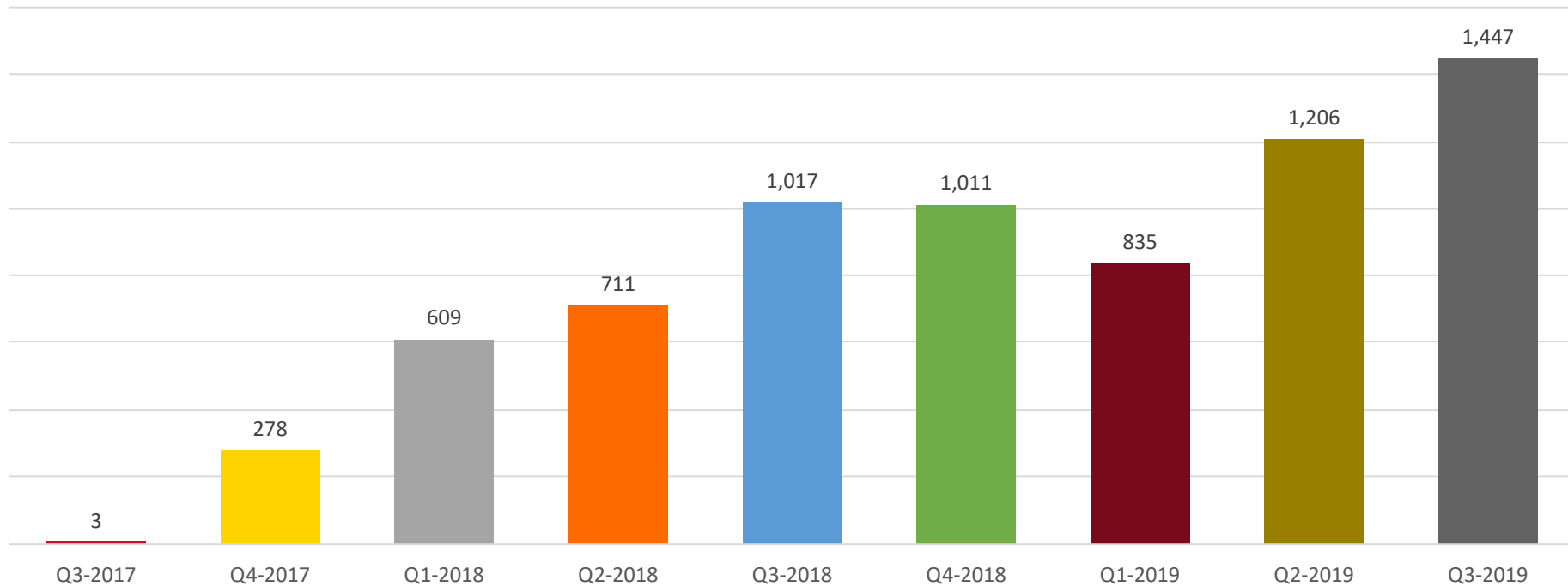


*\* Restated due to database update/changes affecting calculations*



# Pre-Workup Labs

## Scripts Uploaded

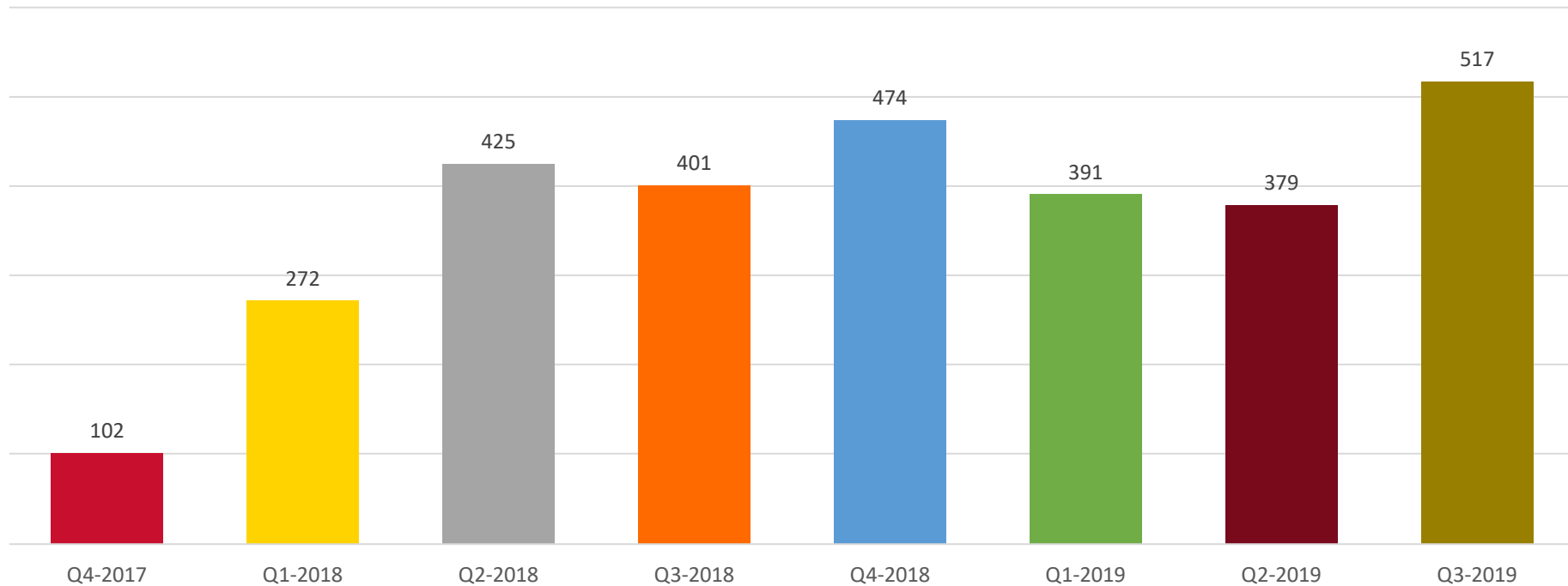


*\* Restated due to database update/changes affecting calculations*



# Pre-Workup Labs

## Results Uploaded

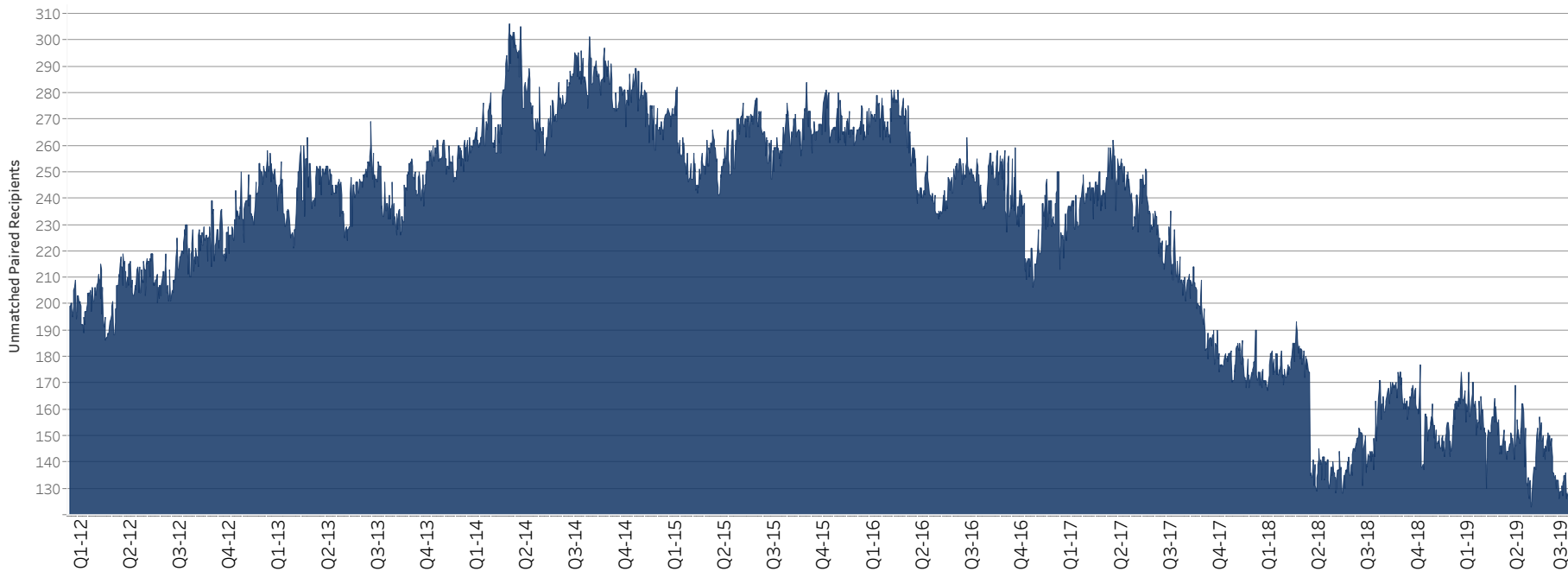


*\* Restated due to database update/changes affecting calculations*

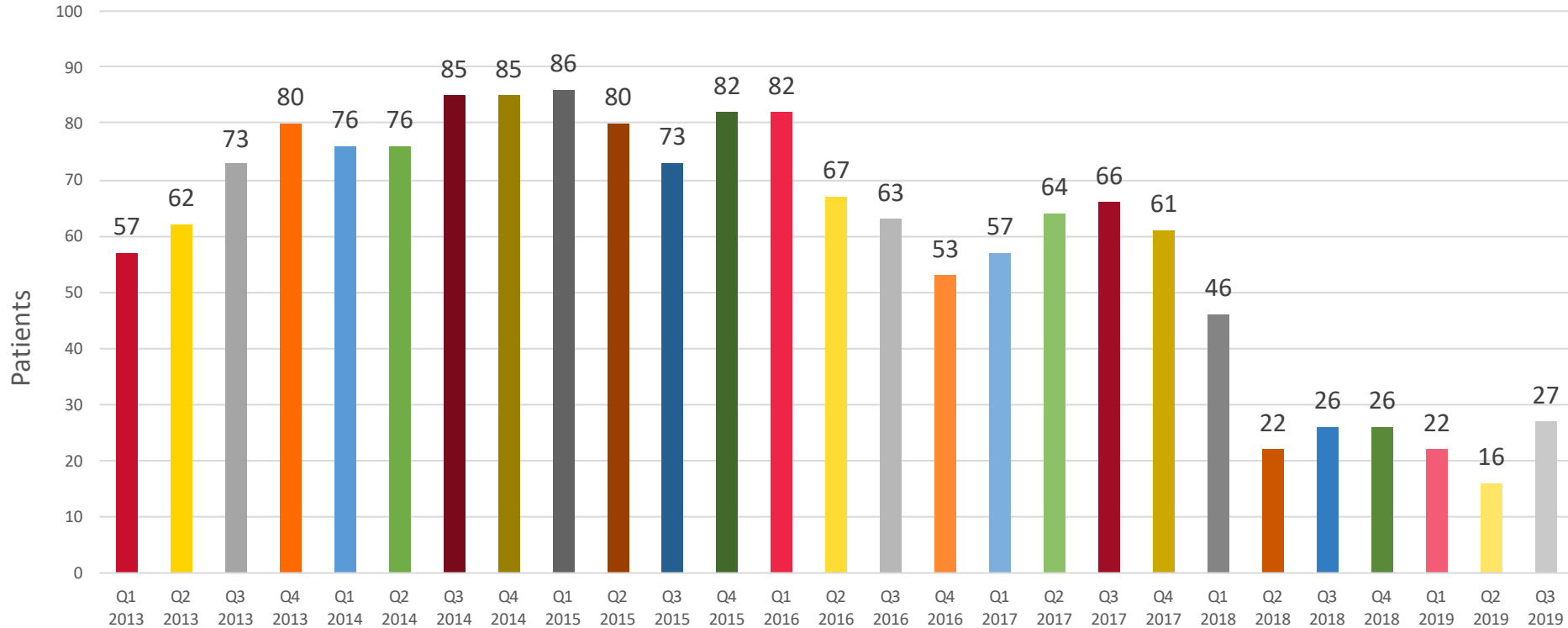


# Pool Size

## Unmatched patients



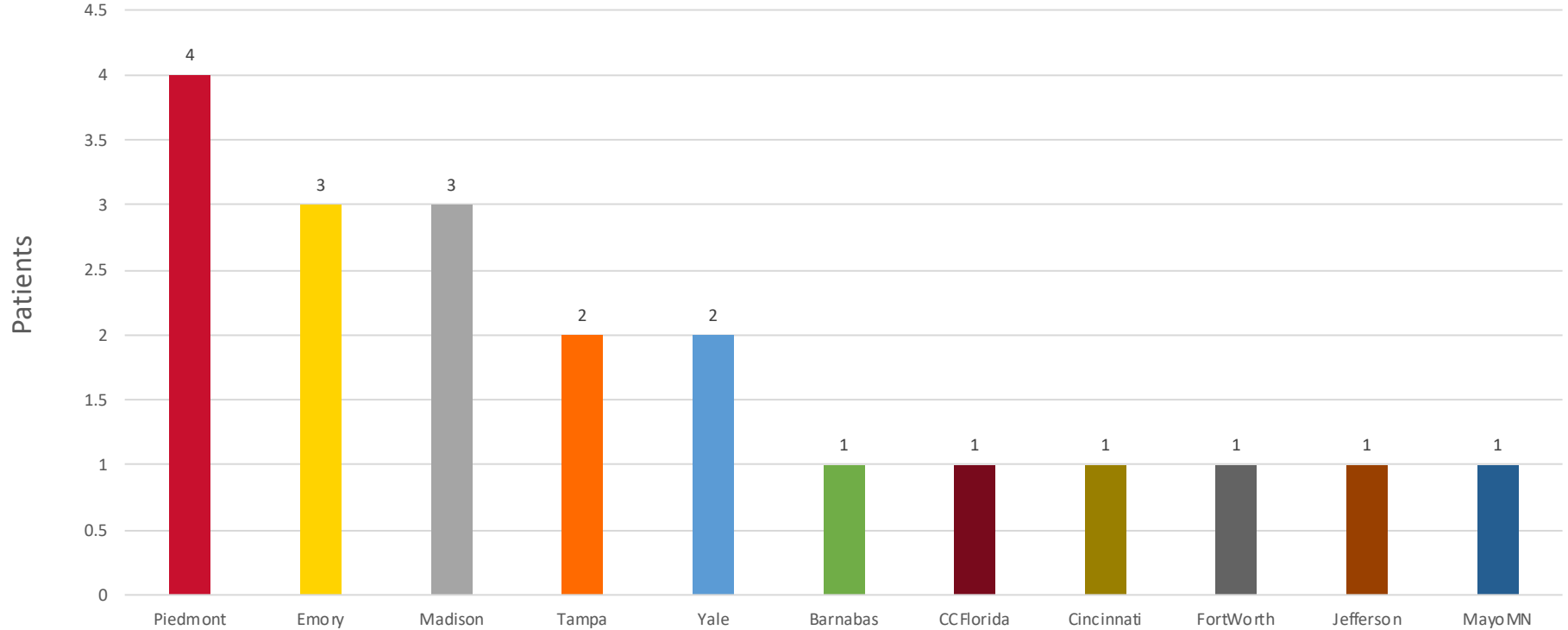
# Patients Waiting > 1 Year



As of 10/15/2019



# Patients Waiting > 1 Year by Center



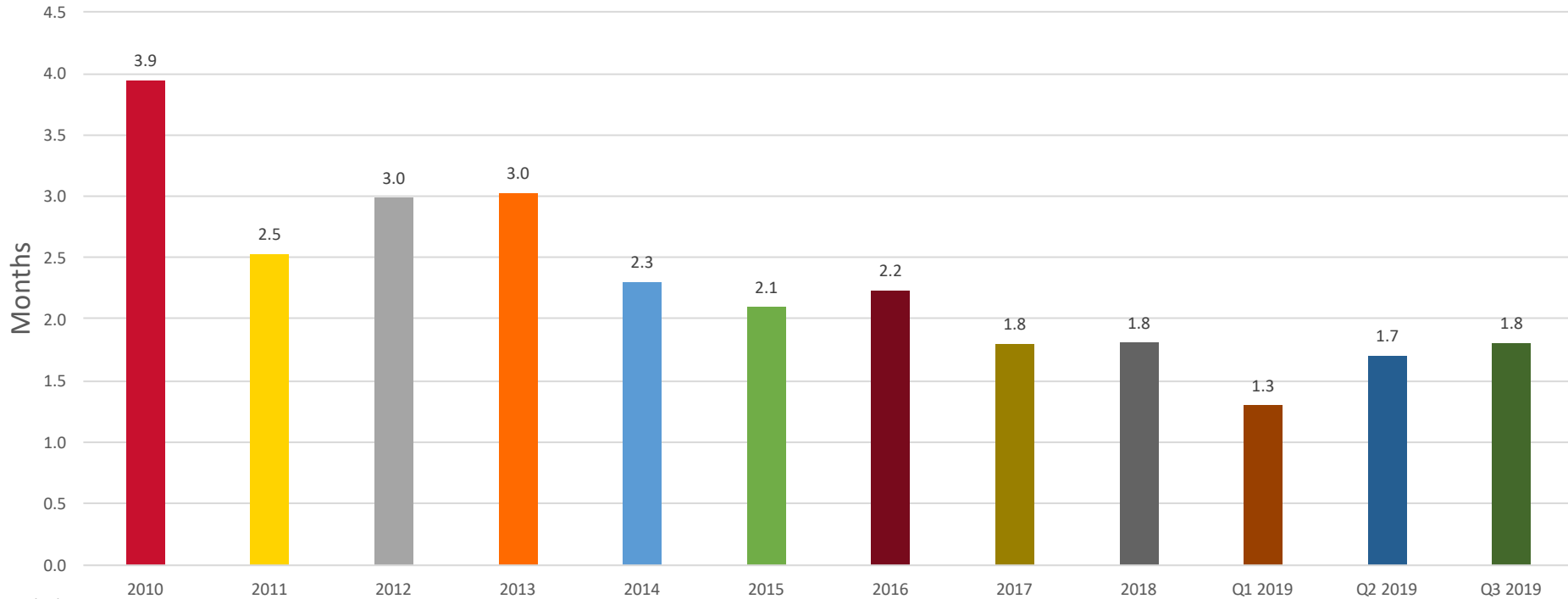
As of 10/01/2019





# Transplanted Patient Median Wait Time

Wait times of patients transplanted during prior 12 months

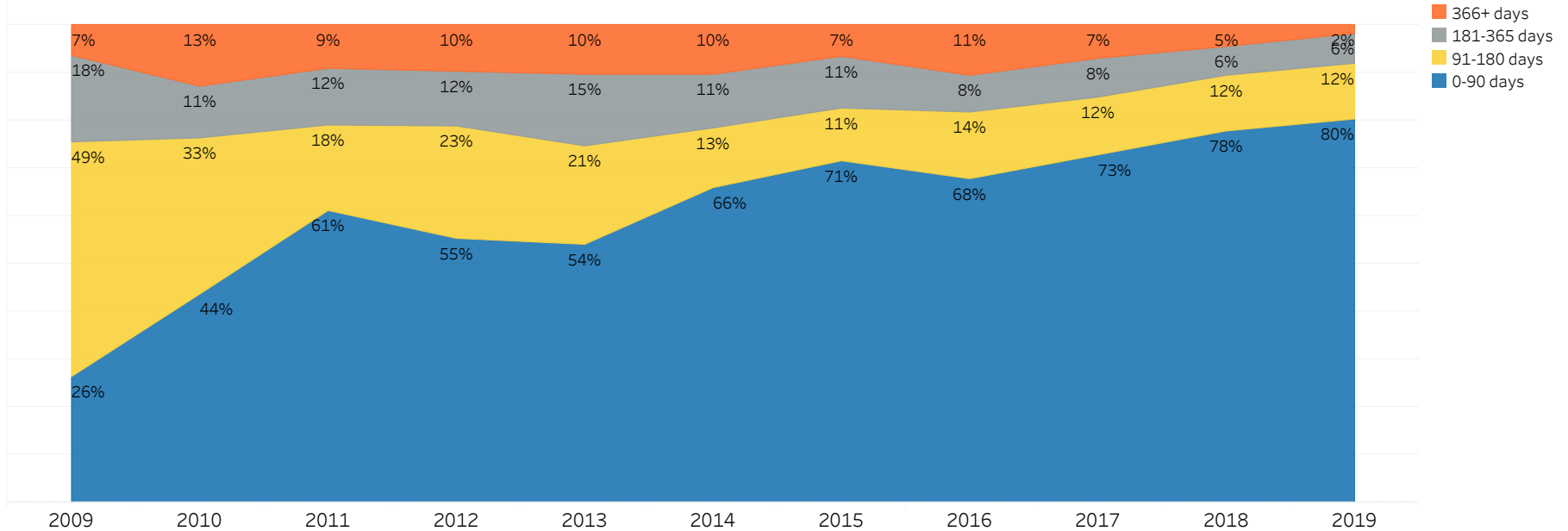


As of 10/01/2019



# Wait Time Distribution

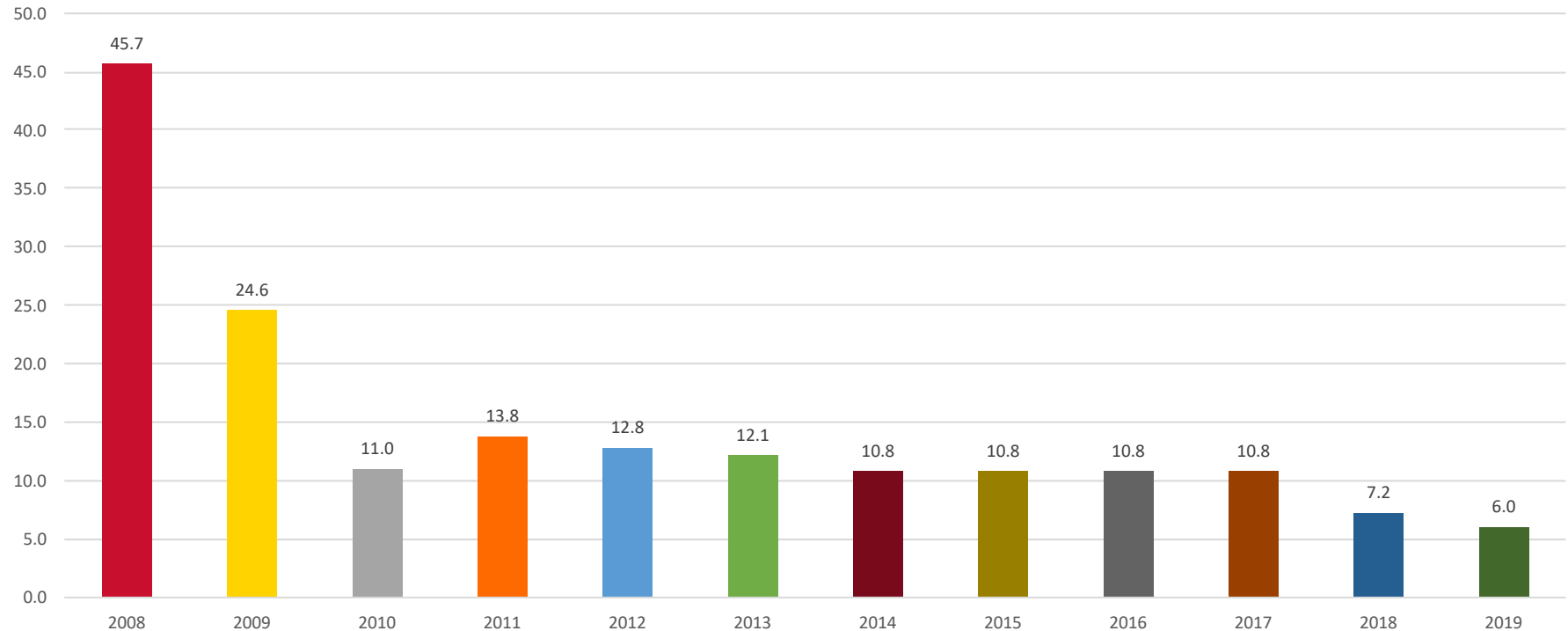
## Transplanted Pairs



\* Restated due to database update/changes affecting calculations



# Unmatched Patient Mean Wait Time

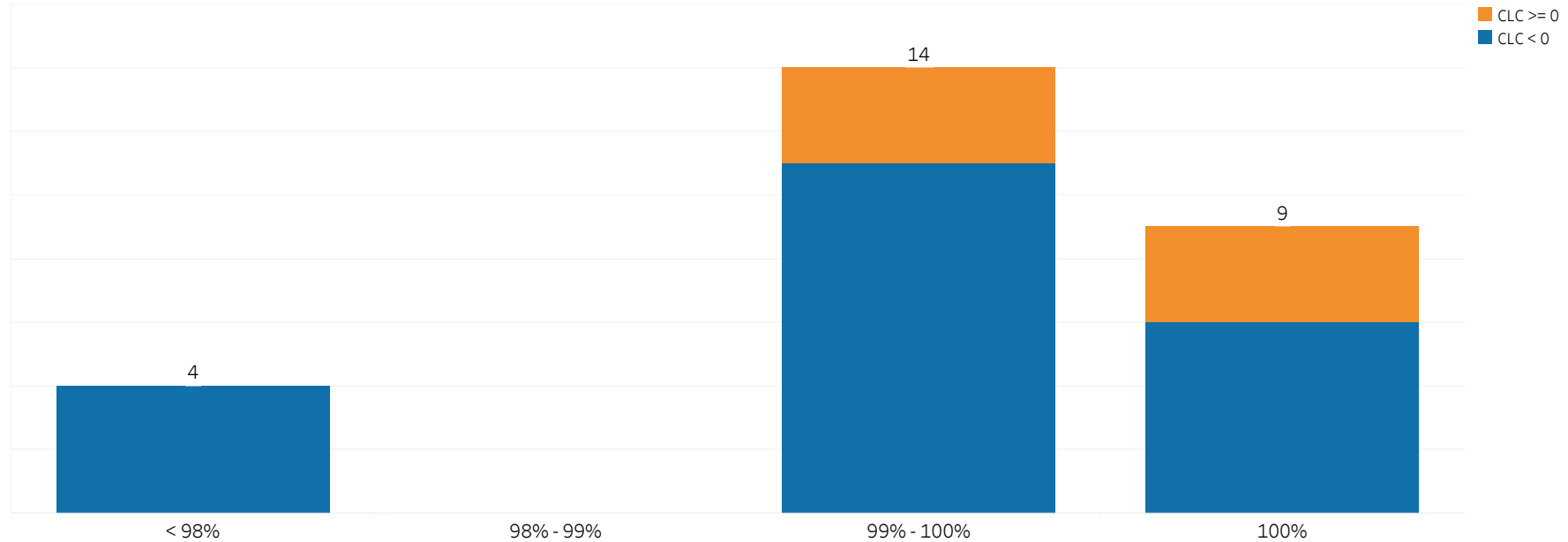


As of 10/01/2019



# Unmatched Target Pairs

Waiting more than 12 Months



As of 10/31/2019 13:42:10



# Pairs waiting > 1 Year

## Due to Unfavorable Blood Type Combination

#	R Alias	R ABO	D ABO	cPRA4	R Age	D Age	PMPc	Wait (Months)	CLCu
1	UVA2723541	O	A1	94.5	59	61	9	13	-4540
2	JJ12051951	O	B	30.03	67	43	35	14	-2170

As of 10/15/2019



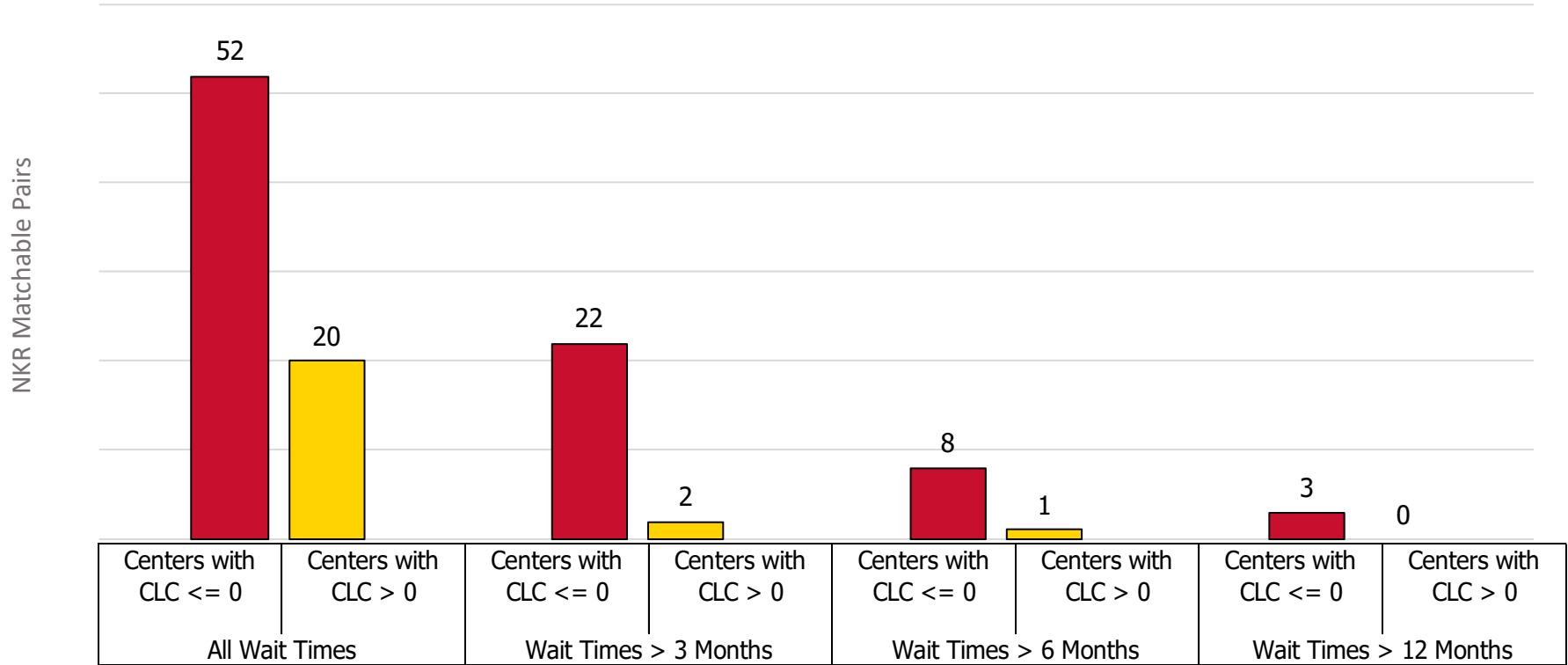
# Paired recipients waiting > 1 Year Due to High cPRA

#	R Alias	R ABO	D ABO	cPRA4	R Age	D Age	PMPc	Wait (Months)
1	STESCA	B	B	100.00	45	42	0	26
2	H903961717	O*	A1 O	100.00	23	53 24	0	21
3	ADGO111180	O*	O	100.00	38	39	0	19
4	F900092902	A	A2B	100.00	39	29	0	17
5	P901134196	B	A1	100.00	53	38	0	15
6	AH6321	O	O	100.00	38	39	0	15
7	POPOJRE2	A	O	100.00	37	27	0	14
8	AH2160223	A	O	100.00	49	51	0	13
9	GM8784	B	O	99.98	24	32	0	46
10	LANDBRE	O	O	99.98	30	55	0	23
11	ROAI1976	A	O	99.98	42	42	0	15
12	JAJO7378	B	O O	99.96	40	48 37	0	73
13	JH12662998	O	O	99.96	23	57	0	17
14	KATPAR	B	B	99.96	32	43	0	17
15	UC06142609	O	O A1	99.94	67	50 42	0	37
16	R203DV	O	O	99.94	50	49	0	22
17	RFLCC22	A	A1	99.94	33	39	0	15
18	CR02221971	O	A1	99.92	47	46	0	25
19	DEKEDRE	O	O	99.88	48	36	0	32
20	WG2276674	O	O	99.86	46	39	0	17
21	GSECRA	B	O	99.80	23	49	0	14
22	BF1396863	O	O	99.59	63	34	0	15
23	M000403173	B	A1	99.08	53	58	0	14

As of 10/15/2019



# Pair Wait Time Analysis

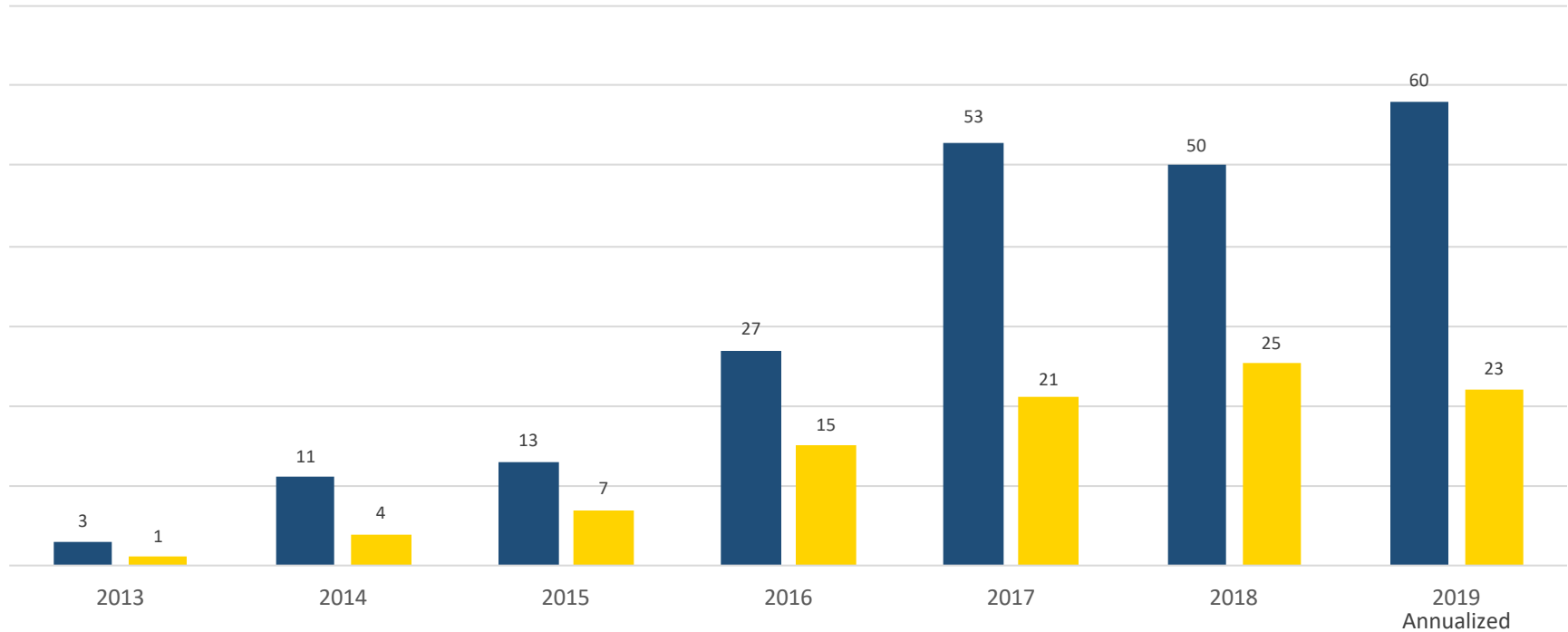


*\*As of 10/17/19, 09:13 AM*



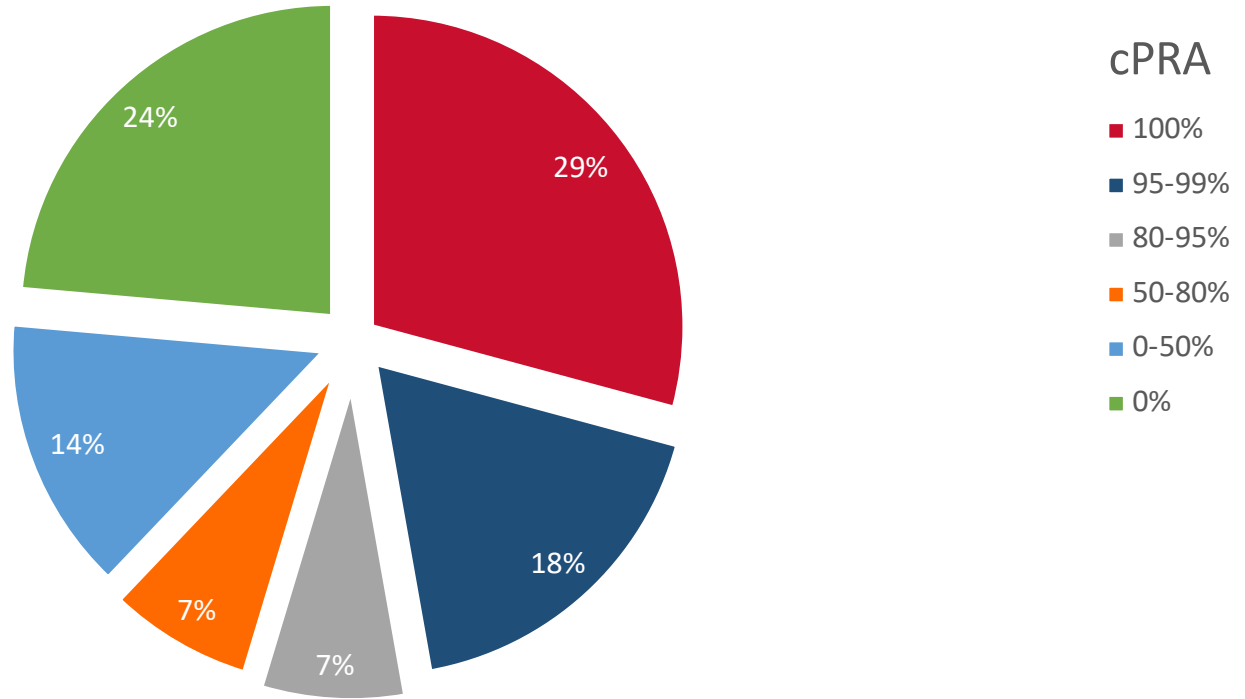
# Compatible Pair Transplanted

■ Compatible Pairs    ■ Favorable Blood Type Combos





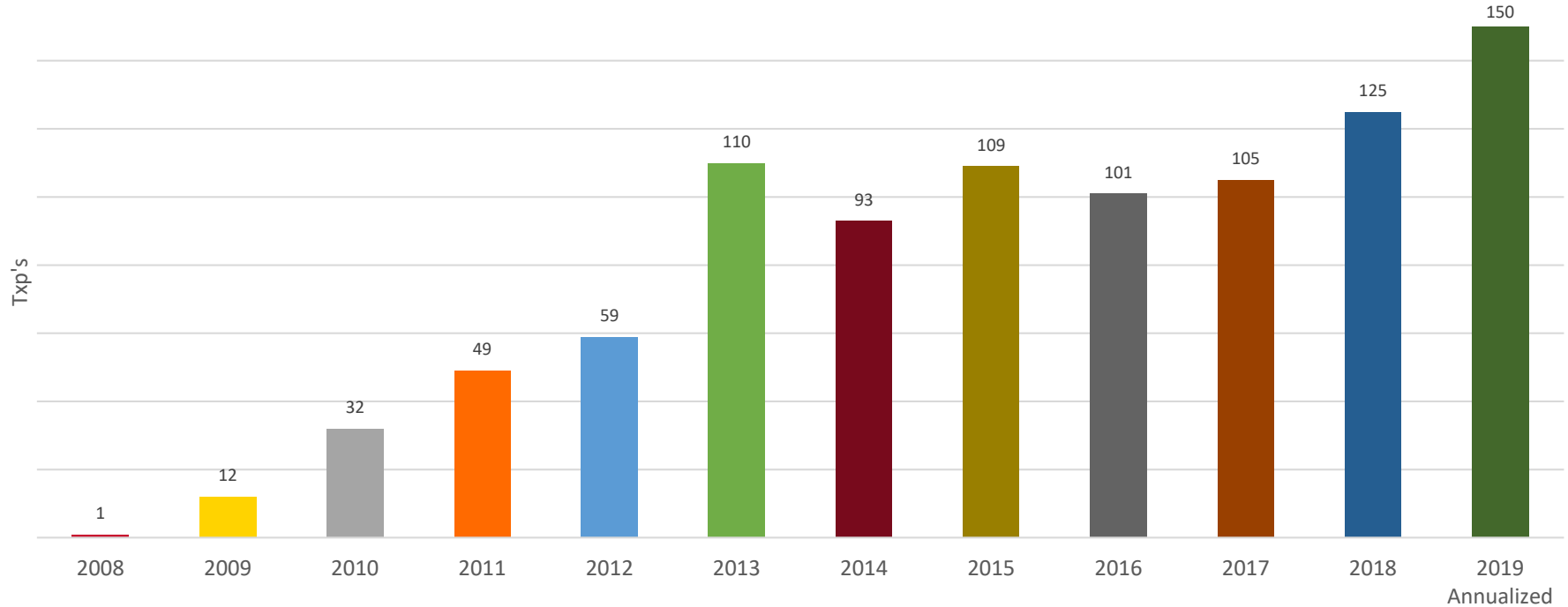
# Pool Composition by cPRA



\* As of 10/30/19



# Transplanted Patients with cPRA > 80%

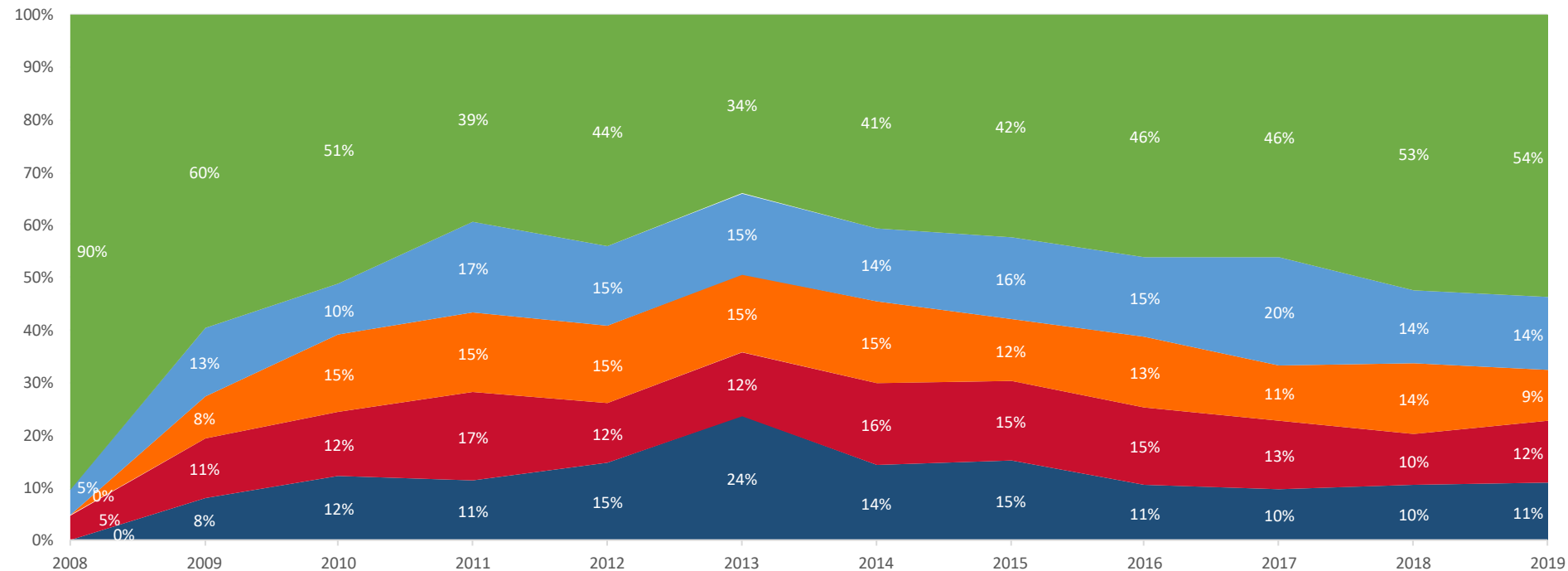


\* As of 10/30/19



# Transplanted Patients by cPRA

cPRA    ■ 95-100%   ■ 80-95%   ■ 50-80%   ■ 0-50%   ■ 0%



# Great HLA Matches

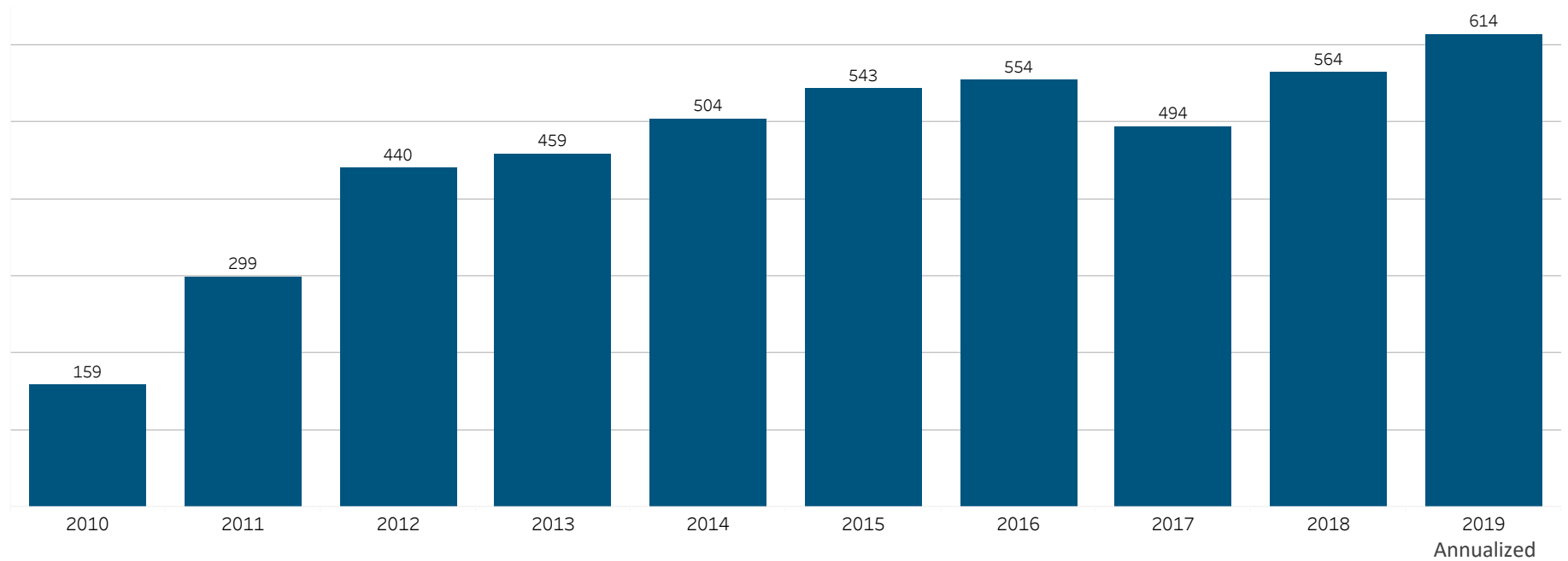
## Zero Mismatch

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	Ulowa	1739	7/17/2019	A	A	100	2	49	32	100
2	UMinn	1468	11/1/2018	A	AB	100	12	49	51	100
3	Piedmont	1295	6/12/2018	O	O	100	2	29	61	100
4	Cornell	1266	4/4/2018	B	AB	0	1	68	63	100
5	Penn	1227	2/14/2018	O	O	7	3	58	26	100
6	WalterReed	1203	2/8/2018	A	AB	100	5	61	40	100
7	Maine	1157	1/3/2018	A	A	100	9	54	52	100
8	Hartford	1191	1/3/2018	O	O	0	9	46	59	100
9	Hopkins	1019	6/1/2017	A	AB	0	2	40	55	100
10	Brigham	1026	5/24/2017	A	A	95	2	58	33	100
11	ChristHosp	952	1/18/2017	A	A	99	1	57	34	100
12	UMinn	928	11/8/2016	A	A	100	4	66	12	100
13	Cincinnati	884	8/31/2016	A	A	73	1	28	40	100
14	OSU	509	8/30/2016	A	A	91	1	38	67	100
15	SCarolina	459	2/11/2016	A	A	100	3	64	53	100
16	Madison	442	12/22/2015	A	A	97	6	22	63	100
17	UMinn	440	11/19/2015	O	O	100	5	23	20	100
18	UCLA	357	2/17/2015	A	A	100	34	39	52	100
19	Emory	351	12/11/2014	A	A	100	5	25	33	100
20	Hopkins	330	11/13/2014	A	O	96	1	41	38	100
21	Loyola	324	8/5/2014	A	A	100	1	37	55	100
22	Madison	674	1/9/2014	O	A	99	5	29	33	100
23	Barnabas	182	10/3/2012	A	A	92	4	51	50	100
24	Barnes	105	3/31/2011	A	A	100	7	60	32	100
25	UCSF	58	6/15/2010	A	A	100	6	47	58	100

\*As of 10/30/2019



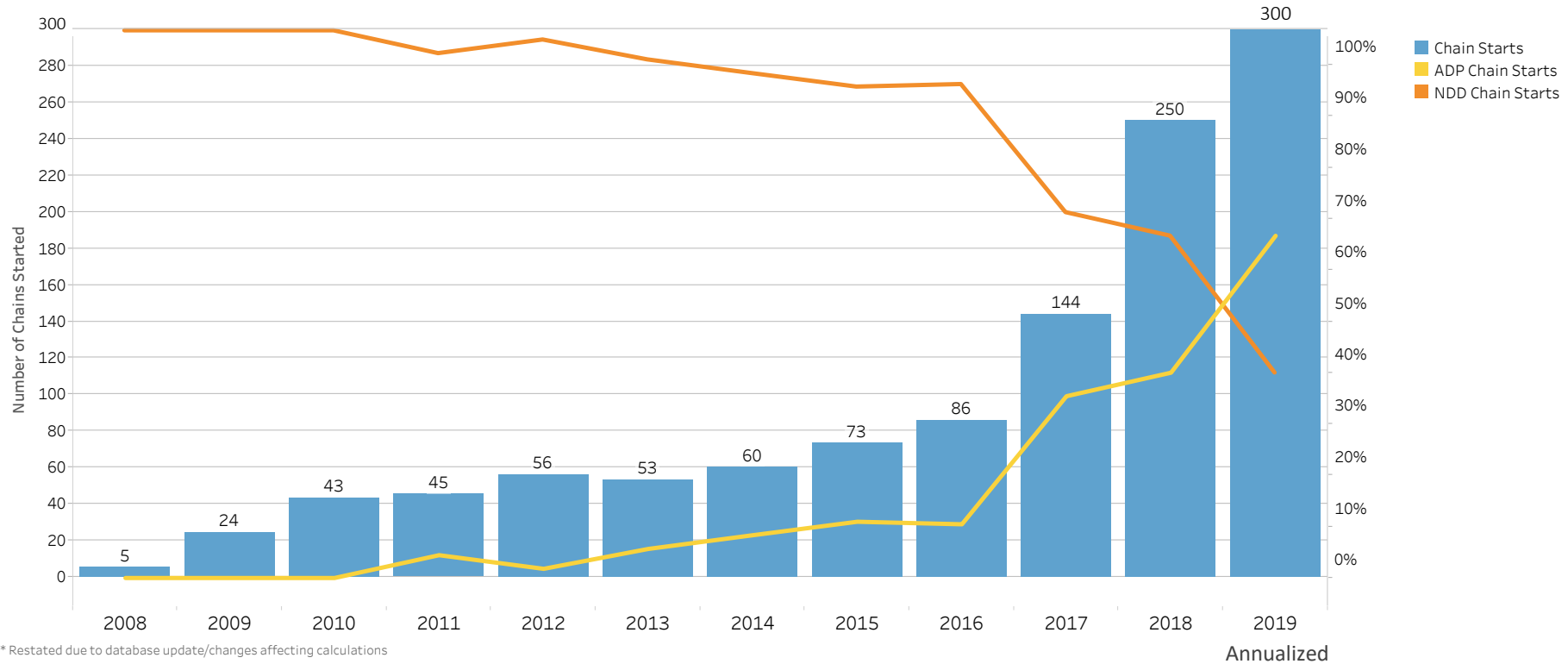
# New Exportable Pairs



*\* Restated due to database update/changes affecting calculations*



# Chains Started



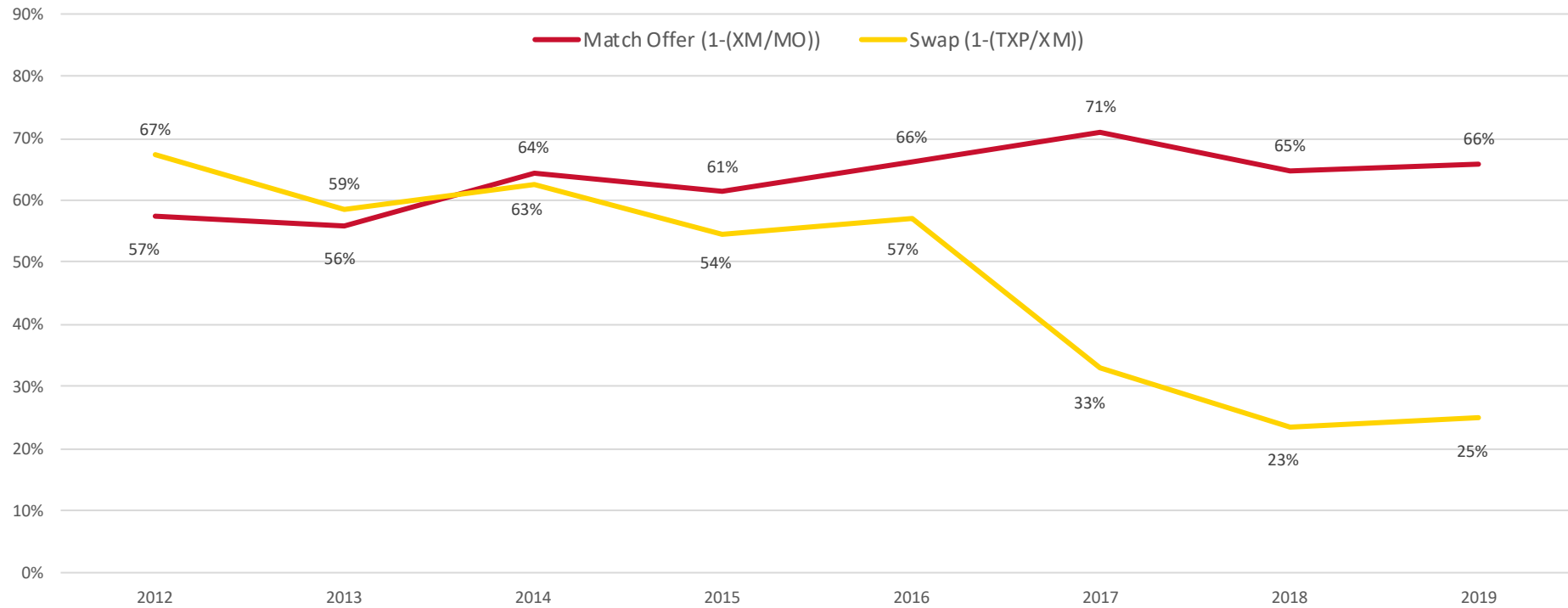
# Chain and Loop Statistics

Category	Count	Mean Length	Transplants
Ended	1,031	3.19	3,294
Broken	27	3.85	104
Active	2	1.5	3
Chain Total	1,060	3.21	3,401
Loops	127	2.3	292
Total	1,187	3.11	3,693

*\*As of 10/30/2019*

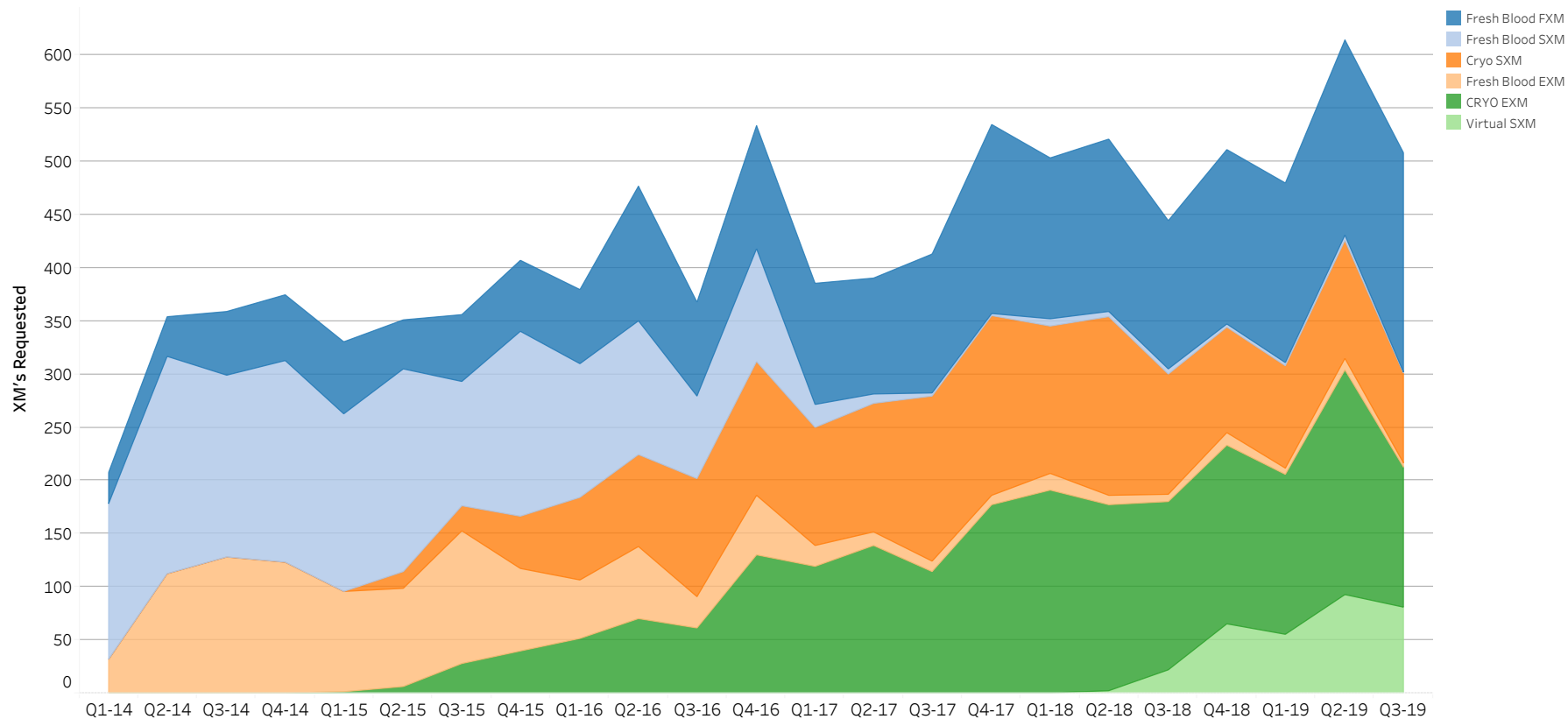


# Failure Rates

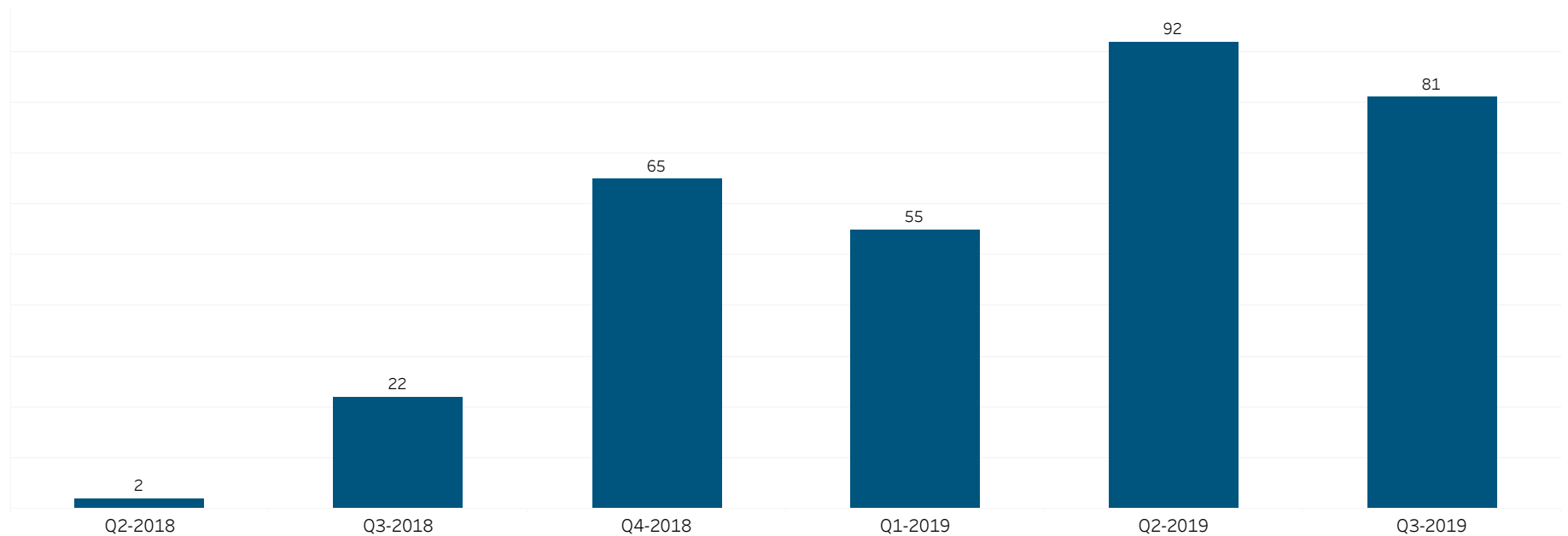




# Streamlined Cross Matches Requested



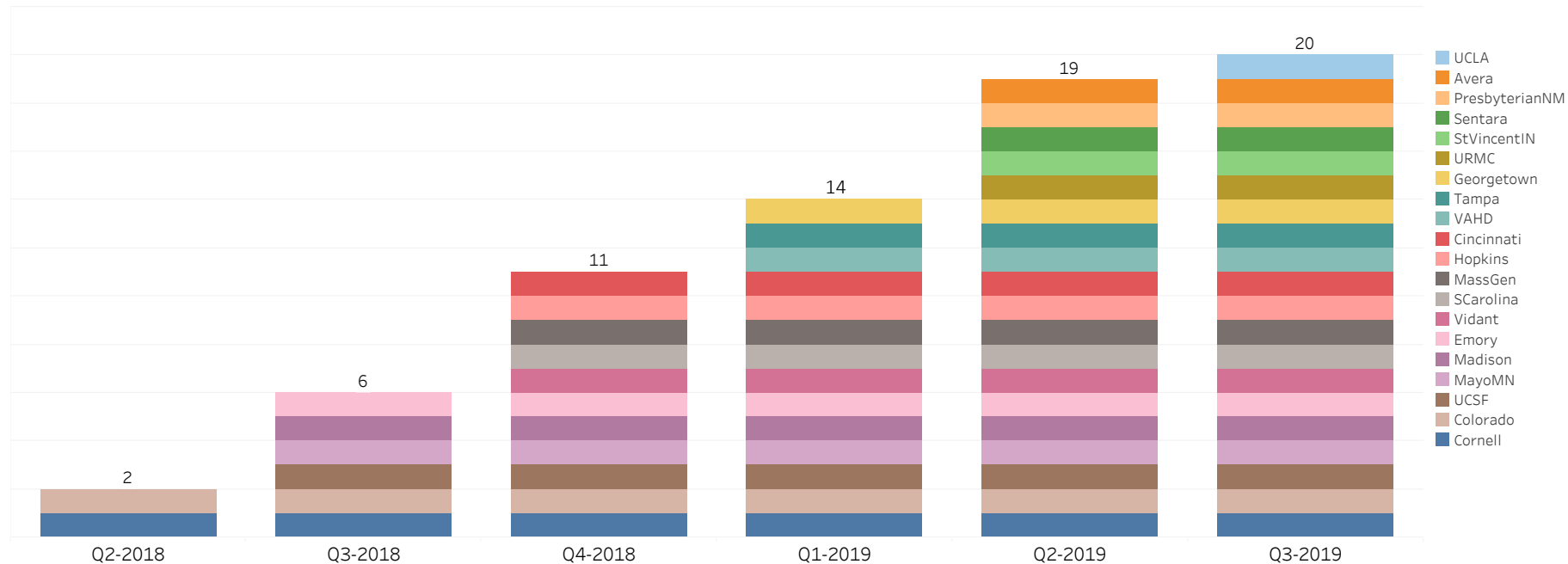
# Virtual Screening Crossmatches



\*Restated due to database update/changes affecting calculations



# Centers Utilizing Virtual Screening Cross Matching



# Summary Report: Broken Chains & Real Time Swap Failures

Year	# Chains	% Broken Chains	# Bridge Donors	# Real Time Swap Failures	# Broken Chains	% Bridge Donations Canceled <sup>1</sup>
2008	4	75%	9	--	3	33%
2009	9	22%	29	1	2	7%
2010	28	7%	61	--	2	3%
2011	36	0%	75	--	0	0%
2012	46	9%	54	--	4	7%
2013	55	5%	37	3	3	8%
2014	63	6%	49	2	4	8%
2015	83	1%	53	1	1	2%
2016	99	1%	68	1	1	3%
2017	160	2%	62	1	3	5%
2018	257	2%	64	2	4	6%
2019	*356	0%	68	1	0	0%
Total	840	3%	532	12	27	5%

\*Annualized

<sup>1</sup>Includes, donors who did not donate due to back outs, medical or surgical issues on the day of scheduled surgery. See following chart for further detail



# 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	10/16/2013
15	Kidney Declined by Recipient Surgeon	✓	✓	Porter/Jefferson	1/9/2014
16	Medical		✓	UCLA	3/4/2014



# Detail Report: Broken Chains & Real Time Swap Failures

## Continued

#	Reason Given	Real Time Swap Failures	Broken Chains	Center	Date
17	Recipient Medical Issue	✓	Loop	ChristHosp	3/11/2014
18	Medical		✓	Hopkins	7/15/2014
19	Medical		✓	Hopkins	10/9/2014
20	Kidney Declined by Recipient Surgeon	✓	✓	Tampa/Hopkins	7/7/2015
21	Kidney Declined by Recipient Surgeon	✓	--	Porter/Aurora St Lukes	3/17/2016
22	Donor reneged		✓	Maryland	8/8/2016
23	Donor reneged		✓	SCarolina	1/10/2017
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
28	Late Stage Donor Decline		✓	Legacy	7/9/2018
29	Kidney Thrombosis		✓	CC Florida	8/14/2018
30	Kidney Declined by Recipient Surgeon	✓	Loop	Emory/UCLA	1/24/2019
Total		11	27		



# Advanced Donation Program (ADP)

## Summary

Type	Cases	Additional TXPs Facilitated	80%+ cPRA TXPs Facilitated	95%+ cPRA TXP Facilitated
Standard Voucher	196	466	107	52
Family Voucher	107	271	53	25
Swap Saver	45	110	35	14
Real-Time Swap Failure	11	12	5	1
Total	359	859	200	92

*\*Standard –(includes former ‘Short-Term’)—At time of advanced donation the intended ADP Recipient is in need of transplant.*

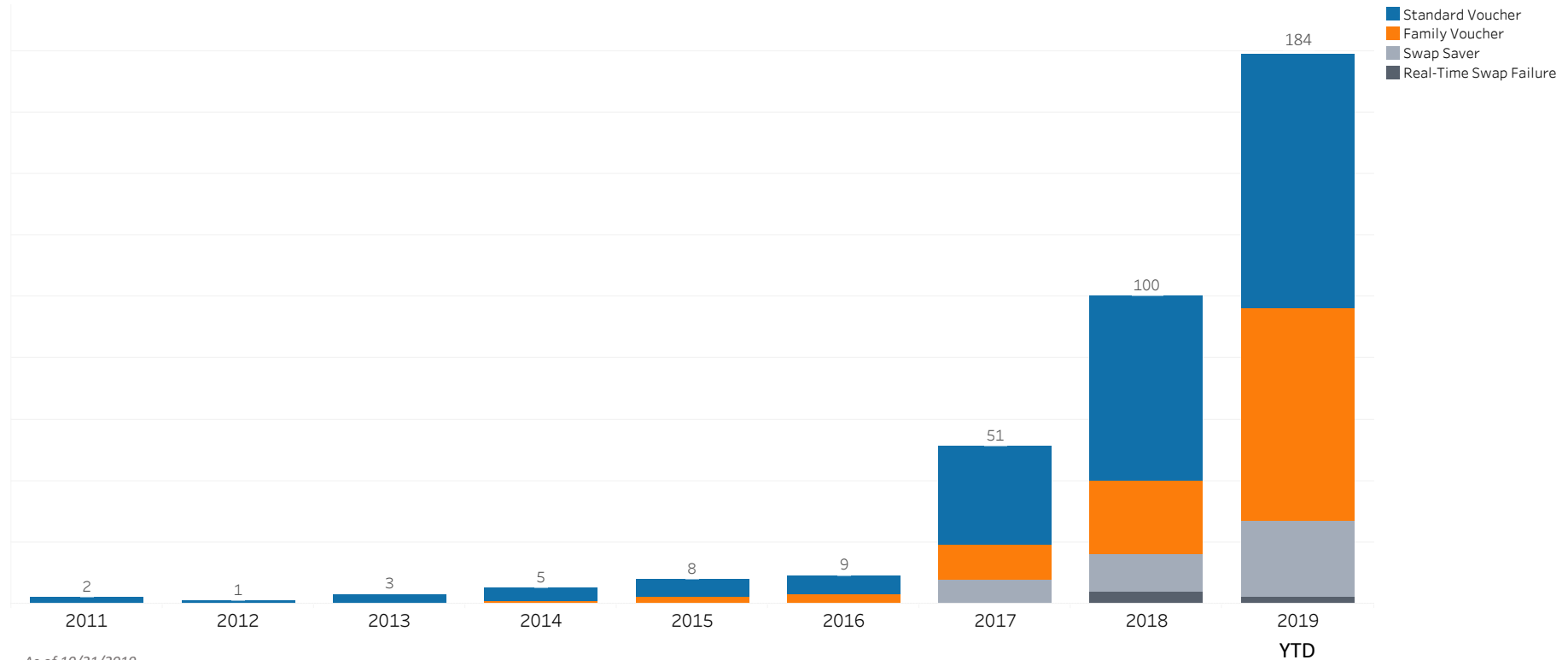
*\*Family –(includes former ‘Vouchers’ -At time of advanced donation the intended ADP Recipient is not in need and may never be in need of transplant.*

*\*Note: Number of high cPRA cases recently restated due to an improved cPRA calculation in NKR database*

*\*As of 10/21/2019*



# Advanced Donation Program (ADP)

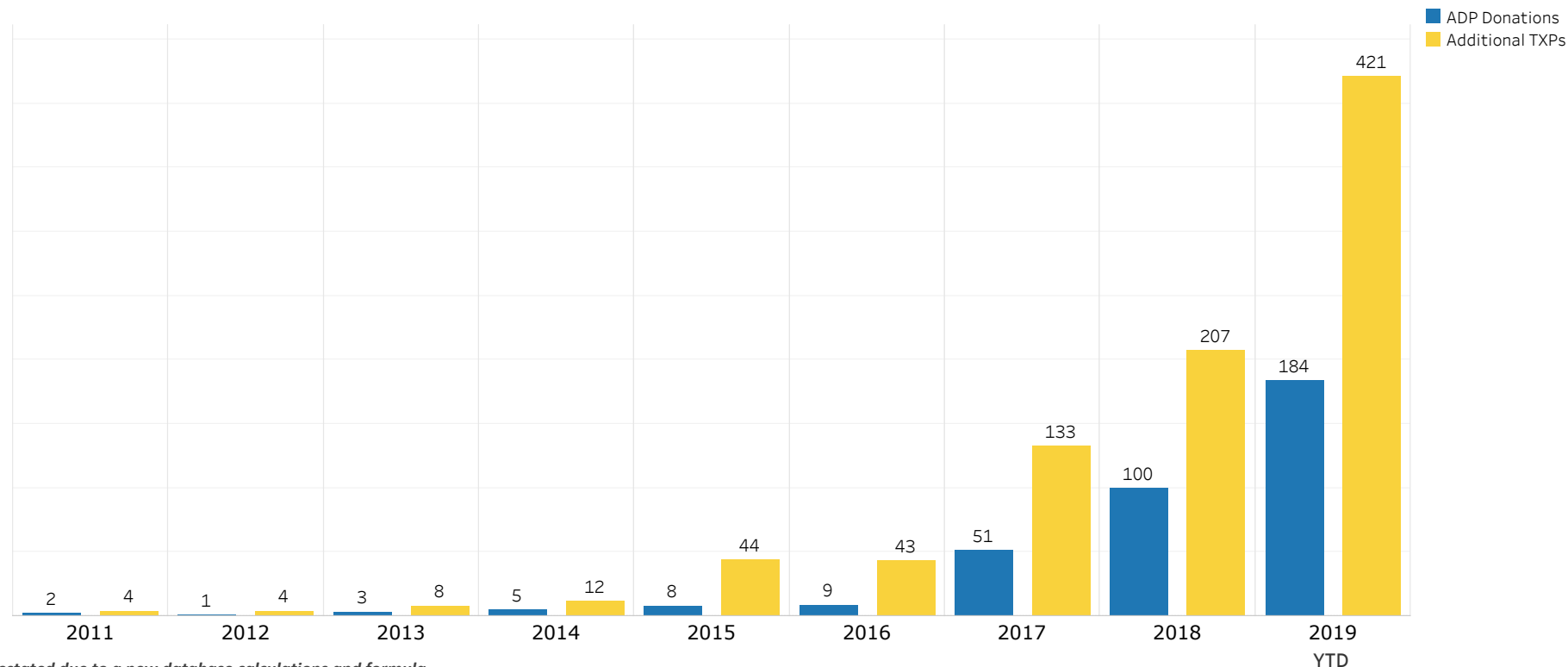


As of 10/21/2019





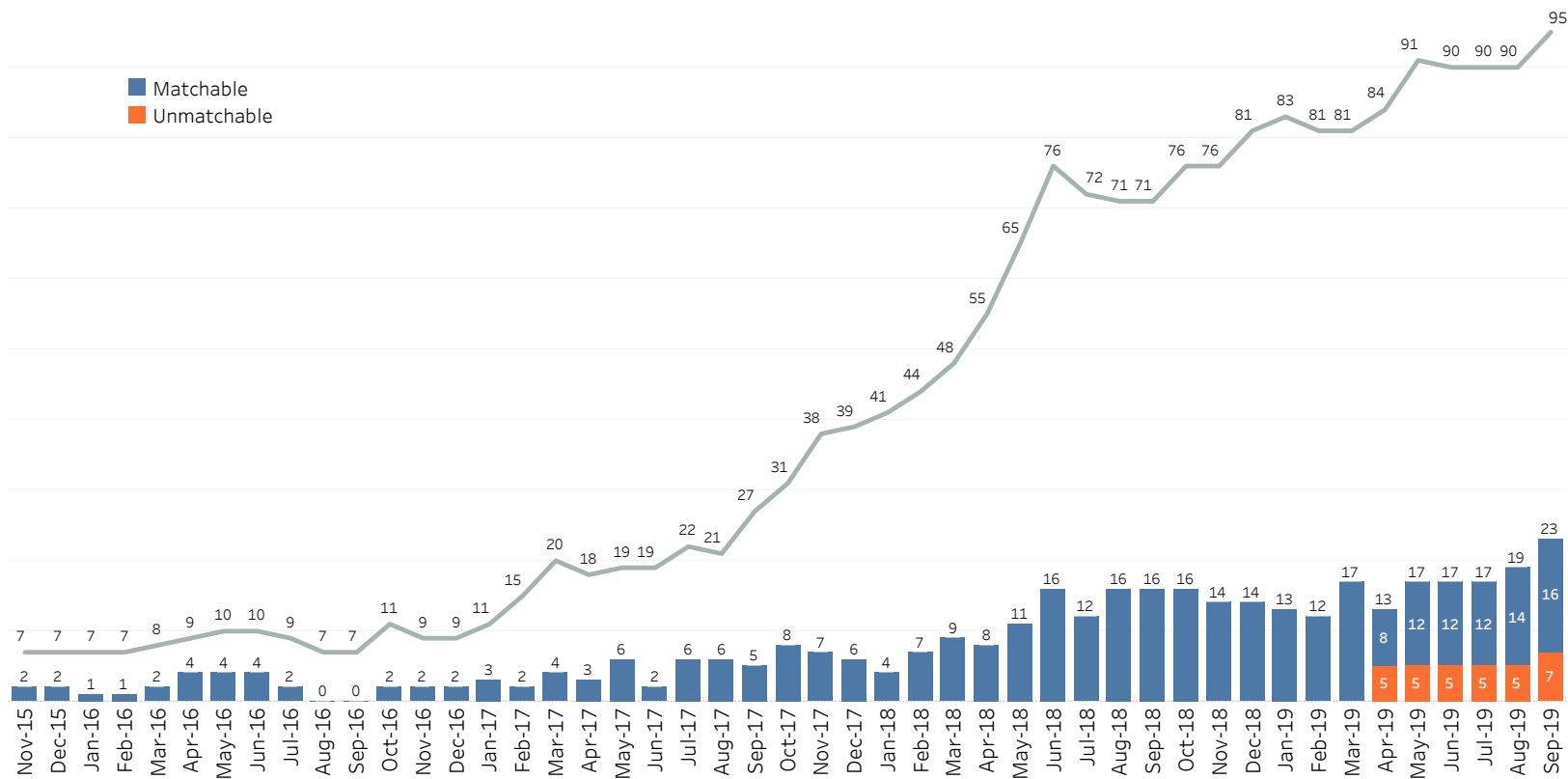
# ADP Donations & Additional TXPs Facilitated



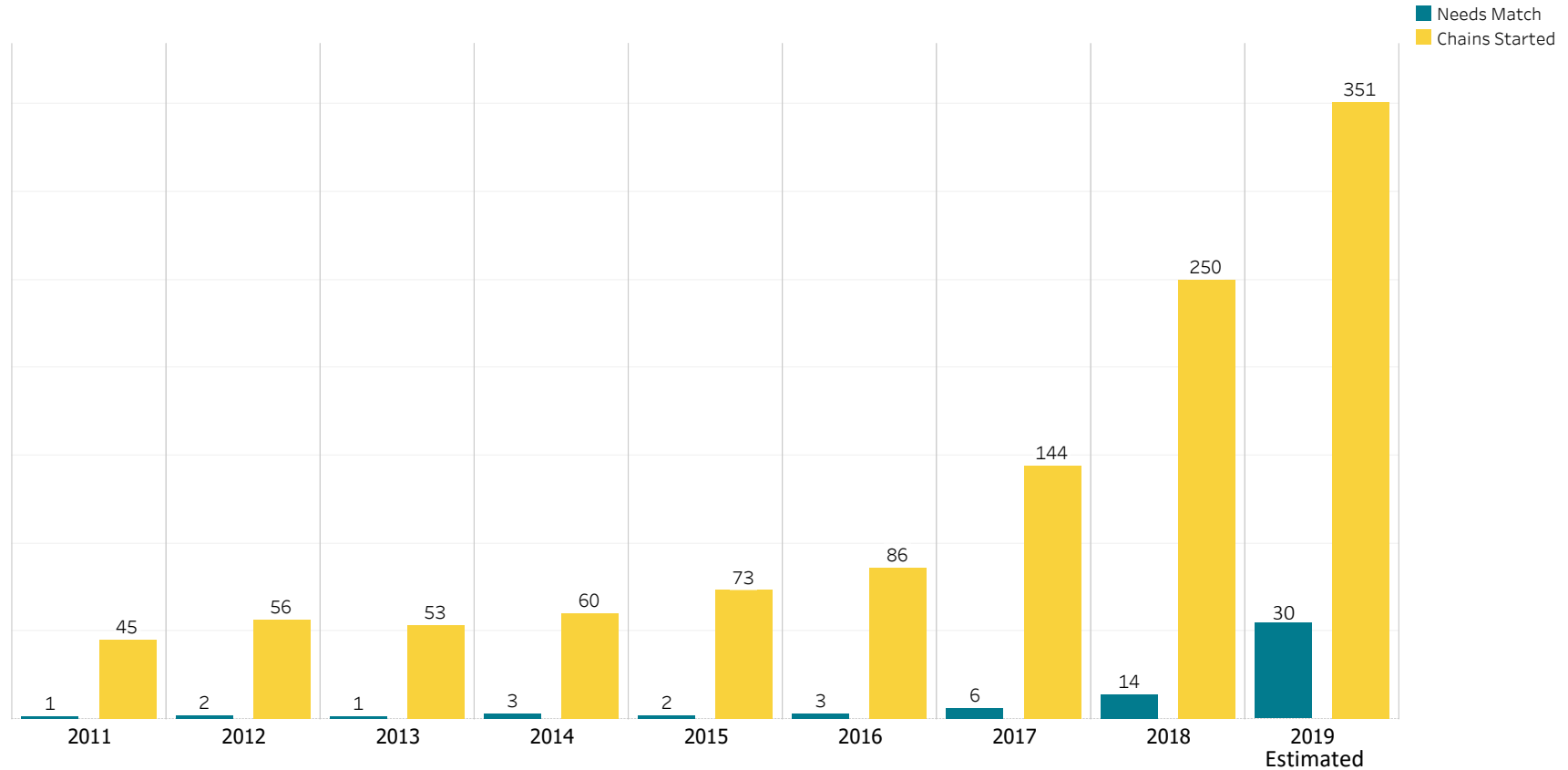
*\*Restated due to a new database calculations and formula.*



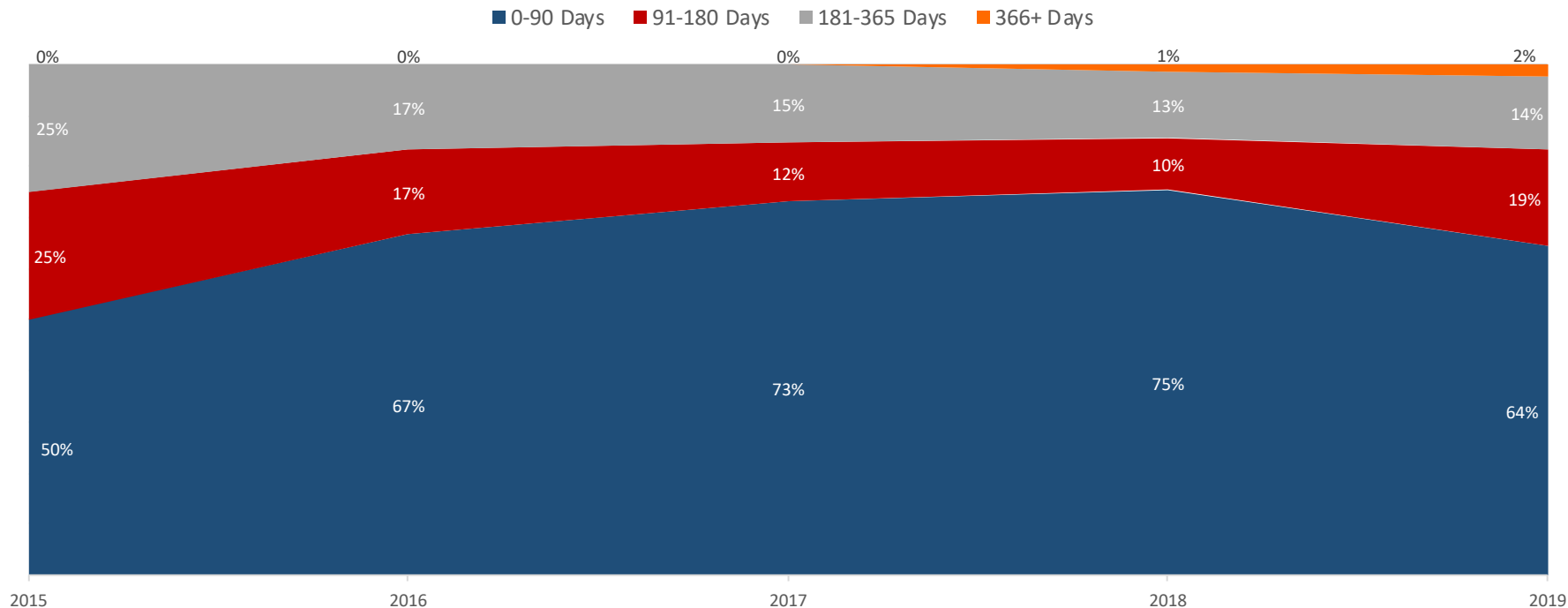
# ADP Recipients Pool



# ADP Recipients Outstanding vs. Overall Chains Started



# ADP Recipient Wait Time Distribution



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



## Program Stats

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	Transplants Facilitated	21	62	131	175	226	308	310	360	399	462	619	559
2	Paired Transplants Facilitated	21	39	91	131	164	252	255	288	315	318	376	317
3	Chip Transplants Facilitated	0	23	40	44	62	56	55	72	84	144	245	242
4	Ending Unmatched Patient Pool	80	127	120	201	241	255	279	280	215	181	157	126
5	Cumulative Transplants	21	83	214	389	615	923	1233	1593	1992	2454	3075	3634
6	Cumulative Paired Transplants	21	60	150	280	526	777	1030	1316	1630	1946	2322	2639
7	Cumulative Chip Transplants	0	23	64	109	89	146	203	277	362	508	753	995
8	Cumulative Paired Patient Pool	101	210	334	590	805	1062	1351	1615	1877	2152	2514	2801
9	Percent of Pool Transplanted (Paired Recipients)	21%	40%	64%	66%	71%	76%	79%	84%	89%	92%	94%	96%
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	0.5
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	3.5	3.0
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	1.8	1.3
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%	40.8%	43.2%
14	Number of Transplants Completed by cPRA												
15	100%	0	1	4	10	4	5	3	7	3	4	7	1
16	95-100%	0	4	12	10	29	68	41	47	39	41	57	16
17	80-95%	1	7	16	29	26	37	49	55	59	60	61	19
18	50-80%	0	5	19	27	33	46	48	42	53	49	85	15
19	0-50%	1	8	13	30	34	47	43	57	61	94	84	22
20	0%	19	37	67	69	100	105	126	152	184	214	327	85
21	Sub-total	21	62	131	175	226	308	310	360	399	462	621	158
22	Percent of Transplants Completed by cPRA												
23	100%	0%	2%	3%	6%	2%	2%	1%	2%	1%	1%	1%	1%
24	95-100%	0%	6%	9%	6%	13%	22%	13%	13%	10%	9%	9%	10%
25	80-95%	5%	11%	12%	17%	12%	12%	16%	15%	15%	13%	10%	12%
26	50-80%	0%	8%	15%	15%	15%	15%	15%	12%	13%	11%	14%	9%
27	0-50%	5%	13%	10%	17%	15%	15%	14%	16%	15%	20%	14%	14%
28	0%	90%	60%	51%	39%	44%	34%	41%	42%	46%	46%	53%	54%
29	Sub-total	100%	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	125	123
31	Percent of Transplanted Patients with cPRA >80%	5%	19%	24%	28%	26%	36%	30%	30%	26%	23%	20%	21%



## Program Stats, Continued

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
32	Number of Unmatched Patients by cPRA												
33	100%				79	73	83	81	80	80	63	54	47
34	95-99%				73	73	61	61	53	37	32	33	29
35	80-95%				15	15	24	19	22	12	14	9	12
36	50-80%				14	11	14	13	25	13	8	9	12
37	0-50%				14	10	22	37	35	28	16	19	23
38	0%				50	59	51	68	65	45	48	33	38
39	Sub-total				245	241	255	279	280	215	181	157	161
40	Percent of Unmatched Patients by cPRA												
41	100%				32%	30%	33%	29%	29%	37%	35%	34%	29%
42	95-99%				30%	30%	24%	22%	19%	17%	18%	21%	18%
43	80-95%				6%	6%	9%	7%	8%	6%	8%	6%	7%
44	50-80%				6%	5%	5%	5%	9%	6%	4%	6%	7%
45	0-50%				6%	4%	9%	13%	13%	13%	9%	12%	14%
46	0%				20%	24%	20%	24%	23%	21%	27%	21%	24%
47	Sub-total				100%	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	555	148
50	6-12 months	0	10	14	19	24	44	35	38	30	37	37	8
51	1-2 years	0	4	15	14	20	25	27	22	32	29	25	0
52	2+ years	0	0	2	2	2	7	5	2	10	4	4	2
53	Sub-total	21	56	105	141	226	308	310	360	399	462	621	158
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%	89.4%	93.7%
56	6-12 months	0.0%	17.9%	13.3%	13.5%	10.6%	14.3%	11.3%	10.6%	7.5%	8.0%	6.0%	5.1%
57	1-2 years	0.0%	7.1%	14.3%	9.9%	8.8%	8.1%	8.7%	6.1%	8.0%	6.3%	4.0%	0.0%
58	2+ years	0.0%	0.0%	1.9%	1.4%	0.9%	2.3%	1.6%	0.6%	2.5%	0.9%	0.6%	1.3%
59	Sub-total	100%	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	257	262
61	Total Loops Completed	0	3	2	3	12	24	17	15	7	15	16	4
62	Number of broken chains	3	2	2	0	4	3	4	1	2	3	2	0
63	Bridge Donors Held (Annualized)	9	29	61	75	54	37	49	53	68	62	66	48
64	Percent of broken chains	33%	7%	3%	0%	7%	8%	8%	2%	3%	5%	3%	0%

