



User Guide

This report contains a wide range of useful information about the heart transplant program at Hospital of the University of Pennsylvania (PAUP). The report has three main sections:

- A. Program Summary
- B. Waiting List Information
- C. Transplant Information

The Program Summary is a one-page summary highlighting characteristics of the program, including the number of candidates on the waiting list, the number of transplants performed at the program, the number of patients being cared for by the program, and patient outcomes, including outcomes while on the waiting list (the transplant rate and the death rate while on the waiting list) and outcomes after transplant (patient and graft survival probabilities). If the program performed transplants in both adults and children, survival probabilities for adults and children (pediatrics) are provided separately. For each of the outcomes measures presented, a comparison is provided showing what would be expected at this program if it were performing as similar programs around the country perform when treating similar patients. More details regarding these outcome measures are provided in Sections B and C of the report.

The Waiting List Information section contains more detailed information on how many candidates are on the waiting list at the program, the types of candidates on the waiting list, how long candidates typically have to wait for a transplant at this program, how frequently candidates successfully receive a transplant, and how often candidates on the waiting list die before receiving a transplant.

Table B1 shows the activity on this program's waiting list during two recent 1-year periods and provides comparisons to all programs within this program's OPTN region (see <http://optn.transplant.hrsa.gov/members/regions.asp> for information on OPTN regions) and the nation as a whole. Tables B2 and B3 describe the candidates on the waiting list at this program, with comparisons to candidates waiting in the same donor service area (OPO/DSA) the OPTN region, and the nation as a whole.

Table B4 shows how many candidates were removed from the waiting list because they received a transplant. The program's transplant rate is calculated as the number of candidates who received a transplant divided by the person-years observed at the program (person-years is a combination of how many candidates were on the waiting list along with how long each candidate was followed since some candidates are not on the waiting list for the entire year). The transplant rate and comparisons to what would be expected at this program are presented in Figures B1 and B2. Figure B1 shows the transplant rate compared to what was expected at this program. The expected transplant rate is an estimate of what we would expect at this program if it were performing transplants at rates similar to other programs in the US with similar candidates on their waiting lists. The expected rate is only an estimate, and is made with a certain level of uncertainty. This uncertainty is shown in Figure B2. Figure B2 displays the ratio of the observed to the expected transplant rate. A ratio of 1 indicates that the observed transplant rate was equal to the expected transplant rate, while a ratio less than 1 indicates the observed rate was lower than expected rate and a ratio greater than 1 indicates the observed rate was higher than the expected rate. However, the level of uncertainty must be considered when interpreting these numbers. The 95% interval is also shown on Figure B2. This interval provides a range within which the true ratio of observed to expected transplant rates is likely to be. If this



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confidence interval includes (crosses) 1.0, then we cannot say that this program's observed transplant rate is different from what would be expected. The observed deceased donor transplant rate at this program was 74.4 per 100 person-years. Transplant rates are also provided for adult and pediatric patients separately along with comparisons to adult and pediatric rates in the DSA, the OPTN region, and the nation. Please refer to the PSR Technical Methods documentation available at <http://www.srtr.org> for more detail regarding how expected rates are calculated.

The death rate (also known as the mortality rate) for candidates on the waiting list is presented in Table B5 and Figures B4-B6. These data are presented in the same way as the transplant rate data in the previous section. The intent of these tables and figures is to describe risk of death once candidates are listed rather than while they are listed. Therefore, time at risk and deaths after removal from the waiting list for reasons other than transplant, transfer to another transplant program, or recovery (no longer needing a transplant), and before any subsequent transplant, are included. As with transplant rates, mortality rates should be interpreted carefully taking into consideration the interval displayed in Figure B5. For a complete description of how observed and expected mortality rates are calculated, please refer to the technical documentation available at <http://www.srtr.org>.

Table B6 presents information on what happens to candidates on the waiting list by three different time points after listing: 6 months, 12 months, and 18 months. The table displays percentages of candidates who have died, been removed from the waiting list, been transplanted, or been transferred or lost-to-follow-up. Tables B7 and B8 provide more detail regarding how many candidates have received a deceased donor transplant by certain time points during the first 3 years after being put on the transplant waiting list. Each row of Tables B7 and B8 presents the percent of candidates who received a deceased donor transplant by each time point. Table B9 presents data on the time it took for different percentages of patients to be transplanted for candidates added to the list between 07/01/2013 and 12/31/2018. The time it took for 5% (the 5th percentile) of patients to receive a transplant at this program was 0.2 months. If "Not Observed" is displayed in the table, then too few candidates received transplants before 06/30/2019 to calculate a particular percentile of transplant times.

Table B10 contains a summary of the offer acceptance practices of the program. The offer acceptance ratio indicates whether the program is more or less likely to accept offers than the average program. If the offer acceptance ratio is greater than 1.0, then the program tends to accept more offers than average; if the offer acceptance ratio is less than 1.0, then the program tends to accept fewer offers than average. Figure B7 shows the distribution of program offer acceptance rates as well as the offer acceptance rate for this program. Figures B8 - B12 similarly show offer acceptance rates for subsets of offers.

The Transplant Information section begins with descriptions of transplant recipients in Tables C1 and C2. Data on recipients of deceased donor transplants are presented (Tables C1D and C2D); if applicable, data on recipients of living donor transplants are presented separately (Tables C1L and C2L). Comparisons to the region and the nation as a whole are provided. A description of the deceased donors used at this program is provided in Table C3D, along with characteristics of living donors in Table C3L, if applicable. Finally, information on the transplant procedure for deceased and living donor transplants is presented in Tables C4D and C4L, respectively.



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Starting with Table C5, transplant outcomes are presented along with comparisons to what would be expected at this program and what happened in the nation as a whole. Tables C5-C10 present information on graft survival (survival of the transplanted organ), with data presented separately for adult and pediatric recipients. Patients are followed from the time of transplant until either failure of the transplanted organ or death, whichever comes first. Please refer to the technical methods for more information on these calculations (<http://www.srtr.org>).

While Tables C5-C10 present data on graft survival, Tables C11-C16 present information on patient survival. For these tables, patients are followed from the time of transplant until death, regardless of whether the transplant is functioning or the patient required another transplant to survive.

Tables C17 and C18 summarize the multiorgan transplant outcomes at this program. The summary statistics in these tables are descriptive and are not risk-adjusted for different donor and candidate characteristics.

Additional information regarding the technical methods and the risk adjustment models used to estimate expected event rates is available on the SRTR website at <http://www.srtr.org>. We welcome and encourage feedback on these reports. Please feel free to share feedback with the SRTR at the following e-mail: srtr@srtr.org.



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A. Program Summary

Figure A1. Waiting list and transplant activity

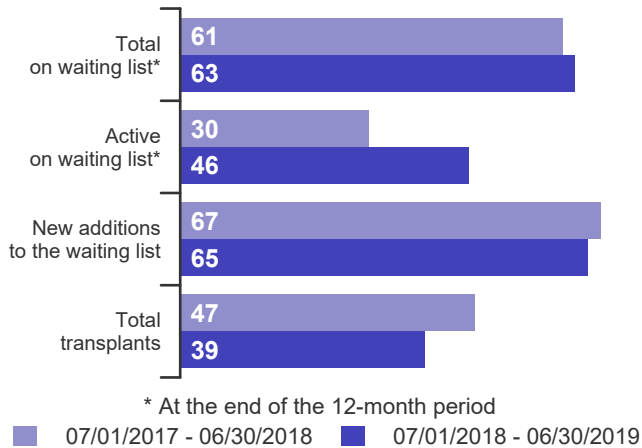


Table A1. Census of transplant recipients

Recipients	07/01/2017-06/30/2018	07/01/2018-06/30/2019
Transplanted at this center	47	39
Followed by this center*	652	662
...transplanted at this program	573	576
...transplanted elsewhere	79	86

* Recipients followed are transplant recipients for whom the center has submitted a post-transplant follow-up form for a transplant that took place before the 12-month interval for each column.

Figure A2. Transplant rates
07/01/2017 - 06/30/2019

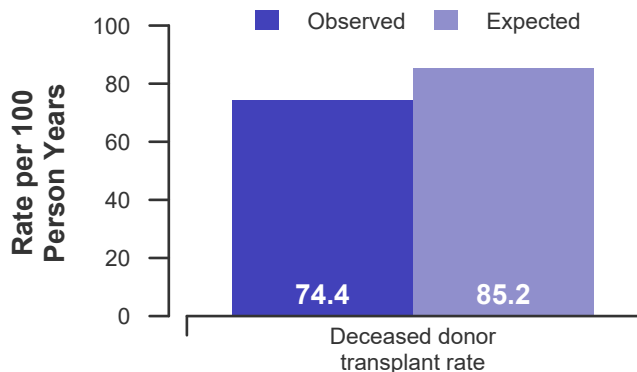


Figure A3. Waiting list mortality rates
07/01/2017 - 06/30/2019

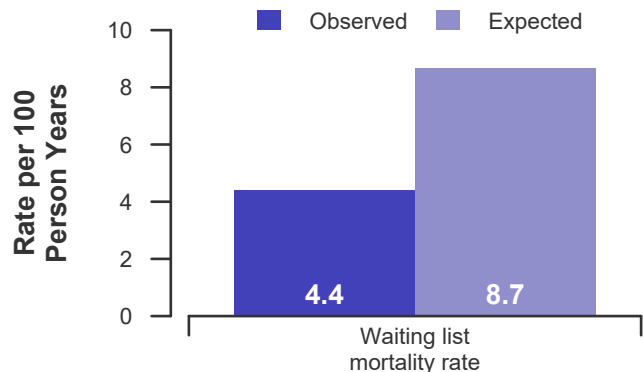


Figure A4. First-year adult graft and patient survival: 07/01/2016 - 12/31/2018

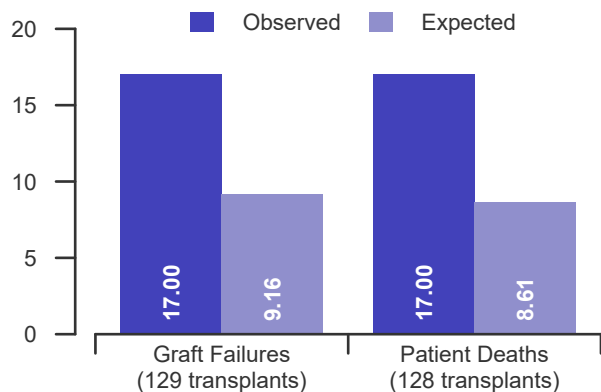


Figure A5. First-year pediatric graft and patient survival: 07/01/2016 - 12/31/2018

This center did not perform any transplants relevant to this figure during 07/01/2016-12/31/2018



B. Waiting List Information

Table B1. Waiting list activity summary: 07/01/2017 - 06/30/2019

Waiting List Registrations	Counts for this center		Activity for 07/01/2018 to 06/30/2019 as percent of registrants on waiting list on 07/01/2018		
	07/01/2017-06/30/2018	07/01/2018-06/30/2019	This Center (%)	OPTN Region (%)	U.S. (%)
On waiting list at start	58	61	100.0	100.0	100.0
Additions					
New listings at this center	67	65	106.6	129.9	116.4
Removals					
Transferred to another center	1	5	8.2	2.2	2.8
Received living donor transplant*	0	0	0.0	0.0	0.0
Received deceased donor transplant*	47	39	63.9	85.3	87.8
Died	2	2	3.3	7.5	6.6
Transplanted at another center	0	0	0.0	0.6	1.3
Deteriorated	5	6	9.8	11.6	7.7
Recovered	4	8	13.1	9.7	6.2
Other reasons	5	3	4.9	11.4	9.2
On waiting list at end of period	61	63	103.3	101.7	94.8

* These patients were removed from waiting list with removal code indicating transplant; this may not equal the number of transplants performed at this center during the specified period.



B. Waiting List Information

Table B2. Demographic characteristics of waiting list candidates
Candidates registered on the waiting list between 07/01/2018 and 06/30/2019

Demographic Characteristic	New Waiting List Registrations 07/01/2018 to 06/30/2019 (%)			All Waiting List Registrations on 06/30/2019 (%)		
	This Center (N=65)	OPTN Region (N=469)	U.S. (N=4,673)	This Center (N=63)	OPTN Region (N=367)	U.S. (N=3,804)
All (%)	100.0	100.0	100.0	100.0	100.0	100.0
Ethnicity/Race (%)*						
White	64.6	55.9	60.8	69.8	53.4	59.8
African-American	29.2	31.3	23.7	27.0	36.5	26.3
Hispanic/Latino	6.2	7.9	10.5	3.2	6.0	10.6
Asian	0.0	3.4	3.8	0.0	3.0	2.3
Other	0.0	1.5	1.1	0.0	1.1	1.1
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
Age (%)						
<2 years	0.0	3.6	5.8	0.0	2.5	3.4
2-11 years	0.0	3.6	4.7	0.0	3.0	4.2
12-17 years	0.0	3.0	4.2	0.0	3.3	3.0
18-34 years	23.1	10.0	9.4	19.0	10.6	11.6
35-49 years	23.1	21.5	18.8	27.0	22.6	22.4
50-64 years	43.1	42.4	42.1	44.4	46.3	44.6
65-69 years	10.8	12.6	12.5	9.5	10.9	9.7
70+ years	0.0	3.2	2.5	0.0	0.8	1.1
Gender (%)						
Male	67.7	74.8	70.0	81.0	79.8	74.6
Female	32.3	25.2	30.0	19.0	20.2	25.4

* Race and ethnicity are reported together as a single data element, reflecting their data collection (either race or ethnicity is required, but not both). Patients formerly coded as white and Hispanic are coded as Hispanic. Race and ethnicity sum to 100%.



B. Waiting List Information

Table B3. Medical characteristics of waiting list candidates

Candidates registered on the waiting list between 07/01/2018 and 06/30/2019

Medical Characteristic	New Waiting List Registrations 07/01/2018 to 06/30/2019 (%)			All Waiting List Registrations on 06/30/2019 (%)		
	This Center	OPTN Region	U.S.	This Center	OPTN Region	U.S.
	(N=65)	(N=469)	(N=4,673)	(N=63)	(N=367)	(N=3,804)
All (%)	100.0	100.0	100.0	100.0	100.0	100.0
Blood Type (%)						
O	44.6	41.8	44.9	63.5	54.2	58.3
A	35.4	35.2	36.1	28.6	28.1	28.9
B	7.7	17.7	14.5	4.8	15.0	11.2
AB	12.3	5.3	4.5	3.2	2.7	1.6
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
Previous Transplant (%)						
Yes	4.6	1.9	4.1	3.2	1.9	3.8
No	95.4	98.1	95.9	96.8	98.1	96.2
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
Primary Disease (%)						
Cardiomyopathy	70.8	65.7	58.1	68.3	64.9	56.9
Coronary Artery Disease	15.4	23.7	25.3	14.3	24.0	27.5
Retransplant/Graft Failure	4.6	1.9	3.7	3.2	1.1	3.2
Valvular Heart Disease	1.5	0.4	0.9	0.0	0.3	0.9
Congenital Heart Disease	7.7	7.0	10.9	14.3	9.5	10.8
Other	0.0	1.3	1.2	0.0	0.3	0.7
Missing	0.0	0.0	0.0	0.0	0.0	0.0
Medical Urgency Status at Listing (%)						
Status 1A	1.5	14.7	16.3	4.8	7.9	9.3
Status 1B	13.8	12.6	13.8	20.6	22.3	24.9
Status 2	3.1	9.8	8.8	22.2	28.9	27.7
Adult Status 1	1.5	1.7	2.5	0.0	0.3	0.2
Adult Status 2	9.2	9.4	10.4	3.2	1.1	1.6
Adult Status 3	6.2	5.8	7.4	0.0	2.7	2.8
Adult Status 4	43.1	26.2	23.4	28.6	20.7	18.2
Adult Status 5	3.1	1.3	1.3	1.6	1.1	1.0
Adult Status 6	16.9	16.2	13.1	15.9	12.5	10.4
Temporarily Inactive	1.5	2.3	2.9	3.2	2.5	3.8



B. Waiting List Information

Table B4D. Deceased donor transplant rates: 07/01/2017 - 06/30/2019

Waiting List Registrations	This Center	OPO/DSA	Region	U.S.
All Candidates				
Count on waiting list at start*	58	114	414	4,000
Person Years**	115.7	212.9	766.2	7,886.3
Removals for Transplant	86	194	636	6,833
Adult (18+) Candidates				
Count on waiting list at start*	58	98	380	3,606
Person Years**	115.7	184.0	690.3	7,082.8
Removals for transplant	86	175	575	5,846
Pediatric (<18) Candidates				
Count on waiting list at start*	--	--	--	--
Person Years**	--	--	--	--
Removals for transplant	--	--	--	--

* Counts in this table may be lower than similar counts in other waiting list tables, such as Table B1. A small percentage (~1%) of patients are found to have died or been transplanted before being removed from the waiting list, so these patients are excluded if the event occurs prior to the start of the study period. Inactive time on the waiting list is included in the calculations for this table.

** Person years are calculated as days (converted to fractional years). The number of days from July 1 or from the date of first wait listing until death, transplant, removal from the waiting list or June 30.

Figure B1D. Observed and expected deceased donor transplant rates: 07/01/2017 - 06/30/2019

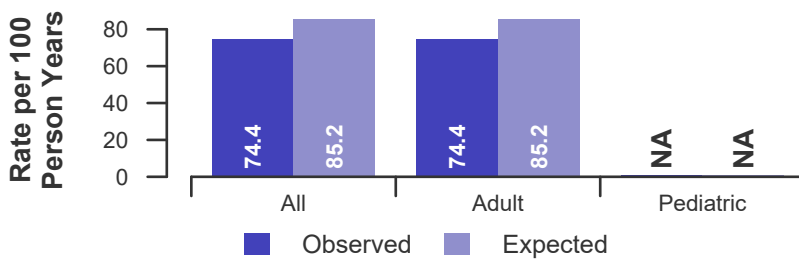


Figure B2D. Deceased donor transplant rate ratio estimate

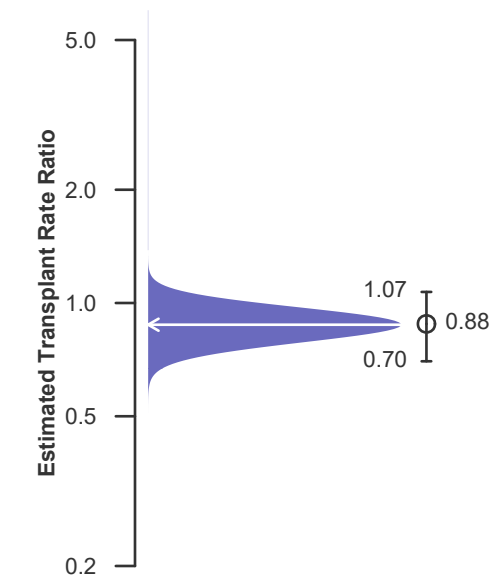
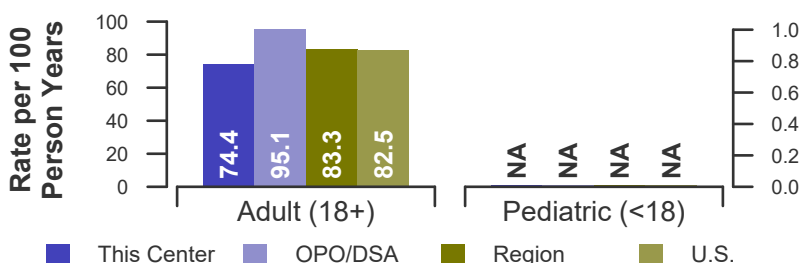


Figure B3D. Observed adult (18+) and pediatric (<18) deceased donor transplant rates: 07/01/2017 - 06/30/2019





B. Waiting List Information

Table B5. Waiting list mortality rates: 07/01/2017 - 06/30/2019

Waiting List Registrations	This Center	OPO/DSA	Region	U.S.
All Candidates				
Count on waiting list at start*	58	114	414	4,000
Person Years**	136.7	253.1	893.7	9,064.5
Number of deaths	6	31	92	840
Adult (18+) Candidates				
Count on waiting list at start*	58	98	380	3,606
Person Years**	136.7	221.4	808.7	8,160.4
Number of deaths	6	20	78	703
Pediatric (<18) Candidates				
Count on waiting list at start*	--	--	--	--
Person Years**	--	--	--	--
Number of deaths	--	--	--	--

* Counts in this table may be lower than similar counts in other waiting list tables, such as Table B1. A small percentage (~1%) of patients are found to have died or been transplanted before being removed from the waiting list, so these patients are excluded if the event occurs prior to the start of the study period. Inactive time on the waiting list is included in the calculations for this table.

** Person years are calculated as days (converted to fractional years). The number of days from July 1 or from the date of first wait listing until death, transplant, 60 days after recovery, transfer or June 30.

Figure B4. Observed and expected waiting list mortality rates: 07/01/2017 - 06/30/2019

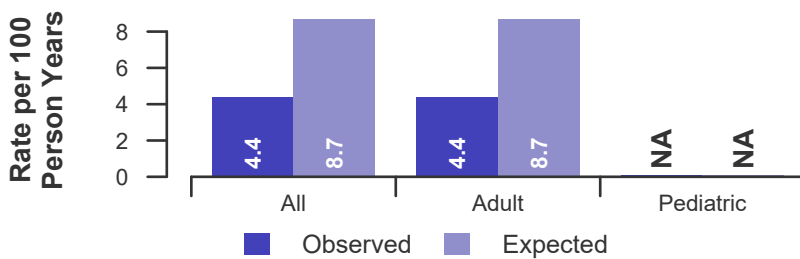


Figure B5. Waiting list mortality rate ratio estimate

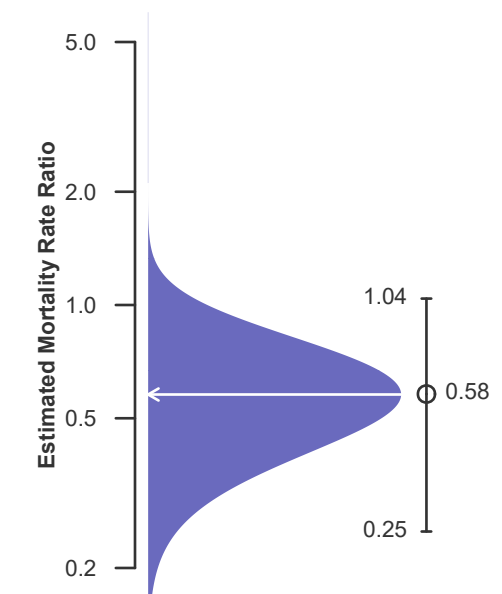
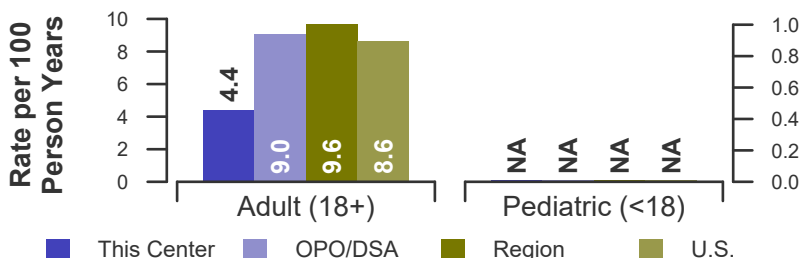


Figure B6. Observed adult (18+) and pediatric (<18) waiting list mortality rates: 07/01/2017 - 06/30/2019





B. Waiting List Information

Table B6. Waiting list candidate status after listing
Candidates registered on waiting list between 01/01/2017 and 12/31/2017

Waiting list status (survival status)	This Center (N=85)			U.S. (N=4,536)		
	Months Since Listing			Months Since Listing		
	6	12	18	6	12	18
Alive on waiting list (%)	40.0	25.9	16.5	40.9	25.3	16.9
Died on the waiting list without transplant (%)	2.4	2.4	2.4	4.9	5.4	5.9
Removed without transplant (%):						
Condition worsened (status unknown)	2.4	3.5	7.1	4.2	5.3	5.9
Condition improved (status unknown)	0.0	1.2	1.2	1.1	2.0	2.8
Refused transplant (status unknown)	0.0	0.0	0.0	0.1	0.3	0.4
Other	2.4	4.7	5.9	1.4	2.9	3.9
Transplant (living or deceased donor) (%):						
Functioning (alive)	49.4	55.3	40.0	43.7	51.5	38.3
Failed-Retransplanted (alive)	0.0	0.0	0.0	0.0	0.0	0.0
Failed-alive not retransplanted	0.0	0.0	0.0	0.0	0.1	0.1
Died	3.5	4.7	4.7	2.4	3.9	5.3
Status Yet Unknown*	0.0	1.2	18.8	0.6	2.1	18.9
Lost or Transferred (status unknown) (%)	0.0	1.2	3.5	0.7	1.1	1.6
TOTAL (%)	100.0	100.0	100.0	100.0	100.0	100.0
Total % known died on waiting list or after transplant	5.9	7.1	7.1	7.3	9.4	11.2
Total % known died or removed as unstable	8.2	10.6	14.1	11.5	14.7	17.2
Total % removed for transplant	52.9	61.2	63.5	46.8	57.6	62.7
Total % with known functioning transplant (alive)	49.4	55.3	40.0	43.7	51.5	38.3

* Follow-up form covering specified time period not yet completed, and possibly has not become due.



B. Waiting List Information

Table B7. Percent of candidates with deceased donor transplants: demographic characteristics
Candidates registered on the waiting list between 07/01/2013 and 06/30/2016

Characteristic	N	Percent transplanted at time periods since listing								
		This Center				United States				
		30 day	1 year	2 years	3 years	N	30 day	1 year	2 years	3 years
All	234	23.9	69.7	73.9	76.9	13,020	14.9	52.5	60.9	64.0
Ethnicity/Race*										
White	150	24.7	74.7	76.7	80.7	8,038	15.2	52.7	61.2	64.2
African-American	70	18.6	62.9	71.4	72.9	3,032	12.6	48.1	57.3	60.8
Hispanic/Latino	7	42.9	57.1	71.4	71.4	1,318	15.2	56.8	63.8	67.1
Asian	5	40.0	40.0	40.0	40.0	496	22.8	61.9	69.0	71.8
Other	2	50.0	50.0	50.0	50.0	136	18.4	61.0	66.2	67.6
Unknown	0	--	--	--	--	0	--	--	--	--
Age										
<2 years	0	--	--	--	--	804	18.0	61.3	62.6	62.8
2-11 years	0	--	--	--	--	587	13.3	63.0	69.3	72.2
12-17 years	0	--	--	--	--	506	23.9	72.1	77.7	79.1
18-34 years	27	14.8	70.4	74.1	77.8	1,207	13.3	48.6	57.0	60.6
35-49 years	59	27.1	69.5	72.9	72.9	2,378	12.8	46.3	57.3	61.2
50-64 years	122	23.0	68.0	73.0	77.9	5,556	14.0	51.0	60.5	64.2
65-69 years	25	28.0	76.0	80.0	80.0	1,672	15.7	52.5	59.7	62.0
70+ years	1	100.0	100.0	100.0	100.0	310	27.7	66.8	69.0	69.0
Gender										
Male	163	19.6	65.6	71.2	74.8	9,328	13.8	51.3	60.5	64.0
Female	71	33.8	78.9	80.3	81.7	3,692	17.7	55.6	61.8	64.0

* Race and ethnicity are reported together as a single data element, reflecting their data collection (either race or ethnicity is required, but not both). Patients formerly coded as white and Hispanic are coded as Hispanic. Race and ethnicity sum to 100%.



B. Waiting List Information

Table B8. Percent of candidates with deceased donor transplants: medical characteristics
Candidates registered on the waiting list between 07/01/2013 and 06/30/2016

Characteristic	N	Percent transplanted at time periods since listing								
		This Center				United States				
		30 day	1 year	2 years	3 years	N	30 day	1 year	2 years	3 years
All	234	23.9	69.7	73.9	76.9	13,020	14.9	52.5	60.9	64.0
Blood Type										
O	104	13.5	58.7	65.4	72.1	5,842	9.4	43.9	53.4	57.2
A	83	33.7	79.5	80.7	80.7	4,708	18.2	58.0	65.7	68.5
B	41	22.0	73.2	78.0	78.0	1,845	17.7	58.9	66.9	69.3
AB	6	83.3	100.0	100.0	100.0	624	32.1	72.9	76.9	78.0
Previous Transplant										
Yes	11	18.2	36.4	36.4	45.5	553	12.1	45.0	50.3	52.8
No	223	24.2	71.3	75.8	78.5	12,467	15.0	52.8	61.4	64.5
Primary Disease										
Cardiomyopathy	163	25.8	73.6	78.5	81.0	7,314	15.5	53.9	63.2	66.4
Coronary Artery Disease	50	20.0	72.0	76.0	80.0	3,665	13.9	50.6	58.8	62.5
Retransplant/Graft Failure	9	11.1	22.2	22.2	33.3	483	12.0	45.1	50.7	53.2
Valvular Heart Disease	2	100.0	100.0	100.0	100.0	144	19.4	55.6	61.8	63.9
Congenital Heart Disease	10	10.0	30.0	30.0	30.0	1,259	14.5	53.1	58.4	60.1
Other	0	--	--	--	--	155	14.2	44.5	51.0	52.3
Missing	0	--	--	--	--	0	--	--	--	--
Medical Urgency Status at Listing										
Old Status 1	0	--	--	--	--	0	--	--	--	--
Status 1A	41	43.9	75.6	80.5	80.5	4,143	28.4	66.8	70.2	71.6
Status 1B	109	23.9	74.3	78.9	80.7	5,046	11.4	53.2	63.8	67.2
Status 2	83	14.5	61.4	65.1	71.1	3,384	4.4	35.8	47.1	52.0
Unknown	1	0.0	0.0	0.0	0.0	447	7.6	38.5	46.3	49.2



B. Waiting List Information

Table B9. Time to transplant for waiting list candidates*

Candidates registered on the waiting list between 07/01/2013 and 12/31/2018

Percentile	Center	Months to Transplant**		U.S.
		OPO/DSA	Region	
5th	0.2	0.2	0.3	0.3
10th	0.3	0.5	0.6	0.5
25th	1.1	1.4	1.8	1.8
50th (median time to transplant)	4.4	6.3	7.8	8.0
75th	30.6	Not Observed	Not Observed	Not Observed

* If cells contain "Not Observed" fewer than that percentile of patients had received a transplant. For example, the 50th percentile of time to transplant is the time when 50% of candidates have received transplants. If waiting times are long, then the 50th percentile may not be observed during the follow-up period for this table. Also, if more than 50% of candidates are removed from the list due to death or other reasons before receiving transplants, then the 50th percentile of time to transplant will not be observed.

** Censored on 06/30/2019. Calculated as the months after listing, during which the corresponding percent of all patients initially listed had received a transplant.



B. Waiting List Information

Table B10. Offer Acceptance Practices: 07/01/2018 - 06/30/2019

Offers Acceptance Characteristics	This Center	OPO/DSA	Region	U.S.
Overall				
Number of Offers	734	1,377	5,219	45,104
Number of Acceptances	35	86	290	3,219
Expected Acceptances	43.5	121.0	331.7	3,216.8
Offer Acceptance Ratio*	0.81	0.72	0.88	1.00
95% Credible Interval**	[0.57, 1.10]	--	--	--
PHS increased infectious risk				
Number of Offers	359	586	1,758	13,883
Number of Acceptances	16	29	103	1,033
Expected Acceptances	25.3	48.9	125.8	1,031.5
Offer Acceptance Ratio*	0.66	0.61	0.82	1.00
95% Credible Interval**	[0.39, 1.00]	--	--	--
Ejection fraction < 60				
Number of Offers	217	399	1,661	15,179
Number of Acceptances	12	20	80	908
Expected Acceptances	11.6	30.7	95.5	905.7
Offer Acceptance Ratio*	1.03	0.67	0.84	1.00
95% Credible Interval**	[0.56, 1.63]	--	--	--
Donor Age >= 40				
Number of Offers	358	592	2,724	21,232
Number of Acceptances	9	21	79	748
Expected Acceptances	11.4	28.7	90.5	755.0
Offer Acceptance Ratio*	0.82	0.75	0.88	0.99
95% Credible Interval**	[0.41, 1.37]	--	--	--
Hard-to-Place Hearts (Over 50 Offers)				
Number of Offers	188	291	1,647	13,632
Number of Acceptances	1	5	17	178
Expected Acceptances	1.8	3.5	20.3	181.8
Offer Acceptance Ratio*	0.79	1.28	0.85	0.98
95% Credible Interval**	[0.16, 1.91]	--	--	--
Donor more than 500 miles away				
Number of Offers	175	317	1,243	12,917
Number of Acceptances	6	14	49	609
Expected Acceptances	5.1	14.8	50.6	605.7
Offer Acceptance Ratio*	1.13	0.95	0.97	1.01
95% Credible Interval**	[0.49, 2.03]	--	--	--

* The offer acceptance ratio estimates the relative offer acceptance practice of Hospital of the University of Pennsylvania (PAUP) compared to the national offer acceptance practice. A ratio above one indicates the program is more likely to accept an offer compared to national offer acceptance practices (e.g., an offer acceptance ratio of 1.25 indicates a 25% more likely to accept an offer), while a ratio below one indicates the program is less likely to accept an offer compared to national offer acceptance practices (e.g., an offer acceptance ratio of 0.75 indicates a 25% less likely to accept an offer).

** As an example, the 95% Credible Interval for the overall offer acceptance ratio, [0.57, 1.10], indicates the location of PAUP's true offer acceptance ratio with 95% probability. The best estimate is 19% less likely to accept an offer compared to national acceptance behavior, but PAUP's performance could plausibly range from 43% reduced acceptance up to 10% higher acceptance.



B. Waiting List Information

Figure B7. Offer acceptance: Overall

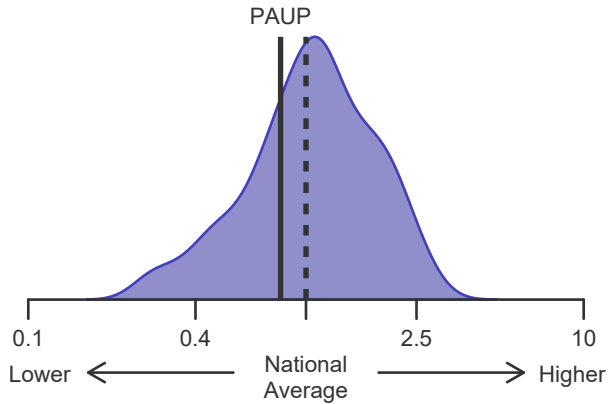


Figure B8. Offer acceptance: PHS increased infectious risk

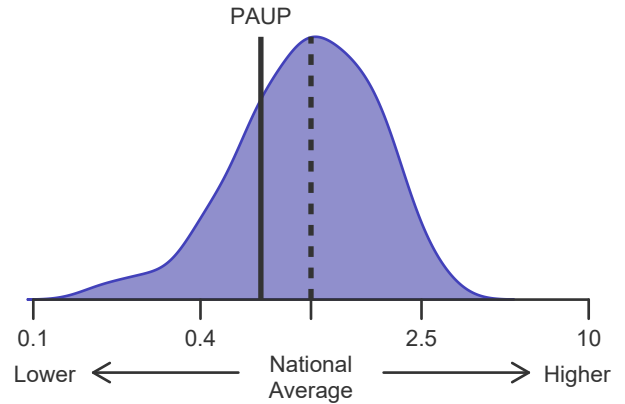


Figure B9. Offer acceptance: Ejection fraction < 60

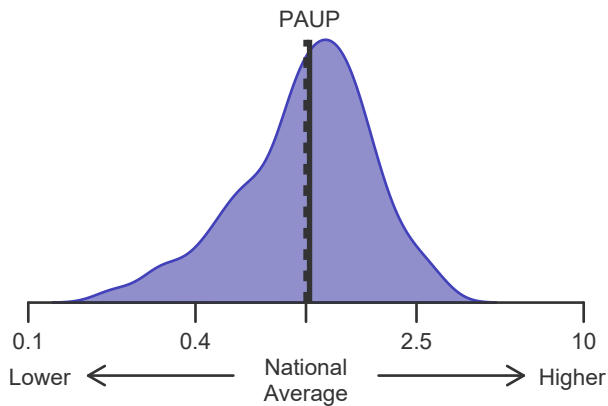


Figure B10. Offer acceptance: Donor age >= 40

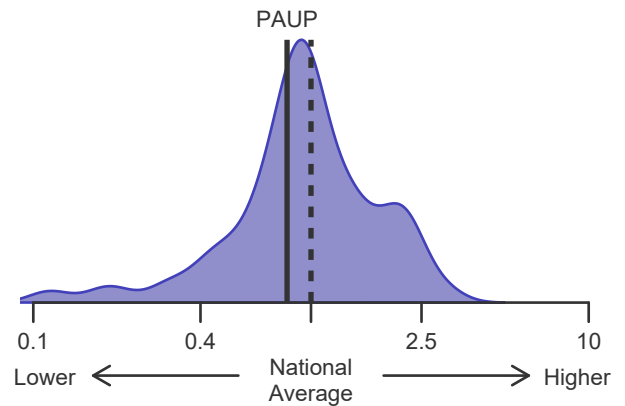


Figure B11. Offer acceptance: Offer number > 50

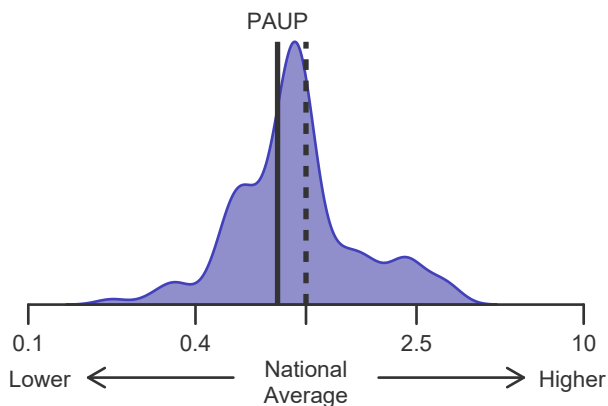
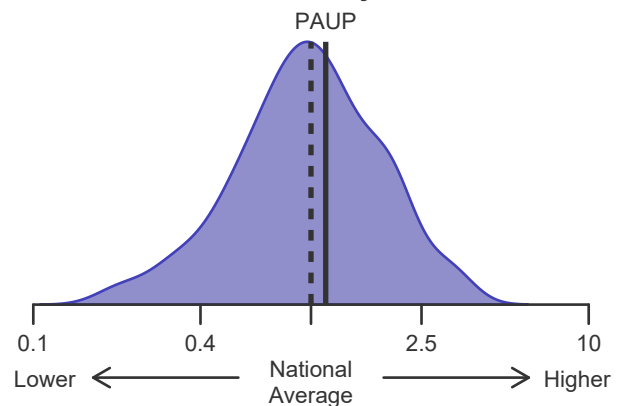


Figure B12. Offer acceptance: Donor more than 500 miles away





C. Transplant Information

Table C1D. Deceased donor transplant recipient demographic characteristics
Patients transplanted between 07/01/2018 and 06/30/2019

Characteristic	Percentage in each category		
	Center (N=39)	Region (N=308)	U.S. (N=3,525)
Ethnicity/Race (%)*			
White	64.1	58.8	62.5
African-American	28.2	29.2	21.7
Hispanic/Latino	7.7	8.4	10.7
Asian	0.0	2.6	4.2
Other	0.0	1.0	0.9
Unknown	0.0	0.0	0.0
Age (%)			
<2 years	0.0	2.9	5.1
2-11 years	0.0	4.2	4.6
12-17	0.0	3.2	4.6
18-34	23.1	11.0	9.8
35-49 years	28.2	19.5	17.7
50-64 years	33.3	42.2	40.7
65-69 years	15.4	13.3	14.2
70+ years	0.0	3.6	3.2
Gender (%)			
Male	71.8	72.1	69.4
Female	28.2	27.9	30.6

* Race and ethnicity are reported together as a single data element, reflecting their data collection (either race or ethnicity is required, but not both). Patients formerly coded as white and Hispanic are coded as Hispanic. Race and ethnicity sum to 100%.



C. Transplant Information

Table C2D. Deceased donor transplant recipient medical characteristics
Patients transplanted between 07/01/2018 and 06/30/2019

Characteristic	Percentage in each category		
	Center (N=39)	Region (N=308)	U.S. (N=3,525)
Blood Type (%)			
O	38.5	36.4	40.4
A	38.5	39.0	38.4
B	10.3	18.5	15.7
AB	12.8	6.2	5.5
Previous Transplant (%)			
Yes	5.1	1.9	3.9
No	94.9	98.1	96.1
Body Mass Index (%)			
0-20	7.7	14.9	20.7
21-25	43.6	34.7	27.3
26-30	25.6	28.9	28.4
31-35	20.5	16.2	18.5
36-40	2.6	4.5	4.1
41+	0.0	0.6	0.5
Unknown	0.0	0.0	0.6
Primary Disease (%)			
Cardiomyopathy	79.5	66.2	61.5
Coronary Artery Disease	10.3	25.6	24.5
Retransplant/Graft Failure	0.0	0.0	0.0
Valvular Heart Disease	2.6	0.3	1.0
Congenital Heart Disease	7.7	6.8	11.5
Other	0.0	1.0	1.5
Missing	0.0	0.0	0.1
Medical Urgency Status at Transplant (%)			
Status 1A	20.5	26.9	30.6
Status 1B	2.6	8.8	9.0
Status 2	0.0	1.0	1.4
Adult Status 1	5.1	4.9	5.0
Adult Status 2	25.6	32.5	26.2
Adult Status 3	20.5	12.0	14.6
Adult Status 4	23.1	11.4	10.5
Adult Status 5	0.0	0.0	0.3
Adult Status 6	2.6	2.6	2.5
Recipient Medical Condition at Transplant (%)			
Not Hospitalized	41.0	37.3	37.4
Hospitalized	12.8	20.5	17.5
ICU	46.2	42.2	44.8
Unknown	0.0	0.0	0.3
Recipient Mechanical, Ventilated or Organ-Perfusion Support Status at Transplant (%)			
No Support Mechanism	17.9	21.8	19.5
Devices*	46.2	54.2	59.1
Other Support Mechanism	35.9	24.0	21.2
Unknown	0.0	0.0	0.2

* Devices include ventricular assist devices (VAD), extracorporeal membrane oxygenation (ECMO), intraaortic balloon pump (IABP), and total artificial heart (TAH).



C. Transplant Information

Table C3D. Deceased donor characteristics
Transplants performed between 07/01/2018 and 06/30/2019

Donor Characteristic	Percentage in each category		
	Center (N=39)	Region (N=308)	U.S. (N=3,525)
Cause of Death (%)			
Deceased: Stroke	5.1	12.3	14.0
Deceased: MVA	23.1	17.2	18.9
Deceased: Other	71.8	70.5	67.0
Ethnicity/Race (%)*			
White	64.1	63.0	62.5
African-American	20.5	22.4	16.7
Hispanic/Latino	10.3	12.7	17.2
Asian	2.6	1.0	1.8
Other	2.6	1.0	1.8
Not Reported	0.0	0.0	0.0
Age (%)			
<2 years	0.0	2.9	4.0
2-11 years	0.0	2.3	4.6
12-17	5.1	7.1	7.5
18-34	46.2	48.1	48.4
35-49 years	48.7	31.2	28.4
50-64 years	0.0	8.4	7.0
65-69 years	0.0	0.0	0.0
70+ years	0.0	0.0	0.0
Gender (%)			
Male	74.4	70.5	68.4
Female	25.6	29.5	31.6
Blood Type (%)			
O	43.6	47.7	51.3
A	33.3	35.4	34.9
B	12.8	13.6	11.5
AB	10.3	3.2	2.4
Unknown	0.0	0.0	0.0

* Race and ethnicity are reported together as a single data element, reflecting their data collection (either race or ethnicity is required, but not both). Patients formerly coded as white and Hispanic are coded as Hispanic. Race and ethnicity sum to 100%.



C. Transplant Information

Table C4D. Deceased donor transplant characteristics
Transplants performed between 07/01/2018 and 06/30/2019

Transplant Characteristic	Percentage in each category		
	Center (N=39)	Region (N=308)	U.S. (N=3,525)
Total Ischemic Time (Minutes): Local (%)			
Deceased: 0-90 min	4.5	6.1	8.8
Deceased: 91-180 min	72.7	73.7	59.4
Deceased: 181-270 min	22.7	16.7	27.9
Deceased: 271-360 min	0.0	0.9	1.9
Deceased: 361+ min	0.0	0.0	0.7
Not Reported	0.0	2.6	1.3
Total Ischemic Time (Minutes): Shared (%)			
Deceased: 0-90 min	0.0	0.0	0.3
Deceased: 91-180 min	29.4	19.6	13.8
Deceased: 181-270 min	64.7	77.3	71.1
Deceased: 271-360 min	5.9	3.1	12.2
Deceased: 361+ min	0.0	0.0	1.0
Not Reported	0.0	0.0	1.5
Procedure Type (%)			
Heart alone	92.3	95.1	92.2
Heart and another organ	7.7	4.9	7.8
Sharing (%)			
Local	56.4	37.0	39.5
Shared	43.6	63.0	60.5
Median Time in Hospital After Transplant*	13.0 Days	17.0 Days	17.0 Days

* Multiple organ transplants are excluded from this statistic.



C. Transplant Information

Table C5D. Adult (18+) 1-month survival with a functioning deceased donor graft
Single organ transplants performed between 07/01/2016 and 12/31/2018
Deaths and retransplants are considered graft failures

	PAUP	U.S.
Number of transplants evaluated	129	6,572
Estimated probability of surviving with a functioning graft at 1 month (unadjusted for patient and donor characteristics)	94.57%	96.42%
Expected probability of surviving with a functioning graft at 1 month (adjusted for patient and donor characteristics)	96.90%	--
Number of observed graft failures (including deaths) during the first month after transplant	7	235
Number of expected graft failures (including deaths) during the first month after transplant	3.97	--
Estimated hazard ratio*	1.51	--
95% credible interval for the hazard ratio**	[0.69, 2.64]	--

* The hazard ratio provides an estimate of how Hospital of the University of Pennsylvania (PAUP)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected graft failure rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk), and a ratio below 1 indicates lower than expected graft failure rates (e.g., a hazard ratio of 0.75 would indicate 25% lower risk). If PAUP's graft failure rate were precisely the expected rate, the estimated hazard ratio would be 1.0.

** The 95% credible interval, [0.69, 2.64], indicates the location of PAUP's true hazard ratio with 95% probability. The best estimate is 51% higher risk of graft failure compared to an average program, but PAUP's performance could plausibly range from 31% reduced risk up to 164% increased risk.

Figure C1D. Adult (18+) 1-month deceased donor graft failure HR estimate

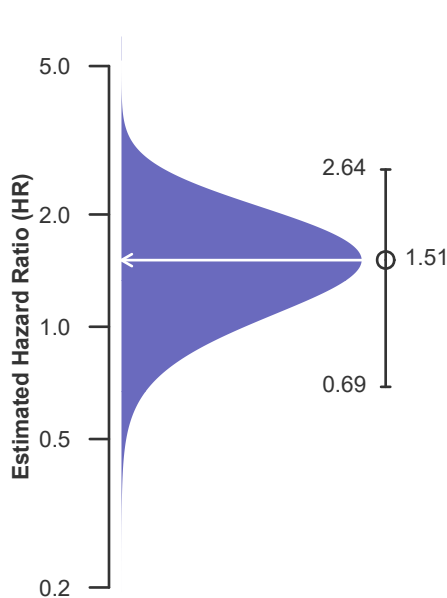
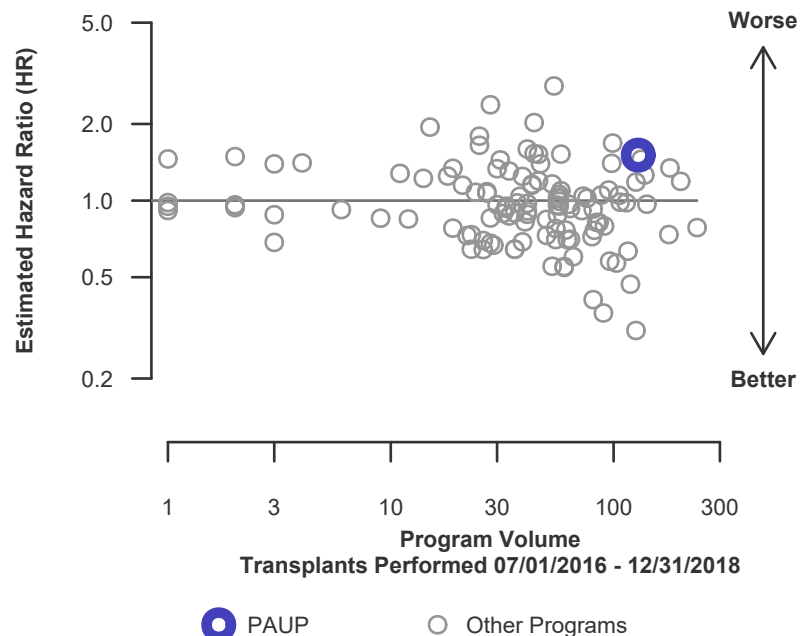


Figure C2D. Adult (18+) 1-month deceased donor graft failure HR program comparison





C. Transplant Information

Table C6D. Adult (18+) 1-year survival with a functioning deceased donor graft
Single organ transplants performed between 07/01/2016 and 12/31/2018
Deaths and retransplants are considered graft failures

	PAUP	U.S.
Number of transplants evaluated	129	6,572
Estimated probability of surviving with a functioning graft at 1 year (unadjusted for patient and donor characteristics)	86.59%	91.30%
Expected probability of surviving with a functioning graft at 1 year (adjusted for patient and donor characteristics)	92.28%	--
Number of observed graft failures (including deaths) during the first year after transplant	17	547
Number of expected graft failures (including deaths) during the first year after transplant	9.16	--
Estimated hazard ratio*	1.70	--
95% credible interval for the hazard ratio**	[1.02, 2.55]	--

* The hazard ratio provides an estimate of how Hospital of the University of Pennsylvania (PAUP)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected graft failure rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk), and a ratio below 1 indicates lower than expected graft failure rates (e.g., a hazard ratio of 0.75 would indicate 25% lower risk). If PAUP's graft failure rate were precisely the expected rate, the estimated hazard ratio would be 1.0.

** The 95% credible interval, [1.02, 2.55], indicates the location of PAUP's true hazard ratio with 95% probability. The best estimate is 70% higher risk of graft failure compared to an average program, but PAUP's performance could plausibly range from 2% increased risk up to 155% increased risk.

Figure C3D. Adult (18+) 1-year deceased donor graft failure HR estimate

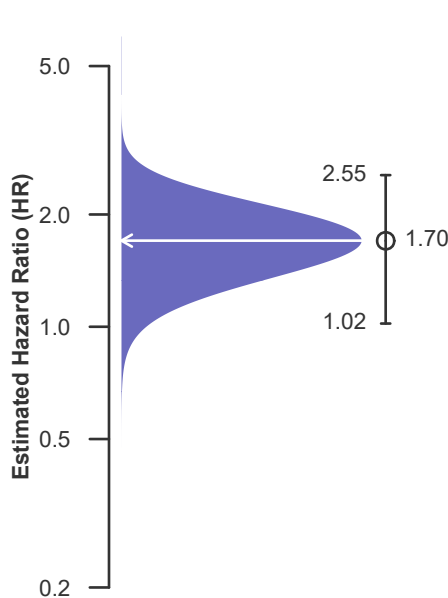
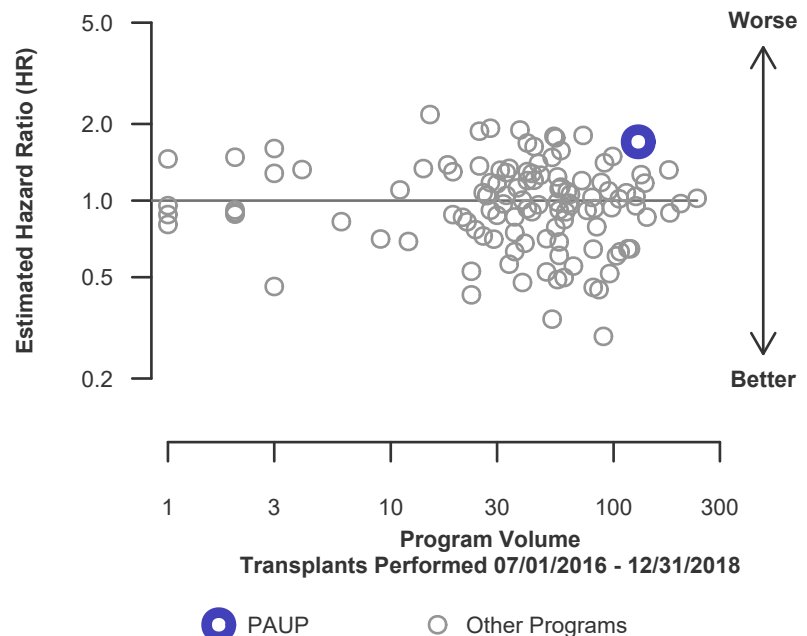


Figure C4D. Adult (18+) 1-year deceased donor graft failure HR program comparison





C. Transplant Information

Table C7D. Adult (18+) 3-year survival with a functioning deceased donor graft
Single organ transplants performed between 01/01/2014 and 06/30/2016
Deaths and retransplants are considered graft failures

	PAUP	U.S.
Number of transplants evaluated	140	5,552
Estimated probability of surviving with a functioning graft at 3 years (unadjusted for patient and donor characteristics)	85.00%	84.69%
Expected probability of surviving with a functioning graft at 3 years (adjusted for patient and donor characteristics)	85.47%	--
Number of observed graft failures (including deaths) during the first 3 years after transplant	21	850
Number of expected graft failures (including deaths) during the first 3 years after transplant	20.35	--
Estimated hazard ratio*	1.03	--
95% credible interval for the hazard ratio**	[0.65, 1.49]	--

* The hazard ratio provides an estimate of how Hospital of the University of Pennsylvania (PAUP)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected graft failure rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk), and a ratio below 1 indicates lower than expected graft failure rates (e.g., a hazard ratio of 0.75 would indicate 25% lower risk). If PAUP's graft failure rate were precisely the expected rate, the estimated hazard ratio would be 1.0.

** The 95% credible interval, [0.65, 1.49], indicates the location of PAUP's true hazard ratio with 95% probability. The best estimate is 3% higher risk of graft failure compared to an average program, but PAUP's performance could plausibly range from 35% reduced risk up to 49% increased risk.

Figure C5D. Adult (18+) 3-year deceased donor graft failure HR estimate

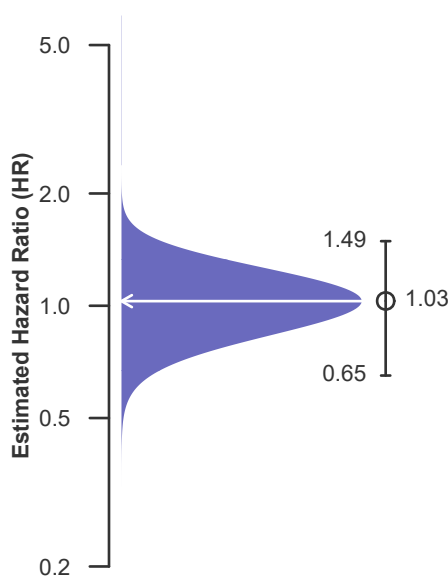
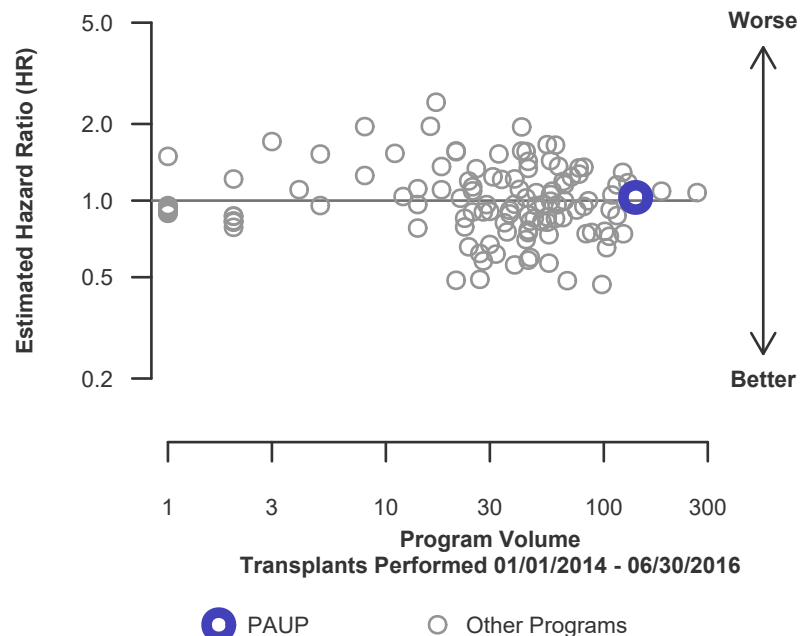


Figure C6D. Adult (18+) 3-year deceased donor graft failure HR program comparison





C. Transplant Information

Table C8D. Pediatric (<18) 1-month survival with a functioning deceased donor graft
Single organ transplants performed between 07/01/2016 and 12/31/2018
Deaths and retransplants are considered graft failures

This center did not perform any
transplants relevant to
this table during
07/01/2016-12/31/2018

Figure C7D. Pediatric (<18)
1-month deceased donor graft
failure HR estimate

This center did not perform any
transplants relevant to
this figure during
07/01/2016-12/31/2018

Figure C8D. Pediatric (<18) 1-month deceased donor graft
failure HR program comparison

This center did not perform any
transplants relevant to
this figure during
07/01/2016-12/31/2018



C. Transplant Information

Table C9D. Pediatric (<18) 1-year survival with a functioning deceased donor graft
Single organ transplants performed between 07/01/2016 and 12/31/2018
Deaths and retransplants are considered graft failures

This center did not perform any
transplants relevant to
this table during
07/01/2016-12/31/2018

Figure C9D. Pediatric (<18)
1-year deceased donor graft
failure HR estimate

This center did not perform any
transplants relevant to
this figure during
07/01/2016-12/31/2018

Figure C10D. Pediatric (<18) 1-year deceased donor graft
failure HR program comparison

This center did not perform any
transplants relevant to
this figure during
07/01/2016-12/31/2018



C. Transplant Information

Table C10D. Pediatric (<18) 3-year survival with a functioning deceased donor graft
Single organ transplants performed between 01/01/2014 and 06/30/2016
Deaths and retransplants are considered graft failures

This center did not perform any
transplants relevant to
this table during
01/01/2014-06/30/2016

Figure C11D. Pediatric (<18)
3-year deceased donor graft
failure HR estimate

This center did not perform any
transplants relevant to
this figure during
01/01/2014-06/30/2016

Figure C12D. Pediatric (<18) 3-year deceased donor graft
failure HR program comparison

This center did not perform any
transplants relevant to
this figure during
01/01/2014-06/30/2016



C. Transplant Information

Table C11D. Adult (18+) 1-month patient survival (deceased donor graft recipients)
Single organ transplants performed between 07/01/2016 and 12/31/2018
Retransplants excluded

	PAUP	U.S.
Number of transplants evaluated	128	6,420
Estimated probability of surviving at 1 month (unadjusted for patient and donor characteristics)	94.53%	96.71%
Expected probability of surviving at 1 month (adjusted for patient and donor characteristics)	97.18%	--
Number of observed deaths during the first month after transplant	7	211
Number of expected deaths during the first month after transplant	3.57	--
Estimated hazard ratio*	1.62	--
95% credible interval for the hazard ratio**	[0.74, 2.83]	--

* The hazard ratio provides an estimate of how Hospital of the University of Pennsylvania (PAUP)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected patient death rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk), and a ratio below 1 indicates lower than expected patient death rates (e.g., a hazard ratio of 0.75 would indicate 25% lower risk). If PAUP's patient death rate were precisely the expected rate, the estimated hazard ratio would be 1.0.

** The 95% credible interval, [0.74, 2.83], indicates the location of PAUP's true hazard ratio with 95% probability. The best estimate is 62% higher risk of patient death compared to an average program, but PAUP's performance could plausibly range from 26% reduced risk up to 183% increased risk.

Figure C13D. Adult (18+) 1-month patient death HR estimate (deceased donor grafts)

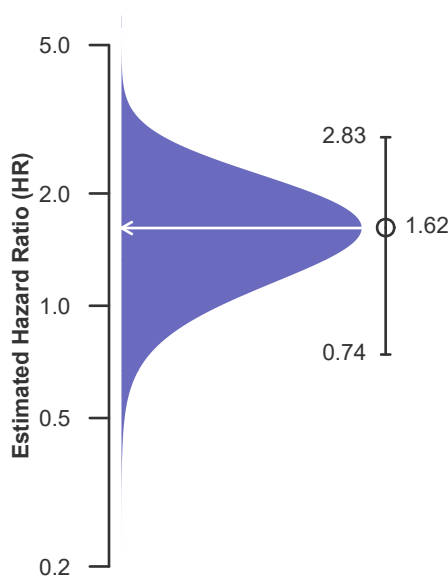
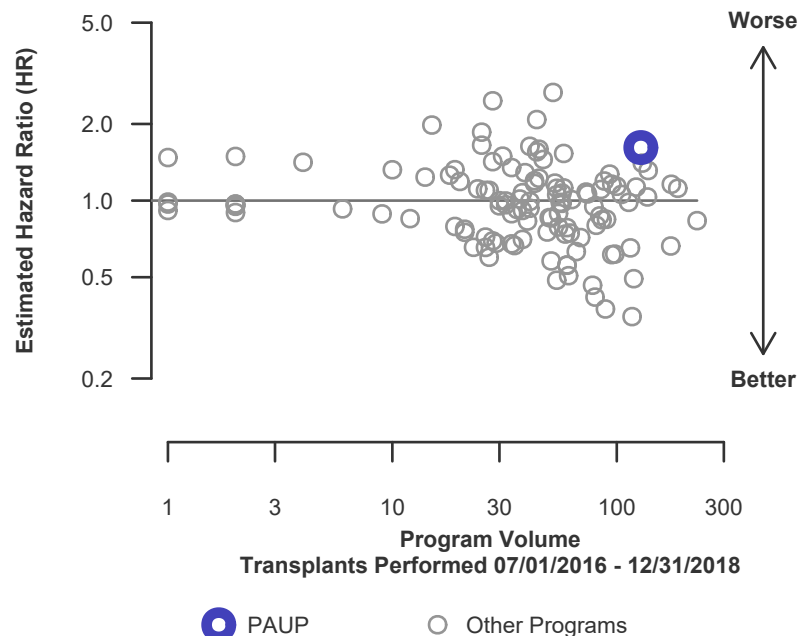


Figure C14D. Adult (18+) 1-month patient death HR program comparison (deceased donor grafts)





C. Transplant Information

Table C12D. Adult (18+) 1-year patient survival (deceased donor graft recipients)
Single organ transplants performed between 07/01/2016 and 12/31/2018
Retransplants excluded

	PAUP	U.S.
Number of transplants evaluated	128	6,420
Estimated probability of surviving at 1 year (unadjusted for patient and donor characteristics)	86.48%	91.60%
Expected probability of surviving at 1 year (adjusted for patient and donor characteristics)	92.61%	--
Number of observed deaths during the first year after transplant	17	515
Number of expected deaths during the first year after transplant	8.61	--
Estimated hazard ratio*	1.79	--
95% credible interval for the hazard ratio**	[1.08, 2.68]	--

* The hazard ratio provides an estimate of how Hospital of the University of Pennsylvania (PAUP)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected patient death rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk), and a ratio below 1 indicates lower than expected patient death rates (e.g., a hazard ratio of 0.75 would indicate 25% lower risk). If PAUP's patient death rate were precisely the expected rate, the estimated hazard ratio would be 1.0.

** The 95% credible interval, [1.08, 2.68], indicates the location of PAUP's true hazard ratio with 95% probability. The best estimate is 79% higher risk of patient death compared to an average program, but PAUP's performance could plausibly range from 8% increased risk up to 168% increased risk.

Figure C15D. Adult (18+) 1-year patient death HR estimate (deceased donor grafts)

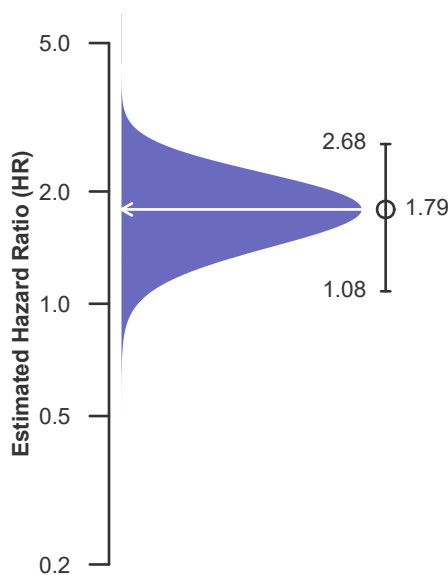
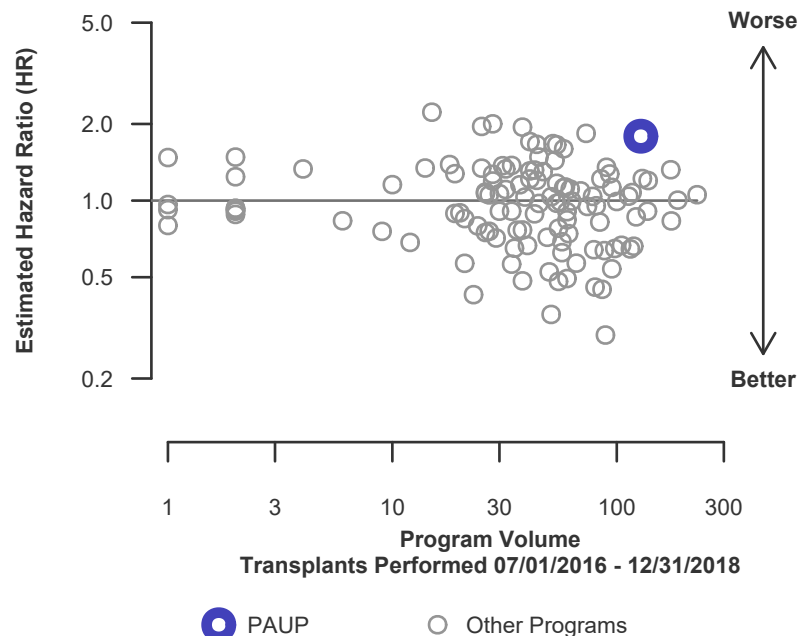


Figure C16D. Adult (18+) 1-year patient death HR program comparison (deceased donor grafts)





C. Transplant Information

Table C13D. Adult (18+) 3-year patient survival (deceased donor graft recipients)
Single organ transplants performed between 01/01/2014 and 06/30/2016
Retransplants excluded

	PAUP	U.S.
Number of transplants evaluated	138	5,427
Estimated probability of surviving at 3 years (unadjusted for patient and donor characteristics)	84.78%	85.19%
Expected probability of surviving at 3 years (adjusted for patient and donor characteristics)	85.95%	--
Number of observed deaths during the first 3 years after transplant	21	804
Number of expected deaths during the first 3 years after transplant	19.24	--
Estimated hazard ratio*	1.08	--
95% credible interval for the hazard ratio**	[0.69, 1.57]	--

* The hazard ratio provides an estimate of how Hospital of the University of Pennsylvania (PAUP)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected patient death rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk), and a ratio below 1 indicates lower than expected patient death rates (e.g., a hazard ratio of 0.75 would indicate 25% lower risk). If PAUP's patient death rate were precisely the expected rate, the estimated hazard ratio would be 1.0.

** The 95% credible interval, [0.69, 1.57], indicates the location of PAUP's true hazard ratio with 95% probability. The best estimate is 8% higher risk of patient death compared to an average program, but PAUP's performance could plausibly range from 31% reduced risk up to 57% increased risk.

Figure C17D. Adult (18+) 3-year patient death HR estimate (deceased donor grafts)

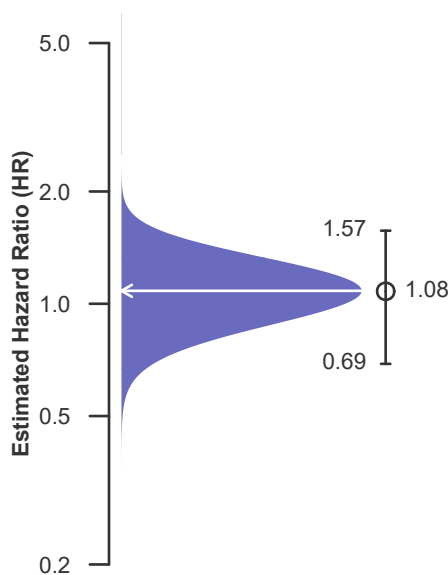
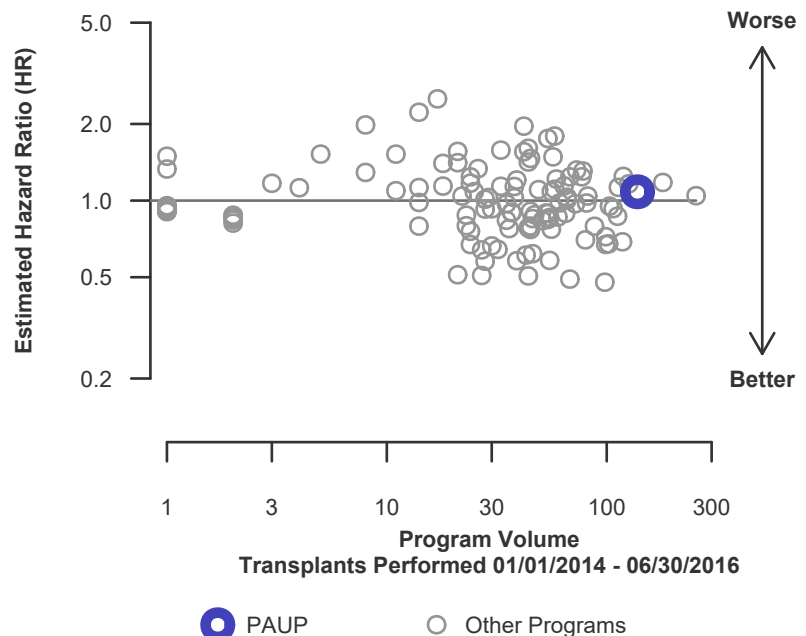


Figure C18D. Adult (18+) 3-year patient death HR program comparison (deceased donor grafts)





C. Transplant Information

**Table C14D. Pediatric (<18) 1-month patient survival (deceased donor graft recipients)
Single organ transplants performed between 07/01/2016 and 12/31/2018
Retransplants excluded**

This center did not perform any
transplants relevant to
this table during
07/01/2016-12/31/2018

**Figure C19D. Pediatric (<18)
1-month patient death HR
estimate (deceased donor grafts)**

This center did not perform any
transplants relevant to
this figure during
07/01/2016-12/31/2018

**Figure C20D. Pediatric (<18) 1-month patient death HR
program comparison (deceased donor grafts)**

This center did not perform any
transplants relevant to
this figure during
07/01/2016-12/31/2018



C. Transplant Information

Table C15D. Pediatric (<18) 1-year patient survival (deceased donor graft recipients)
Single organ transplants performed between 07/01/2016 and 12/31/2018
Retransplants excluded

This center did not perform any
transplants relevant to
this table during
07/01/2016-12/31/2018

**Figure C21D. Pediatric (<18)
1-year patient death HR estimate
(deceased donor grafts)**

This center did not perform any
transplants relevant to
this figure during
07/01/2016-12/31/2018

**Figure C22D. Pediatric (<18) 1-year patient death HR program
comparison (deceased donor grafts)**

This center did not perform any
transplants relevant to
this figure during
07/01/2016-12/31/2018



C. Transplant Information

Table C16D. Pediatric (<18) 3-year patient survival (deceased donor graft recipients)
Single organ transplants performed between 01/01/2014 and 06/30/2016
Retransplants excluded

This center did not perform any
transplants relevant to
this table during
01/01/2014-06/30/2016

**Figure C23D. Pediatric (<18)
3-year patient death HR estimate
(deceased donor grafts)**

This center did not perform any
transplants relevant to
this figure during
01/01/2014-06/30/2016

**Figure C24D. Pediatric (<18) 3-year patient death HR program
comparison (deceased donor grafts)**

This center did not perform any
transplants relevant to
this figure during
01/01/2014-06/30/2016



C. Transplant Information

Table C17. Multi-organ transplant graft survival: 07/01/2016 - 12/31/2018

Adult (18+) Transplants

Transplant Type	First-Year Outcomes					
	Transplants Performed		Heart Graft Failures		Estimated Heart Graft Survival	
	PAUP-TX1	USA	PAUP-TX1	USA	PAUP-TX1	USA
Heart-Lung	5	62	2	7	60.0%	88.1%
Kidney-Heart	1	463	0	44	100.0%	90.1%
Liver-Heart	5	75	1	7	80.0%	89.5%

Pediatric (<18) Transplants

No pediatric (<18) multi-organ transplants were performed

Table C18. Multi-organ transplant patient survival: 07/01/2016 - 12/31/2018

Adult (18+) Transplants

Transplant Type	First-Year Outcomes					
	Transplants Performed		Patient Deaths		Estimated Patient Survival	
	PAUP-TX1	USA	PAUP-TX1	USA	PAUP-TX1	USA
Heart-Lung	5	62	2	7	60.0%	88.1%
Kidney-Heart	1	463	0	43	100.0%	90.3%
Liver-Heart	5	75	1	7	80.0%	89.5%

Pediatric (<18) Transplants

No pediatric (<18) multi-organ transplants were performed