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## User Guide

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This report contains a wide range of useful information about the lung transplant program at Spectrum Health (MISH). 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 237.0 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 01/01/2013 and 06/30/2018. 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 12/31/2018 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](mailto:srtr@srtr.org).



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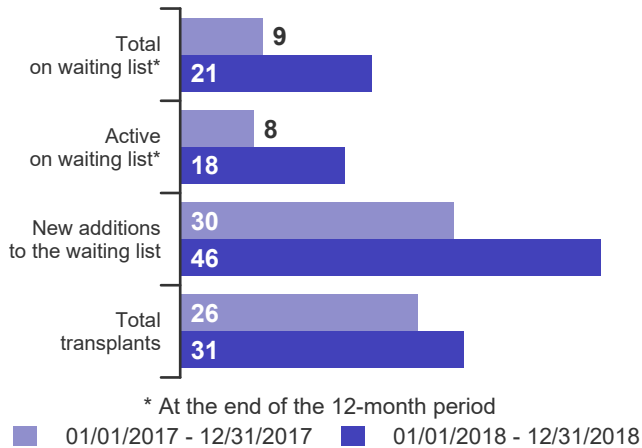
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## A. Program Summary

**Figure A1. Waiting list and transplant activity**

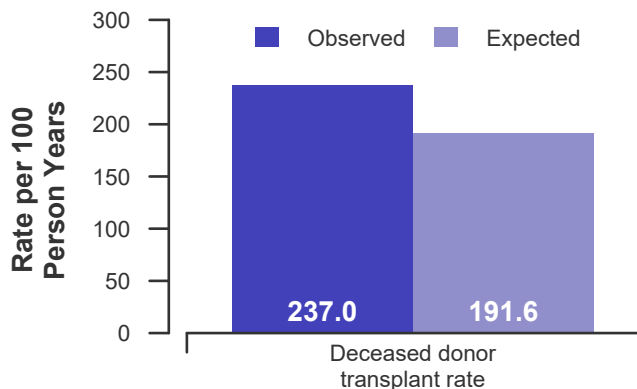


**Table A1. Census of transplant recipients**

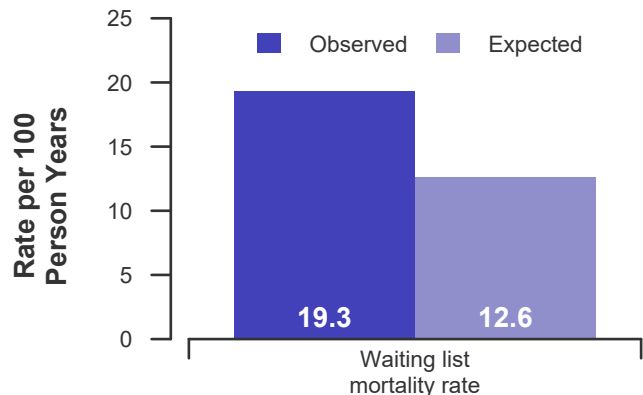
Recipients	01/01/2017-12/31/2017	01/01/2018-12/31/2018
Transplanted at this center	26	31
Followed by this center*	73	88
...transplanted at this program	70	83
...transplanted elsewhere	3	5

\* 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.

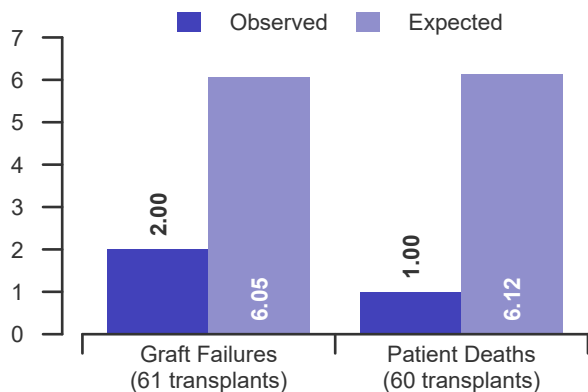
**Figure A2. Transplant rates  
01/01/2017 - 12/31/2018**



**Figure A3. Waiting list mortality rates  
01/01/2017 - 12/31/2018**



**Figure A4. First-year adult graft and patient survival: 01/01/2016 - 06/30/2018**



**Figure A5. First-year pediatric graft and patient survival: 01/01/2016 - 06/30/2018**

This center did not perform any transplants relevant to this figure during 01/01/2016-06/30/2018



## B. Waiting List Information

**Table B1. Waiting list activity summary: 01/01/2017 - 12/31/2018**

Waiting List Registrations	Counts for this center		Activity for 01/01/2018 to 12/31/2018 as percent of registrants on waiting list on 01/01/2018		
	01/01/2017-12/31/2017	01/01/2018-12/31/2018	This Center (%)	OPTN Region (%)	U.S. (%)
<b>On waiting list at start</b>	11	9	100.0	100.0	100.0
<b>Additions</b>					
New listings at this center	30	46	511.1	200.0	230.8
<b>Removals</b>					
Transferred to another center	0	0	0.0	2.1	1.5
Received living donor transplant*	0	0	0.0	0.0	0.0
Received deceased donor transplant*	26	31	344.4	157.7	182.1
Died	1	1	11.1	11.3	15.3
Transplanted at another center	0	0	0.0	1.5	2.5
Deteriorated	2	0	0.0	9.3	11.4
Recovered	1	1	11.1	1.5	3.4
Other reasons	2	1	11.1	8.8	10.2
<b>On waiting list at end of period</b>	9	21	233.3	107.7	104.2

\* 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 01/01/2018 and 12/31/2018

Demographic Characteristic	New Waiting List Registrations 01/01/2018 to 12/31/2018 (%)			All Waiting List Registrations on 12/31/2018 (%)		
	This Center (N=46)	OPTN Region (N=388)	U.S. (N=3,206)	This Center (N=21)	OPTN Region (N=209)	U.S. (N=1,448)
<b>All (%)</b>	100.0	100.0	100.0	100.0	100.0	100.0
<b>Ethnicity/Race (%)*</b>						
White	89.1	85.6	76.4	90.5	87.6	73.3
African-American	6.5	10.3	10.0	9.5	11.0	11.5
Hispanic/Latino	0.0	1.5	10.0	0.0	0.5	11.1
Asian	2.2	2.1	2.9	0.0	1.0	3.5
Other	2.2	0.5	0.8	0.0	0.0	0.6
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
<b>Age (%)</b>						
<2 years	0.0	0.0	0.1	0.0	0.5	0.2
2-11 years	0.0	0.5	0.7	0.0	0.5	1.3
12-17 years	0.0	1.5	1.1	0.0	2.4	1.2
18-34 years	2.2	4.9	8.5	0.0	4.3	8.1
35-49 years	13.0	10.8	12.4	9.5	14.4	15.0
50-64 years	30.4	46.6	44.4	38.1	50.7	48.4
65+ years	54.3	35.6	32.8	52.4	27.3	25.8
Other (includes prenatal)	0.0	0.0	0.0	0.0	0.0	0.0
<b>Gender (%)</b>						
Male	71.7	59.5	57.1	52.4	41.6	41.8
Female	28.3	40.5	42.9	47.6	58.4	58.2

\* 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 01/01/2018 and 12/31/2018

Medical Characteristic	New Waiting List Registrations 01/01/2018 to 12/31/2018 (%)			All Waiting List Registrations on 12/31/2018 (%)		
	This Center (N=46)	OPTN Region (N=388)	U.S. (N=3,206)	This Center (N=21)	OPTN Region (N=209)	U.S. (N=1,448)
<b>All (%)</b>	100.0	100.0	100.0	100.0	100.0	100.0
<b>Blood Type (%)</b>						
O	43.5	45.9	47.5	42.9	46.4	51.9
A	37.0	40.2	37.5	38.1	40.7	35.1
B	13.0	9.8	11.1	19.0	10.0	10.9
AB	6.5	4.1	3.9	0.0	2.9	2.1
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
<b>Previous Transplant (%)</b>						
Yes	0.0	2.6	3.3	0.0	1.4	2.4
No	100.0	97.4	96.7	100.0	98.6	97.6
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
<b>Primary Disease (%)</b>						
Idiopathic Pulmonary Arterial Hypertension	4.3	8.8	6.6	0.0	7.2	8.8
Cystic Fibrosis	6.5	6.2	9.3	0.0	7.2	8.4
Idiopathic Pulmonary Fibrosis	58.7	54.1	58.0	33.3	31.1	41.2
Emphysema/COPD	28.3	28.6	23.2	61.9	49.8	37.6
Other	2.2	2.3	3.0	4.8	4.8	4.1
Missing	0.0	0.0	0.0	0.0	0.0	0.0





## B. Waiting List Information

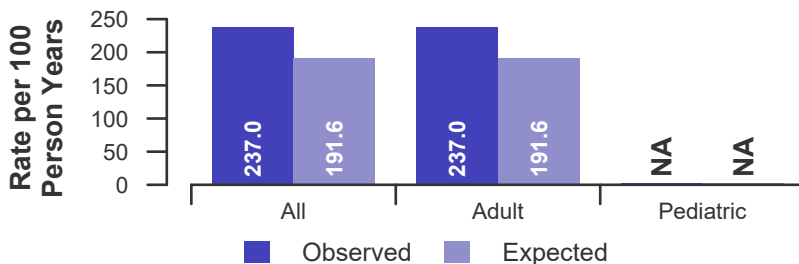
**Table B4D. Deceased donor transplant rates: 01/01/2017 - 12/31/2018**

Waiting List Registrations	This Center	OPO/DSA	Region	U.S.
<b>All Candidates</b>				
Count on waiting list at start*	11	87	226	1,420
Person Years**	24.0	187.3	385.5	2,851.0
Removals for Transplant	57	162	633	5,015
<b>Adult (18+) Candidates</b>				
Count on waiting list at start*	11	87	223	1,384
Person Years**	24.0	187.3	375.9	2,781.6
Removals for transplant	57	162	629	4,928
<b>Pediatric (&lt;18) Candidates</b>				
Count on waiting list at start*	--	--	--	--
Person Years**	--	--	--	--
Removals for transplant	--	--	--	--

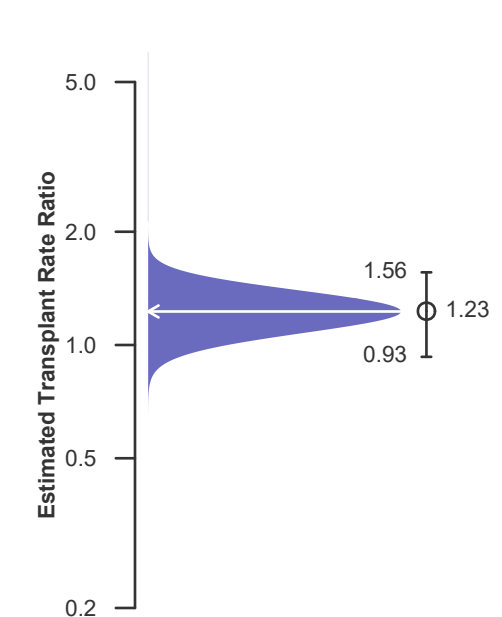
\* Counts in this table may be lower than similar counts in other waiting list tables, such as Table B1. A small percentage (~1%) of patients are found to have died or been transplanted before being removed from the waiting list, so these patients are excluded if the event occurs prior to the start of 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 January 1 or from the date of first wait listing until death, transplant, removal from the waiting list or December 31.

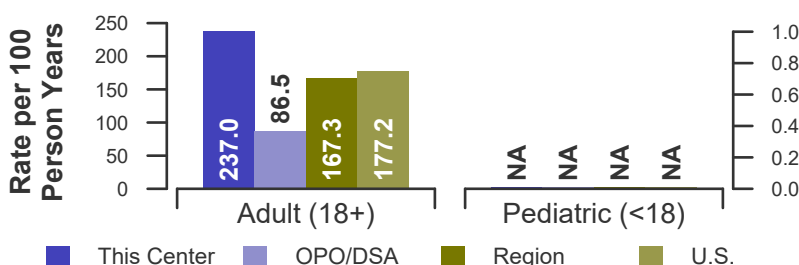
**Figure B1D. Observed and expected deceased donor transplant rates: 01/01/2017 - 12/31/2018**



**Figure B2D. Deceased donor transplant rate ratio estimate**



**Figure B3D. Observed adult (18+) and pediatric (<18) deceased donor transplant rates: 01/01/2017 - 12/31/2018**





## B. Waiting List Information

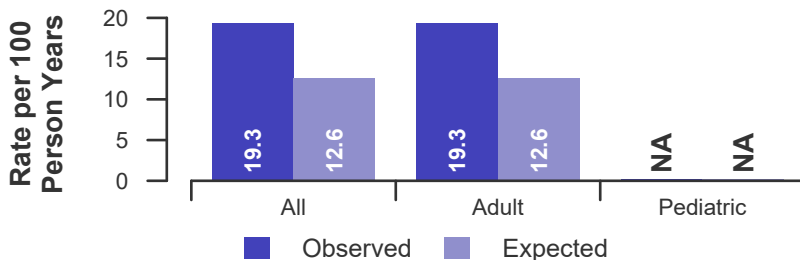
**Table B5. Waiting list mortality rates: 01/01/2017 - 12/31/2018**

Waiting List Registrations	This Center	OPO/DSA	Region	U.S.
<b>All Candidates</b>				
Count on waiting list at start*	11	87	226	1,420
Person Years**	25.9	203.4	425.4	3,236.5
Number of deaths	5	44	85	575
<b>Adult (18+) Candidates</b>				
Count on waiting list at start*	11	87	223	1,384
Person Years**	25.9	203.4	415.7	3,160.9
Number of deaths	5	44	84	558
<b>Pediatric (&lt;18) Candidates</b>				
Count on waiting list at start*	--	--	--	--
Person Years**	--	--	--	--
Number of deaths	--	--	--	--

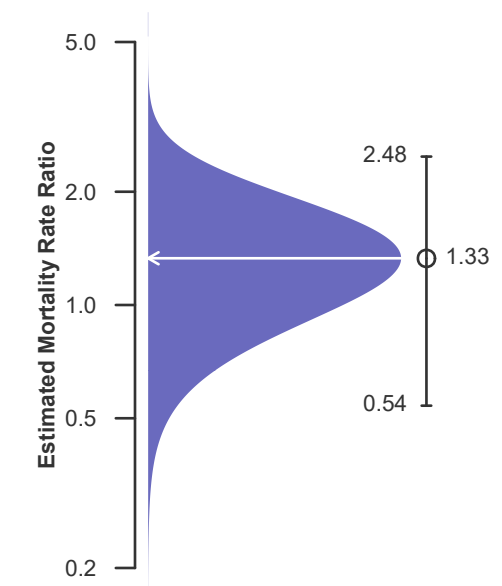
\* Counts in this table may be lower than similar counts in other waiting list tables, such as Table B1. A small percentage (~1%) of patients are found to have died or been transplanted before being removed from the waiting list, so these patients are excluded if the event occurs prior to the start of 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 January 1 or from the date of first wait listing until death, transplant, 60 days after recovery, transfer or December 31.

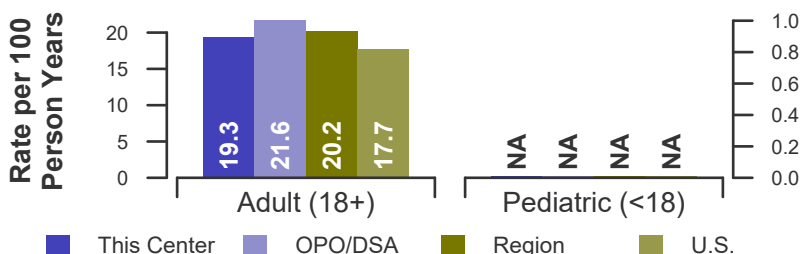
**Figure B4. Observed and expected waiting list mortality rates: 01/01/2017 - 12/31/2018**



**Figure B5. Waiting list mortality rate ratio estimate**



**Figure B6. Observed adult (18+) and pediatric (<18) waiting list mortality rates: 01/01/2017 - 12/31/2018**





## B. Waiting List Information

**Table B6. Waiting list candidate status after listing**  
Candidates registered on waiting list between 07/01/2016 and 06/30/2017

Waiting list status (survival status)	This Center (N=24)			U.S. (N=2,895)		
	Months Since Listing			Months Since Listing		
	6	12	18	6	12	18
<b>Alive on waiting list (%)</b>	29.2	4.2	4.2	24.7	12.6	7.9
<b>Died on the waiting list without transplant (%)</b>	0.0	0.0	0.0	4.3	5.2	5.6
<b>Removed without transplant (%):</b>						
Condition worsened (status unknown)	8.3	8.3	8.3	3.5	4.2	4.5
Condition improved (status unknown)	0.0	0.0	0.0	0.3	0.5	0.7
Refused transplant (status unknown)	0.0	0.0	0.0	0.1	0.2	0.3
Other	0.0	0.0	0.0	1.0	1.9	2.5
<b>Transplant (living or deceased donor) (%):</b>						
Functioning (alive)	58.3	83.3	66.7	61.4	65.2	43.9
Failed-Retransplanted (alive)	0.0	0.0	0.0	0.1	0.2	0.3
Failed-alive not retransplanted	0.0	0.0	0.0	0.0	0.0	0.0
Died	4.2	4.2	4.2	3.9	6.9	10.3
Status Yet Unknown*	0.0	0.0	16.7	0.5	2.8	23.8
<b>Lost or Transferred (status unknown) (%)</b>	0.0	0.0	0.0	0.2	0.2	0.3
<b>TOTAL (%)</b>	100.0	100.0	100.0	100.0	100.0	100.0
Total % known died on waiting list or after transplant	4.2	4.2	4.2	8.2	12.1	15.9
Total % known died or removed as unstable	12.5	12.5	12.5	11.7	16.4	20.4
Total % removed for transplant	62.5	87.5	87.5	65.9	75.1	78.2
Total % with known functioning transplant (alive)	58.3	83.3	66.7	61.4	65.2	43.9

\* 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 01/01/2013 and 12/31/2015

Characteristic	N	Percent transplanted at time periods since listing				N	United States			
		This Center					30 day	1 year	2 years	3 years
		30 day	1 year	2 years	3 years					
<b>All</b>	75	30.7	72.0	76.0	78.7	7,758	25.8	67.1	73.0	75.2
<b>Ethnicity/Race*</b>										
White	72	30.6	70.8	75.0	77.8	6,228	26.2	68.1	74.2	76.4
African-American	2	50.0	100.0	100.0	100.0	714	23.0	63.3	68.9	71.1
Hispanic/Latino	0	--	--	--	--	585	26.5	66.0	70.8	72.6
Asian	0	--	--	--	--	186	19.9	53.8	57.5	58.1
Other	1	0.0	100.0	100.0	100.0	45	35.6	60.0	75.6	77.8
Unknown	0	--	--	--	--	0	--	--	--	--
<b>Age</b>										
<2 years	0	--	--	--	--	28	25.0	60.7	60.7	60.7
2-11 years	0	--	--	--	--	79	6.3	51.9	55.7	58.2
12-17 years	0	--	--	--	--	142	22.5	53.5	58.5	58.5
18-34 years	5	20.0	80.0	100.0	100.0	838	22.8	60.0	67.4	70.0
35-49 years	7	28.6	57.1	57.1	57.1	1,020	22.1	58.8	65.2	68.1
50-64 years	37	29.7	64.9	70.3	75.7	3,612	25.2	68.2	74.8	77.3
65+ years	26	34.6	84.6	84.6	84.6	2,039	31.1	73.9	78.0	79.3
Other (includes prenatal)	0	--	--	--	--	0	--	--	--	--
<b>Gender</b>										
Male	39	41.0	84.6	87.2	87.2	4,337	31.6	75.3	79.5	80.7
Female	36	19.4	58.3	63.9	69.4	3,421	18.6	56.8	64.8	68.2

\* 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 01/01/2013 and 12/31/2015

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
<b>All</b>	75	30.7	72.0	76.0	78.7	7,758	25.8	67.1	73.0	75.2
<b>Blood Type</b>										
O	38	31.6	73.7	76.3	81.6	3,557	26.1	66.4	72.7	75.0
A	33	24.2	66.7	72.7	72.7	3,003	25.8	67.7	73.7	76.0
B	2	50.0	100.0	100.0	100.0	895	24.2	66.9	71.8	73.4
AB	2	100.0	100.0	100.0	100.0	303	27.4	70.6	74.3	75.2
<b>Previous Transplant</b>										
Yes	4	50.0	50.0	50.0	50.0	359	29.5	66.0	67.7	68.8
No	71	29.6	73.2	77.5	80.3	7,399	25.7	67.2	73.3	75.5
<b>Primary Disease</b>										
Congenital Disease	0	--	--	--	--	0	--	--	--	--
Retransplant/Graft Failure	0	--	--	--	--	0	--	--	--	--
Idiopathic Pulmonary Arterial Hypertension	2	0.0	0.0	0.0	0.0	348	12.1	46.0	50.3	52.3
Cystic Fibrosis	7	0.0	71.4	85.7	85.7	935	23.1	64.2	71.9	74.0
Idiopathic Pulmonary Fibrosis	39	48.7	79.5	79.5	79.5	4,409	31.4	71.9	75.8	77.0
Alpha-1-Antitrypsin Deficiency	0	--	--	--	--	0	--	--	--	--
Emphysema/COPD	27	14.8	66.7	74.1	81.5	1,866	17.0	61.6	71.4	76.0
Other	0	--	--	--	--	200	22.5	65.0	71.5	75.0
Missing	0	--	--	--	--	0	--	--	--	--



## B. Waiting List Information

**Table B9. Time to transplant for waiting list candidates\***

Candidates registered on the waiting list between 01/01/2013 and 06/30/2018

Percentile	Center	Months to Transplant**		U.S.
		OPO/DSA	Region	
5th	0.2	0.2	0.2	0.2
10th	0.2	0.4	0.3	0.3
25th	0.8	1.3	0.8	0.8
50th (median time to transplant)	2.2	6.4	2.9	3.1
75th	10.1	Not Observed	16.1	16.3

\* 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 12/31/2018. 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: 01/01/2018 - 12/31/2018**

Offers Acceptance Characteristics	This Center	OPO/DSA	Region	U.S.
<b>Overall</b>				
Number of Offers	713	3,453	6,971	48,032
Number of Acceptances	31	85	304	2,502
Expected Acceptances	38.2	150.6	300.6	2,500.4
Offer Acceptance Ratio*	0.82	0.57	1.01	1.00
95% Credible Interval**	[0.57, 1.12]	--	--	--
<b>PHS increased infectious risk</b>				
Number of Offers	181	1,047	2,111	14,353
Number of Acceptances	9	28	95	688
Expected Acceptances	9.4	43.5	91.0	687.9
Offer Acceptance Ratio*	0.96	0.66	1.04	1.00
95% Credible Interval**	[0.48, 1.61]	--	--	--
<b>Donor was current smoker</b>				
Number of Offers	82	275	641	5,081
Number of Acceptances	3	8	30	174
Expected Acceptances	2.2	8.5	21.0	174.4
Offer Acceptance Ratio*	1.18	0.95	1.39	1.00
95% Credible Interval**	[0.38, 2.42]	--	--	--
<b>Donor age &gt;= 55</b>				
Number of Offers	113	578	1,186	7,489
Number of Acceptances	1	7	41	287
Expected Acceptances	3.5	14.7	33.6	283.6
Offer Acceptance Ratio*	0.54	0.54	1.21	1.01
95% Credible Interval**	[0.11, 1.31]	--	--	--
<b>Hard-to-Place Lungs (Over 50 Offers)</b>				
Number of Offers	242	1,412	2,782	14,801
Number of Acceptances	1	4	49	264
Expected Acceptances	5.0	27.2	52.8	266.2
Offer Acceptance Ratio*	0.43	0.21	0.93	0.99
95% Credible Interval**	[0.09, 1.04]	--	--	--
<b>Donor more than 500 miles away</b>				
Number of Offers	128	503	1,020	8,419
Number of Acceptances	3	5	36	295
Expected Acceptances	4.0	13.1	27.5	278.2
Offer Acceptance Ratio*	0.84	0.46	1.29	1.06
95% Credible Interval**	[0.27, 1.72]	--	--	--

\* The offer acceptance ratio estimates the relative offer acceptance practice of Spectrum Health (MISH) 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, 1.12], indicates the location of MISH's true offer acceptance ratio with 95% probability. The best estimate is 18% less likely to accept an offer compared to national acceptance behavior, but MISH's performance could plausibly range from 43% reduced acceptance up to 12% higher acceptance.



## B. Waiting List Information

Figure B7. Offer acceptance: Overall

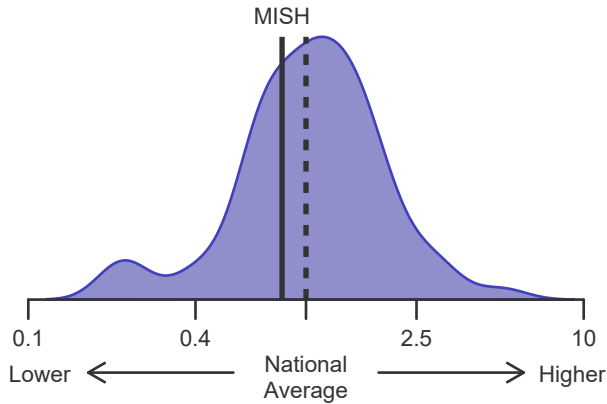


Figure B8. Offer acceptance: PHS increased infectious risk

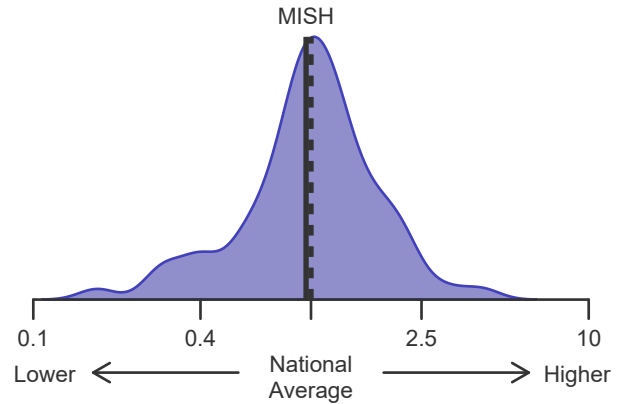


Figure B9. Offer acceptance: Donor was current smoker

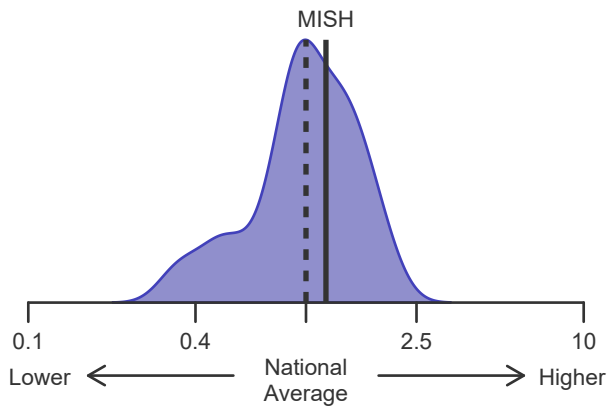


Figure B10. Offer acceptance: Donor age >= 55

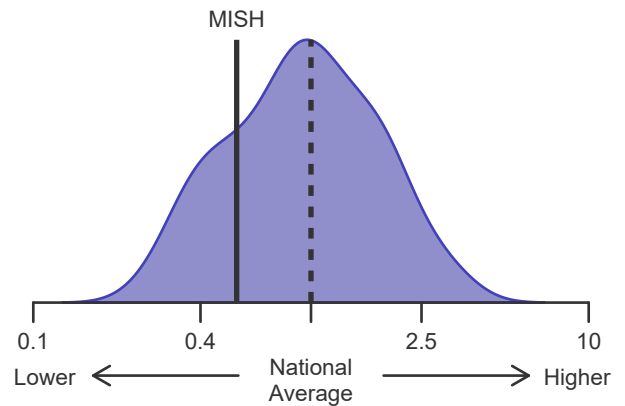


Figure B11. Offer acceptance: Offer number > 50

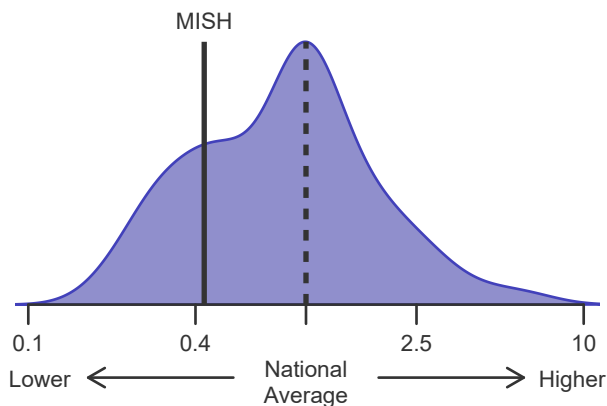
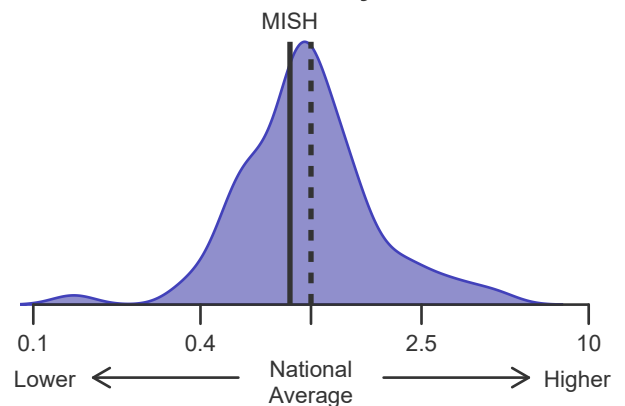


Figure B12. Offer acceptance: Donor more than 500 miles away







## C. Transplant Information

**Table C1D. Deceased donor transplant recipient demographic characteristics**  
Patients transplanted between 01/01/2018 and 12/31/2018

Characteristic	Percentage in each category		
	Center (N=31)	Region (N=306)	U.S. (N=2,530)
<b>Ethnicity/Race (%)*</b>			
White	90.3	87.9	79.0
African-American	3.2	8.5	9.2
Hispanic/Latino	0.0	1.3	8.8
Asian	3.2	1.6	2.1
Other	3.2	0.7	0.9
Unknown	0.0	0.0	0.0
<b>Age (%)</b>			
<2 years	0.0	0.0	0.1
2-11 years	0.0	0.3	0.4
12-17	0.0	0.3	0.9
18-34	3.2	5.9	8.9
35-49 years	12.9	9.5	11.9
50-64 years	25.8	46.1	42.8
65+ years	58.1	37.9	34.9
Unknown	0.0	0.0	0.0
<b>Gender (%)</b>			
Male	71.0	63.7	59.8
Female	29.0	36.3	40.2

\* 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 01/01/2018 and 12/31/2018

Characteristic	Percentage in each category		
	Center (N=31)	Region (N=306)	U.S. (N=2,530)
<b>Blood Type (%)</b>			
O	48.4	47.4	46.9
A	29.0	40.2	37.5
B	9.7	8.8	11.1
AB	12.9	3.6	4.4
<b>Previous Transplant (%)</b>			
Yes	0.0	2.9	2.7
No	100.0	97.1	97.3
<b>Body Mass Index (%)</b>			
0-20	16.1	16.0	18.9
21-25	41.9	31.0	32.8
26-30	38.7	39.5	36.4
31+	3.2	13.4	11.3
Unknown	0.0	0.0	0.6
<b>Primary Disease (%)</b>			
Idiopathic Pulmonary Arterial Hypertension	6.5	4.6	5.7
Cystic Fibrosis	9.7	6.5	11.2
Idiopathic Pulmonary Fibrosis	64.5	59.5	56.2
Emphysema/COPD	19.4	27.5	24.2
Other	0.0	2.0	2.6
Missing	0.0	0.0	0.0
<b>Recipient Medical Condition at Transplant (%)</b>			
Not Hospitalized	67.7	73.9	74.5
Hospitalized	19.4	9.8	11.4
ICU	12.9	16.3	13.5
Unknown	0.0	0.0	0.6



## C. Transplant Information

**Table C3D. Deceased donor characteristics**  
Transplants performed between 01/01/2018 and 12/31/2018

Donor Characteristic	Percentage in each category		
	Center (N=31)	Region (N=306)	U.S. (N=2,530)
<b>Cause of Death (%)</b>			
Deceased: Stroke	19.4	23.2	27.2
Deceased: MVA	12.9	13.1	15.2
Deceased: Other	67.7	63.7	57.7
<b>Ethnicity/Race (%)*</b>			
White	74.2	74.2	61.7
African-American	16.1	18.3	18.2
Hispanic/Latino	9.7	5.2	15.8
Asian	0.0	2.3	3.4
Other	0.0	0.0	0.9
Not Reported	0.0	0.0	0.0
<b>Age (%)</b>			
<2 years	0.0	0.0	0.1
2-11 years	0.0	0.7	1.0
12-17	16.1	7.5	7.4
18-34	41.9	44.4	45.7
35-49 years	25.8	28.1	27.0
50-64 years	16.1	18.0	17.3
65+ years	0.0	1.3	1.5
Unknown	0.0	0.0	0.0
<b>Gender (%)</b>			
Male	51.6	58.2	61.5
Female	48.4	41.8	38.5
<b>Blood Type (%)</b>			
O	48.4	48.7	50.8
A	29.0	39.5	35.6
B	16.1	10.1	11.3
AB	6.5	1.6	2.3
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 01/01/2018 and 12/31/2018

Transplant Characteristic	Percentage in each category		
	Center (N=31)	Region (N=306)	U.S. (N=2,530)
<b>Total Ischemic Time (Minutes): Local (%)</b>			
Deceased: 0-90 min	0.0	0.0	1.1
Deceased: 91-180 min	0.0	7.2	11.1
Deceased: 181-270 min	25.0	27.5	33.3
Deceased: 271-360 min	12.5	27.5	34.0
Deceased: 361+ min	62.5	37.7	19.7
Not Reported	0.0	0.0	0.8
<b>Total Ischemic Time (Minutes): Shared (%)</b>			
Deceased: 0-90 min	0.0	0.0	0.9
Deceased: 91-180 min	0.0	0.0	1.0
Deceased: 181-270 min	17.4	14.8	18.8
Deceased: 271-360 min	13.0	35.0	41.5
Deceased: 361+ min	69.6	50.2	36.6
Not Reported	0.0	0.0	1.3
<b>Procedure Type (%)</b>			
Lung alone	100.0	99.3	99.1
Lung and another organ	0.0	0.7	0.9
<b>Sharing (%)</b>			
Local	25.8	22.5	31.3
Shared	74.2	77.5	68.7
<b>Median Time in Hospital After Transplant*</b>	18.0 Days	23.0 Days	19.0 Days

\* Multiple organ transplants are excluded from this statistic.



## C. Transplant Information

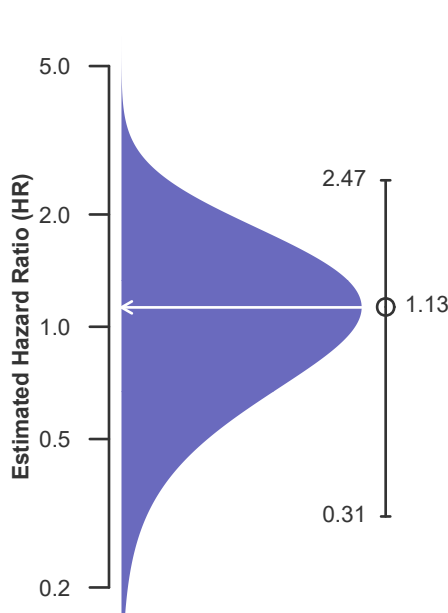
**Table C5D. Adult (18+) 1-month survival with a functioning deceased donor graft**  
**Single organ transplants performed between 01/01/2016 and 06/30/2018**  
**Deaths and retransplants are considered graft failures**

	MISH	U.S.
Number of transplants evaluated	61	5,868
Estimated probability of surviving with a functioning graft at 1 month (unadjusted for patient and donor characteristics)	96.72%	97.32%
Expected probability of surviving with a functioning graft at 1 month (adjusted for patient and donor characteristics)	97.42%	--
Number of observed graft failures (including deaths) during the first month after transplant	2	157
Number of expected graft failures (including deaths) during the first month after transplant	1.55	--
Estimated hazard ratio*	1.13	--
95% credible interval for the hazard ratio**	[0.31, 2.47]	--

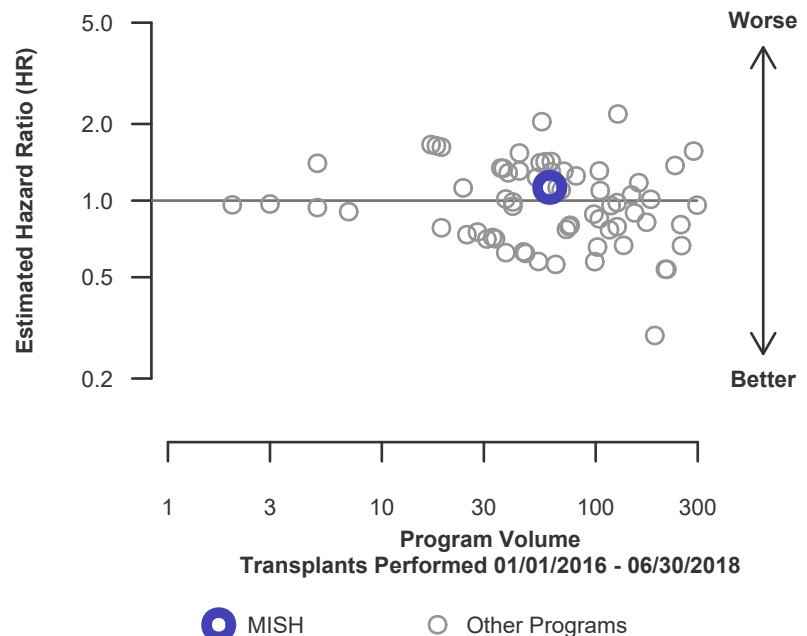
\* The hazard ratio provides an estimate of how Spectrum Health (MISH)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected graft failure rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk),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

\*\* The 95% credible interval, [0.31, 2.47], indicates the location of MISH's true hazard ratio with 95% probability. The best estimate is 13% higher risk of graft failure compared to an average program, but MISH's performance could plausibly range from 69% reduced risk up to 147% 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

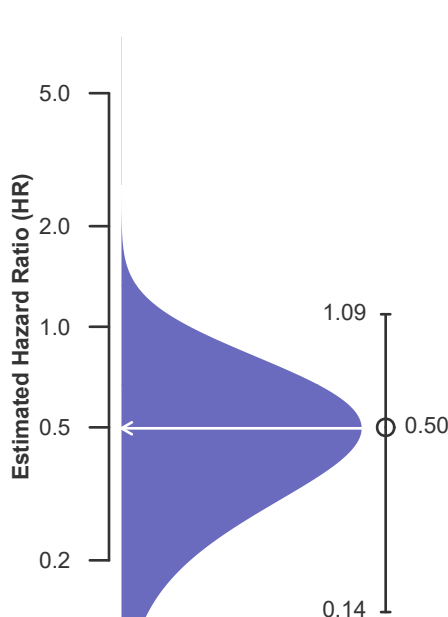
**Table C6D. Adult (18+) 1-year survival with a functioning deceased donor graft**  
**Single organ transplants performed between 01/01/2016 and 06/30/2018**  
**Deaths and retransplants are considered graft failures**

	MISH	U.S.
Number of transplants evaluated	61	5,868
Estimated probability of surviving with a functioning graft at 1 year (unadjusted for patient and donor characteristics)	96.72%	88.98%
Expected probability of surviving with a functioning graft at 1 year (adjusted for patient and donor characteristics)	89.28%	--
Number of observed graft failures (including deaths) during the first year after transplant	2	591
Number of expected graft failures (including deaths) during the first year after transplant	6.05	--
Estimated hazard ratio*	0.50	--
95% credible interval for the hazard ratio**	[0.14, 1.09]	--

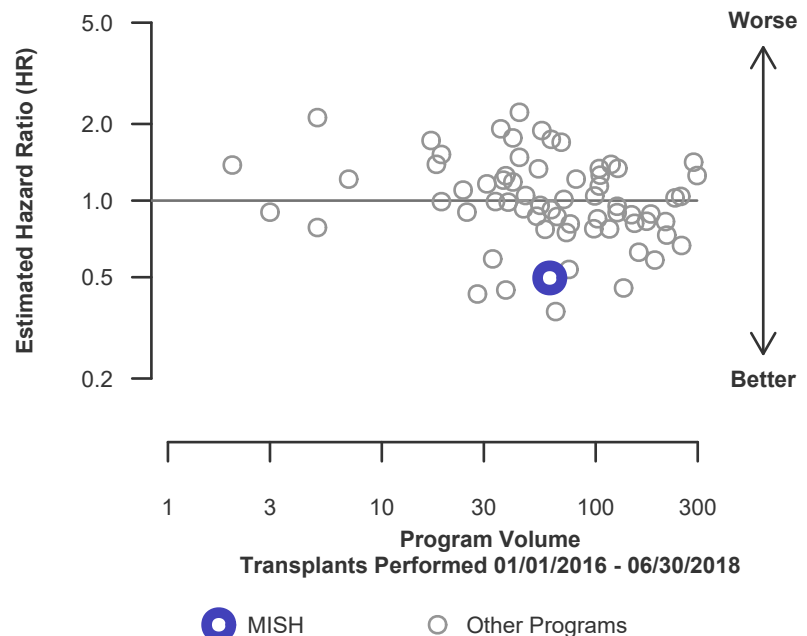
\* The hazard ratio provides an estimate of how Spectrum Health (MISH)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected graft failure rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk),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

\*\* The 95% credible interval, [0.14, 1.09], indicates the location of MISH's true hazard ratio with 95% probability. The best estimate is 50% lower risk of graft failure compared to an average program, but MISH's performance could plausibly range from 86% reduced risk up to 9% 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

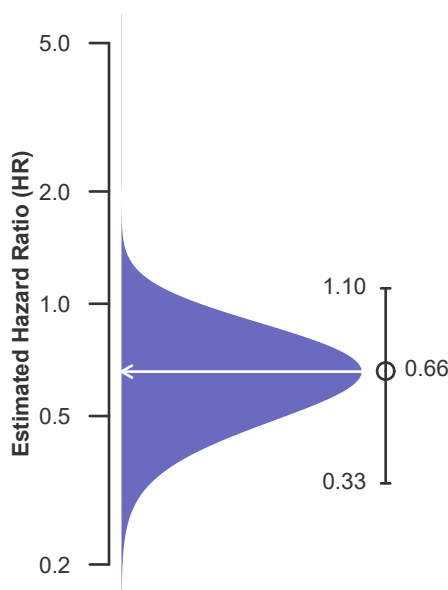
**Table C7D. Adult (18+) 3-year survival with a functioning deceased donor graft**  
**Single organ transplants performed between 07/01/2013 and 12/31/2015**  
**Deaths and retransplants are considered graft failures**

	MISH	U.S.
Number of transplants evaluated	45	4,792
Estimated probability of surviving with a functioning graft at 3 years (unadjusted for patient and donor characteristics)	80.00%	71.22%
Expected probability of surviving with a functioning graft at 3 years (adjusted for patient and donor characteristics)	68.88%	--
Number of observed graft failures (including deaths) during the first 3 years after transplant	9	1,362
Number of expected graft failures (including deaths) during the first 3 years after transplant	14.72	--
Estimated hazard ratio*	0.66	--
95% credible interval for the hazard ratio**	[0.33, 1.10]	--

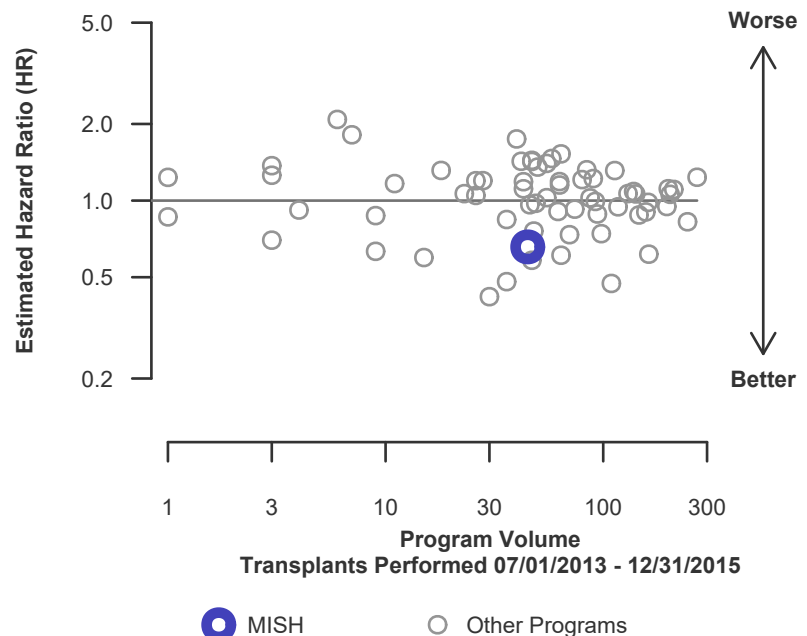
\* The hazard ratio provides an estimate of how Spectrum Health (MISH)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected graft failure rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk),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

\*\* The 95% credible interval, [0.33, 1.10], indicates the location of MISH's true hazard ratio with 95% probability. The best estimate is 34% lower risk of graft failure compared to an average program, but MISH's performance could plausibly range from 67% reduced risk up to 10% 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 01/01/2016 and 06/30/2018**  
**Deaths and retransplants are considered graft failures**

This center did not perform any  
transplants relevant to  
this table during  
01/01/2016-06/30/2018

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

This center did not perform any  
transplants relevant to  
this figure during  
01/01/2016-06/30/2018

**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  
01/01/2016-06/30/2018





## C. Transplant Information

**Table C9D. Pediatric (<18) 1-year survival with a functioning deceased donor graft**  
**Single organ transplants performed between 01/01/2016 and 06/30/2018**  
**Deaths and retransplants are considered graft failures**

This center did not perform any  
transplants relevant to  
this table during  
01/01/2016-06/30/2018

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

This center did not perform any  
transplants relevant to  
this figure during  
01/01/2016-06/30/2018

**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  
01/01/2016-06/30/2018



## C. Transplant Information

**Table C10D. Pediatric (<18) 3-year survival with a functioning deceased donor graft**  
**Single organ transplants performed between 07/01/2013 and 12/31/2015**  
**Deaths and retransplants are considered graft failures**

This center did not perform any  
transplants relevant to  
this table during  
07/01/2013-12/31/2015

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

This center did not perform any  
transplants relevant to  
this figure during  
07/01/2013-12/31/2015

**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  
07/01/2013-12/31/2015



## C. Transplant Information

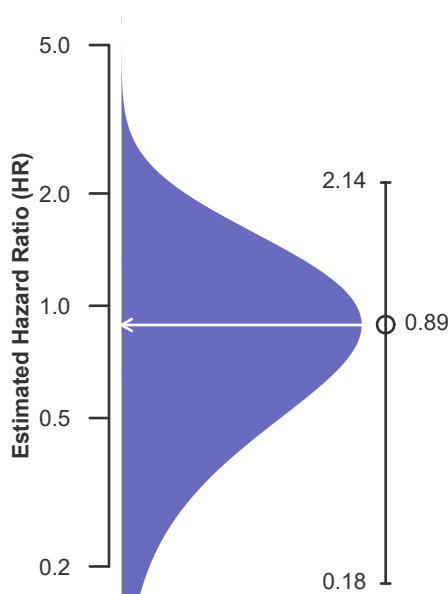
**Table C11D. Adult (18+) 1-month patient survival (deceased donor graft recipients)  
Single organ transplants performed between 01/01/2016 and 06/30/2018  
Retransplants excluded**

	MISH	U.S.
Number of transplants evaluated	60	5,682
Estimated probability of surviving at 1 month (unadjusted for patient and donor characteristics)	98.33%	97.78%
Expected probability of surviving at 1 month (adjusted for patient and donor characteristics)	97.71%	--
Number of observed deaths during the first month after transplant	1	126
Number of expected deaths during the first month after transplant	1.38	--
Estimated hazard ratio*	0.89	--
95% credible interval for the hazard ratio**	[0.18, 2.14]	--

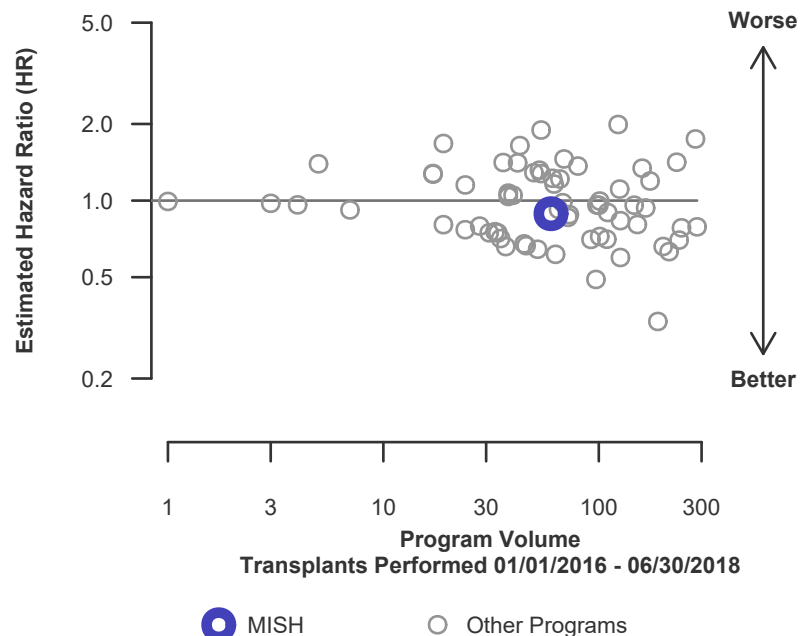
\* The hazard ratio provides an estimate of how Spectrum Health (MISH)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected patient death rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk),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

\*\* The 95% credible interval, [0.18, 2.14], indicates the location of MISH's true hazard ratio with 95% probability. The best estimate is 11% lower risk of patient death compared to an average program, but MISH's performance could plausibly range from 82% reduced risk up to 114% 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

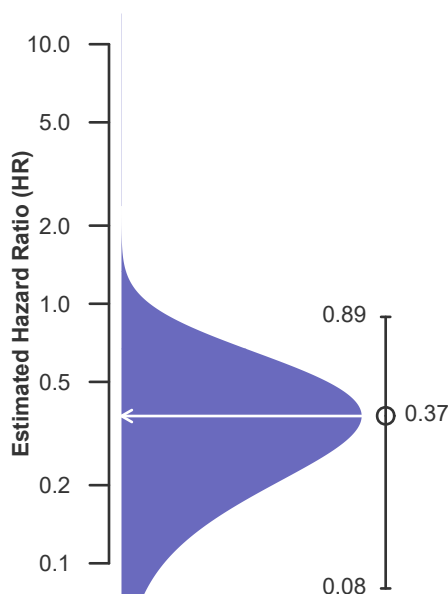
**Table C12D. Adult (18+) 1-year patient survival (deceased donor graft recipients)**  
**Single organ transplants performed between 01/01/2016 and 06/30/2018**  
**Retransplants excluded**

	MISH	U.S.
Number of transplants evaluated	60	5,682
Estimated probability of surviving at 1 year (unadjusted for patient and donor characteristics)	98.33%	89.55%
Expected probability of surviving at 1 year (adjusted for patient and donor characteristics)	89.17%	--
Number of observed deaths during the first year after transplant	1	543
Number of expected deaths during the first year after transplant	6.12	--
Estimated hazard ratio*	0.37	--
95% credible interval for the hazard ratio**	[0.08, 0.89]	--

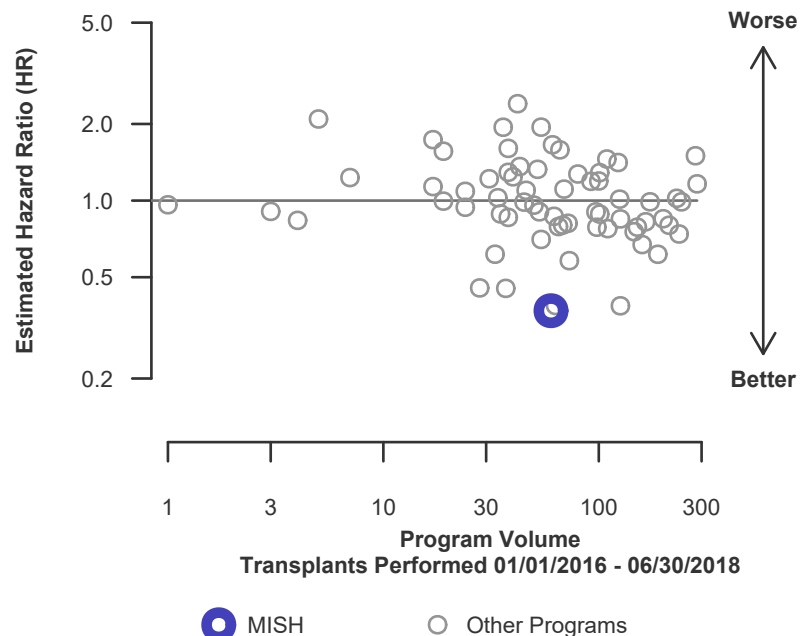
\* The hazard ratio provides an estimate of how Spectrum Health (MISH)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected patient death rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk),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

\*\* The 95% credible interval, [0.08, 0.89], indicates the location of MISH's true hazard ratio with 95% probability. The best estimate is 63% lower risk of patient death compared to an average program, but MISH's performance could plausibly range from 92% reduced risk up to 11% reduced 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

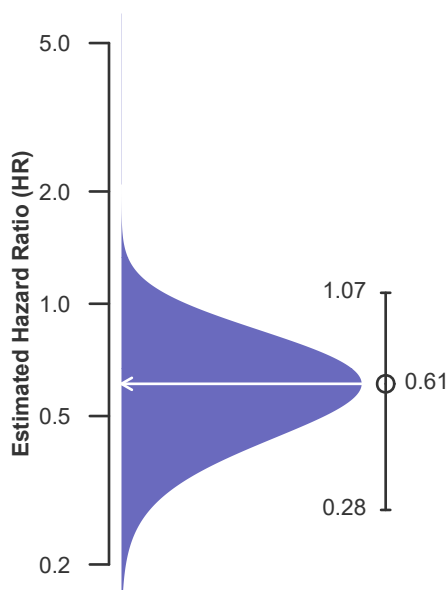
**Table C13D. Adult (18+) 3-year patient survival (deceased donor graft recipients)**  
**Single organ transplants performed between 07/01/2013 and 12/31/2015**  
**Retransplants excluded**

	MISH	U.S.
Number of transplants evaluated	43	4,622
Estimated probability of surviving at 3 years (unadjusted for patient and donor characteristics)	83.72%	73.13%
Expected probability of surviving at 3 years (adjusted for patient and donor characteristics)	73.18%	--
Number of observed deaths during the first 3 years after transplant	7	1,242
Number of expected deaths during the first 3 years after transplant	12.75	--
Estimated hazard ratio*	0.61	--
95% credible interval for the hazard ratio**	[0.28, 1.07]	--

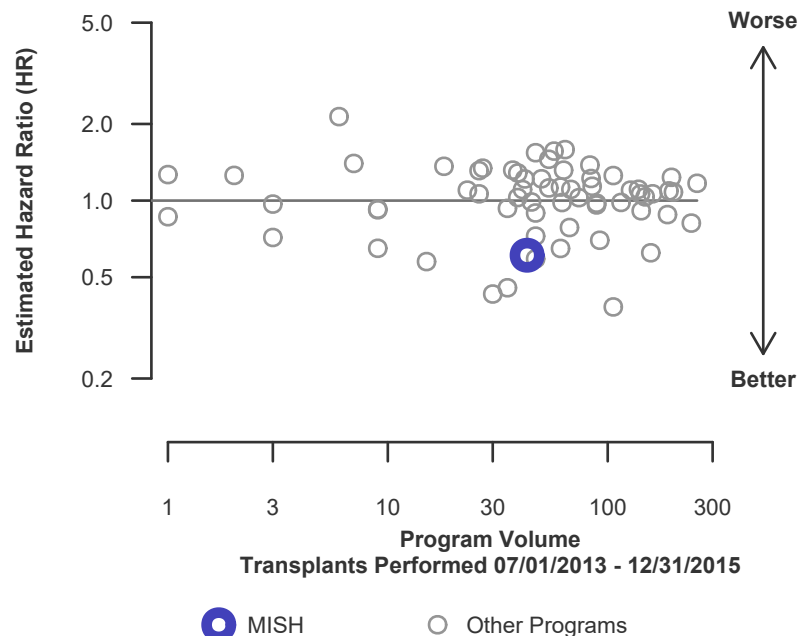
\* The hazard ratio provides an estimate of how Spectrum Health (MISH)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected patient death rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk),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

\*\* The 95% credible interval, [0.28, 1.07], indicates the location of MISH's true hazard ratio with 95% probability. The best estimate is 39% lower risk of patient death compared to an average program, but MISH's performance could plausibly range from 72% reduced risk up to 7% 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 01/01/2016 and 06/30/2018  
Retransplants excluded**

This center did not perform any  
transplants relevant to  
this table during  
01/01/2016-06/30/2018

**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  
01/01/2016-06/30/2018

**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  
01/01/2016-06/30/2018



## C. Transplant Information

**Table C15D. Pediatric (<18) 1-year patient survival (deceased donor graft recipients)**  
**Single organ transplants performed between 01/01/2016 and 06/30/2018**  
**Retransplants excluded**

This center did not perform any  
transplants relevant to  
this table during  
01/01/2016-06/30/2018

**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  
01/01/2016-06/30/2018

**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  
01/01/2016-06/30/2018



## C. Transplant Information

**Table C16D. Pediatric (<18) 3-year patient survival (deceased donor graft recipients)**  
Single organ transplants performed between 07/01/2013 and 12/31/2015  
Retransplants excluded

This center did not perform any  
transplants relevant to  
this table during  
07/01/2013-12/31/2015

**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  
07/01/2013-12/31/2015

**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  
07/01/2013-12/31/2015





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## C. Transplant Information

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**Table C17. Multi-organ transplant graft survival: 01/01/2016 - 06/30/2018**

### Adult (18+) Transplants

No adult (18+) multi-organ transplants were performed

### Pediatric (<18) Transplants

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

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**Table C18. Multi-organ transplant patient survival: 01/01/2016 - 06/30/2018**

### Adult (18+) Transplants

No adult (18+) multi-organ transplants were performed

### Pediatric (<18) Transplants

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