Proposal to Modify Pediatric Lung Allocation Policy

Sponsoring Committee: **Thoracic Organ Transplantation**

Policy/Bylaws Affected: **10.4.B: Allocation of Lungs by Blood Type, 10.4.C: Allocation of Lungs from Deceased Donors at Least 18 Years Old, 10.4.D: Allocation of Lungs from Deceased Donors 12 to Less Than 18 Years Old, and 10.4.E: Allocation of Lungs from Deceased Donors Less than 12 Years Old, 3.4.H: In Utero Candidate Registrations, 5.3.C: Pediatric Heart Acceptance Criteria, 6.1: Status Assignments, 6.1.D: Pediatric Heart Status 1A Requirements, 6.1.E: Pediatric Heart Status 1B Requirements, 6.1.F: Pediatric Heart Status 2 Requirements, 6.3: Status Exceptions, 6.3.A: RRB and Committee Review of Status Exceptions, 6.4: Waiting Time, 6.5.A: Allocation of Hearts by Blood Type, 6.5.B: Sorting Within Each Classification, 6.5.C: Allocation of Hearts from Donors at Least 18 Years Old, 6.5.D: Allocation of Hearts from Donors Less Than 18 Years Old, 6.5.E: Allocation of Hearts from Donors Less Than 18 Years Old**

Public Comment: **August 2015**

Effective Date: **Pending implementation and notice to OPTN members**

Problem Statement

Current policy only permits child donor lungs (0-11 years old) to be more broadly shared geographically through Zone B. This means that lungs from child deceased donors are not being offered to adolescent candidates (12-17 years old) beyond Zone A before those lungs are offered to adult candidates. Lungs from adolescent deceased donors are not offered to either adolescent or child candidates of the same age and medical urgency status across a wider area before being offered to adult candidates more proximate to the donor.

Infant lung candidates are especially disadvantaged by a lack of access to organs that are the appropriate size. While current policy allows candidates that were registered before they turned two-years old to receive hearts from deceased donors of any blood type, intended blood type incompatible transplants are not permitted for the 12-14 lung candidates that were registered before their 2nd birthday each year. Candidates less than one year old have the highest percentage of removal from the waiting list because they died or were too sick to transplant. OPTN data also show that the percentage of donors for whom there are no candidates on the match run is substantially higher for donors 0-2 years old than any other age group. While at times this is because the candidates currently waiting are not the appropriate size, it may also be due to the unavailability of an appropriate candidate with the right blood type.

Summary of Changes

This proposal provides more opportunities for candidates younger than 18 years of age to receive offers from donors who are also younger than 18. Simulation modeling suggests that the newly approved policy

will increase transplant rates for children, especially those between the ages of 6 and 11, without significantly affecting adult candidates.

The revised policy also will allow lung candidates listed before they are two years old to be considered for intended blood type incompatible matching, if their transplant program chooses to do so. This should allow greater access to transplantation because it is less common to locate lung donors younger than age two who are an identical blood type match.

What Members Need to Do

Programs should consider the appropriateness of registering patients that meet the following criteria as eligible to accept an intended blood type incompatible lung:

- Priority 1, less than 1 year old
- Priority 1, at least 1 year old but registered before turning 2 years old, with isohemagglutinin titers less than or equal to 1:16.

If you register your candidate as willing to receive an intended blood type incompatible offer, your program will need to submit additional data. If your candidate is less than 2 years old at time you register them on the waiting list, you must report whether they are willing to accept an offer of any blood type for that candidate. If yes, then you must submit isohemagglutinin titers in Waitlist[SM] when you initially report that a candidate is willing to accept an intended blood type incompatible lung and then update these titers every 30 days. For a recipient of a intended blood type incompatible lung, you must submit isohemagglutinin titers from a blood sample taken within 24 hours before transplant and from a recent sample if graft loss or death occurs within one year post-transplant.

Organ Procurement Organizations (OPOs) will need to educate their staff on the new allocation algorithm.

Affected Policy/Bylaw Language:

New language is <u>underlined</u> and language that will be deleted is ~~struck through~~.

10.1.F The LAS Calculation

The LAS calculation uses *all* of the following measures:

- Waiting List Urgency Measure, which is the expected number of days a candidate will live without a transplant during an additional year on the waiting list.
- Post-transplant Survival Measure, which is the expected number of days a candidate will live during the first year post-transplant.
- Transplant Benefit Measure, which is the difference between the Post-transplant Survival Measure and the Waiting List Urgency Measure.
- Raw Allocation Score, which is the difference between Transplant Benefit Measure and Waiting List Urgency Measure.

To determine a candidate's LAS, the Raw Allocation Score is normalized to a continuous scale of zero to 100.

The equation for the LAS calculation is:

$$LAS = \frac{100 * [PTAUC - 2 * WLAUC + 730]}{1095}$$

Table 10-2: LAS Calculation Values

Where…	Includes…
$PTAUC = \sum_{k=0}^{364} S_{TX}(k)$	PTAUC = the area under the post-transplant survival probability curve during the first post-transplant year. β_I = the coefficient for characteristic i from the waiting list measure, according to *Table 10-3: Waiting List Mortality Calculation: Covariates and their Coefficients.*
$S_{TX}(t) = S_{TX,0}(t)^{e^{\alpha_1 Y_1 + \alpha_2 Y_2 + \ldots + \alpha_q Y_q}}$	$S_{TX}(t)$ = the expected post-transplant survival probability at time t for an individual candidate. Y_i = the value of the j^{th} characteristic for an individual candidate $\propto_j$ = the coefficient for characteristic j from the post-transplant survival measure, according to *Table 10-4: Post-Transplant Survival Calculation, Covariates, and Their Coefficients*.
$WLAUC = \sum_{k=0}^{364} S_{WL}(k)$	WLAUC = the area under the waiting list survival probability curve during the next year.
$S_{WL}(t) = S_{WL,0}(t)^{e^{\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p}}$	$S_{WL,0}(t)$ = the baseline waiting list survival probability at time t, according to *Table 10-~~8~~11: Baseline Waiting List Survival (SWL(t)) Probability*. $S_{TX,0}(t)$ = the baseline post-transplant survival probability at time t, according to *Table 10-~~9~~12: Baseline Post-Transplant Survival ($S_{TX}(t)$) Probability*. $S_{WL}(t)$ = the expected waiting list survival probability at time t for an individual candidate X_i = the value of the i^{th} characteristic for an individual candidate.

Table 10-3 provides the covariates and their coefficients for the waiting list mortality calculation. See *Policy 10.1.F.i: Lung Disease Diagnosis Groups* for specific information on each diagnosis group.

Table 10-3: Waiting List Mortality Calculation: Covariates and their Coefficients

For this covariate:	The following coefficient is used in the LAS calculation:
1. Age (year)	0.0083990318885565*age
2. Bilirubin (mg/dL)	0.0431682188302477*(bilirubin – 1) if bilirubin is more than 1.0 mg/dL 0 when bilirubin is 1.0 mg/dL or less
3. Bilirubin increase of at least 50%	1.4144058906830200 for Diagnosis Group B 0 for Diagnosis Groups A, C, and D
4. Body mass index (BMI) (kg/m^2)	0.1261444133358100*(20 – BMI) for BMI less than 20 kg/m^2 0 if BMI is at least 20 kg/m^2
5. Cardiac index prior to any exercise	0.5435368888028200 if the cardiac index is less than 2 $L/min/m^2$ 0 if the cardiac index is at least 2 $L/min/m^2$
6. Central venous pressure (CVP) (mm Hg) at rest, prior to any exercise	0.0173841981251578*(CVP – 7) for CVP greater than 7 mm Hg (Diagnosis Group B only) 0 if less than or equal to 7 mm Hg for Diagnosis Group B 0 for candidates in Diagnosis Groups A, C, and D
7. Ventilation status if candidate is hospitalized	1.6771121096052300 if continuous mechanical ventilation needed 0 if no continuous mechanical ventilation needed
8. Creatinine (serum) (mg/dL)	0.5034346761960600* creatinine if candidate is at least 18 years old 0 if candidate is less than 18 years old
9. Diabetes	0.4680254026735700 if diabetic 0 if not diabetic
10. Diagnosis Group A	0
11. Diagnosis Group B	1.5774243292137200
12. Diagnosis Group C	1.2313926484343600
13. Diagnosis Group D	0.6259577164157700
14. Detailed diagnosis: Bronchiectasis (Diagnosis Group A only)	0.6680518055684700
15. Detailed diagnosis: Eisenmenger's syndrome (Diagnosis Group B only)	-0.6278657824830000
16. Detailed diagnosis: Lymphangioleiomyomatosis (Diagnosis Group A only)	-0.3162937838984600

For this covariate:	The following coefficient is used in the LAS calculation:
17. Detailed Diagnosis: Obliterative bronchiolitis (not-retransplant) (Diagnosis Group D only)	0.4453284411081100
18. Detailed Diagnosis: Pulmonary fibrosis, not idiopathic (Diagnosis Group D only)	-0.2091170018125500
19. Detailed Diagnosis: Sarcoidosis with PA mean pressure greater than 30 mm Hg (Diagnosis Group D only)	-0.4577749354638600
20. Detailed Diagnosis: Sarcoidosis with PA mean pressure of 30 mm Hg or less (Diagnosis Group A only)	0.9330846239906700
21. Forced vital capacity (FVC)	0.1829476350587400*(80 – FVC)/10 if FVC is less than 80% for Diagnosis Group D 0 if FVC is greater than or equal to 80% for Diagnosis Group D 0 for candidates in Diagnosis Groups A, B, and C
22. Functional Status	-0.4471034284458400 if no assistance needed with activities of daily living 0 if some or total assistance needed with activities of daily living
23. Oxygen needed to maintain adequate oxygen saturation (88% or greater) at rest (L/min)	0.0213187586203456*O_2 for Diagnosis Group B 0.1188479817592500*O_2 for Diagnosis Groups A, C, and D
24. PCO_2 (mm Hg): current	0.1104609835819100*PCO_2/10 if PCO_2 is at least 40 mm Hg
25. PCO_2 increase of at least 15%	0.2331149280428300 if PCO_2 increase is at least 15% 0 if PCO_2 increase is less than 15%
26. Pulmonary artery (PA) systolic pressure (10 mm Hg) at rest, prior to any exercise	0.4155116686114300*(PA systolic – 40)/10 for Diagnosis Group A if the PA systolic pressure is greater than 40 mm Hg 0 for Diagnosis Group A if the PA systolic pressure is 40 mm Hg or less 0.0462410402627318*PA systolic/10 for Diagnosis Groups B, C, and D

For this covariate:	The following coefficient is used in the LAS calculation:
27. Six-minute-walk distance (feet) obtained while the candidate is receiving supplemental oxygen required to maintain an oxygen saturation of 88% or greater at rest. Increase in supplemental oxygen during this test is at the discretion of the center performing the test.	-0.0844896372724000*Six-minute-walk distance/100

Table 10-4 lists the covariates and corresponding coefficients in the waiting list and post-transplant survival measures. See *Policy 10.1.F.i: Lung Disease Diagnosis Groups* for specific information on each diagnosis group.

Table 10-4: Post-Transplant Survival Calculation: Covariates and Their Coefficients

For this variable:	The following is used in the LAS calculation:
1. Age (years)	0.0246579831271869*(age–45) if candidate is greater than 45 years old 0 if candidate is 45 years old or younger
2. Creatinine (serum) at transplant (mg/dL)	0.0895569900508900*creatinine if candidate is at least 18 years old 0 if candidate is less than 18 years old
3. Creatinine increase of at least 150%	0.7708616024698100 if increase in creatinine is at least 150%, and the higher value determining this increase is at least 1 mg/dL 0 if increase in creatinine of 150% if the higher value determining this increase is less than 1 mg/dL 0 if increase in creatinine less than 150%
4. Cardiac index (L/min/m^2) at rest, prior to any exercise	0.3499381679822400 if less than 2 L/min/m^2 0 if at least 2 L/min/m^2
5. Ventilation status if candidate is hospitalized	0.6094478988424900 if continuous mechanical ventilation needed 0 if no continuous mechanical ventilation needed
6. Diagnosis Group A	0
7. Diagnosis Group B	0.6115547319209300
8. Diagnosis Group C	0.3627014422464200
9. Diagnosis Group D	0.4641392063023200

For this variable:	The following is used in the LAS calculation:
10. Detailed diagnosis: Bronchiectasis (Diagnosis Group A only)	0.1889100379099400
11. Detailed diagnosis: Eisenmenger's syndrome (Diagnosis Group B only)	0.9146727886744700
12. Detailed diagnosis: Lymphangioleiomyomatosis (Diagnosis Group A only)	-1.5194416206749400
13. Detailed diagnosis: Obliterative bronchiolitis (not-retransplant, Diagnosis Group D only)	-1.2050508750702600
14. Detailed diagnosis: Pulmonary fibrosis, not idiopathic (Diagnosis Group D only)	-0.0723596761367600
15. Detailed diagnosis: Sarcoidosis with PA mean pressure greater than 30 mm Hg (Diagnosis Group D only)	-0.0437880049066331
16. Detailed diagnosis: Sarcoidosis with PA mean pressure of 30 mm Hg or less (Diagnosis Group A only)	-0.1389363636019300
17. Oxygen needed to maintain adequate oxygen saturation (88% or greater) at rest (L/min)	0.0747978926517300*O_2 for Diagnosis Group A 0.0164276945879309*O_2 for Diagnosis Groups B, C, and D
18. Functional Status	-0.1900086366785100 if no assistance needed with activities of daily living 0 if some or total assistance needed with activities of daily living
19. Six-minute-walk-distance (feet) obtained while candidate is receiving supplemental oxygen required to maintain an oxygen saturation of 88% or greater at rest. Increase in supplemental oxygen during this test is at the discretion of the center performing the test.	0.0004594953809594*(1200-Six-minute-walk distance) 0 if six-minute-distance-walked is at least 1,200 feet

See *Policy 10.5: Probability Data Used in the LAS Calculation* for *Tables 10-11~~8~~* and *10-12~~9~~* that provide data used in the LAS calculation.

10.4.B Allocation of Lungs by Blood Type

~~A candidate whose blood type is identical to the donor's will receive the single or double lung offer before a candidate whose blood type is compatible but not identical with the donor's.~~ A deceased donor's blood type compatibility with a lung candidate is defined in *Table 10-5* below.

Table 10-5: Deceased Donor Blood Type Compatibility with a Lung Candidate

Deceased Donor's Blood Type	Candidate's Blood Type			
	O	A	B	AB
O	Identical	Compatible	Compatible	Compatible
A	Screened*	Identical	Screened*	Compatible
B	Screened*	Screened*	Identical	Compatible
AB	Screened*	Screened*	Screened*	Identical

*Screened from match run, unless eligible for intended blood group incompatible offers according to *Policy 10.4.B.i*

10.4.B.i Eligibility for Intended Blood Group Incompatible Offers for Deceased Donor Lungs

Candidates will be eligible for intended blood group incompatible deceased donor lungs if they meet the requirements according to *Table 10-6* below.

Table 10-6: Eligibility for Intended Blood Group Incompatible Offers for Deceased Donor Lungs

If the candidate is:	And meets *all* of the following:
Less than one year old at the time of the match run	1. Is priority 1. 2. Has reported isohemagglutinin titer information for A or B blood type antigens to the OPTN Contractor within the last 30 days.
At least one year old at the time of the match run	1. Is registered prior to turning two years old. 2. Is priority 1. 3. Has reported to the OPTN Contractor isohemagglutinin titers less than or equal to 1:16 for A or B blood type antigens from a blood sample collected within the last 30 days. The candidate must not have received treatments that may have reduced isohemagglutinin titers to 1:16 or less within 30 days of when this blood sample was collected.

10.4.B.ii Isohemagglutinin Titer Reporting Requirements for a Candidate Willing to Receive an Intended Blood Group Incompatible Lung

If a laboratory provides more than one isohemagglutinin titer value for a tested blood sample, the transplant program must report the highest titer value to the OPTN Contractor.

Accurate isohemagglutinin titers must be reported for candidates eligible for an intended blood group incompatible lung, according to Table 10-7 below, at *all* of the following times:

1. Upon initially reporting that a candidate is willing to accept an intended blood group incompatible lung.
2. Every 30 days after initially reporting that a candidate is willing to accept an intended blood group incompatible lung.

Table 10-7: Isohemagglutinin Titer Reporting Requirements for a Candidate Willing to Receive an Intended Blood Group Incompatible Lung

If the candidate's blood type is:	Then the transplant program must report the following isohemagglutinin titers to the OPTN Contractor:
A	Anti-B
B	Anti-A
O	Anti-A and Anti-B

Accurate isohemagglutinin titers must be reported for recipients of an intended blood group incompatible lung, according to *Table 10-8*, as follows:

1. At transplant, from a blood sample taken within 24 hours prior to transplant.
2. If graft loss occurs within one year after transplant from the most recent sample, if available.
3. If recipient death occurs within one year after transplant from the most recent blood sample, if available.

Table 10-8: Isohemagglutinin Titer Reporting Requirements for a Recipient of an Intended Blood Group Incompatible Lung

If the deceased donor's blood type is:	And the recipient's blood type is:	Then the transplant program must report the following isohemagglutinin titers to the OPTN Contractor:
A	B or O	Anti-A
B	A or O	Anti-B
AB	A	Anti-B
AB	B	Anti-A
AB	O	Anti-A and Anti-B

10.4.C Allocation of Lungs from Deceased Donors at Least 18 Years Old

Single and double lungs from deceased donors at least 18 years old are allocated according to *Table 10-~~5~~9* below.

Table 10-~~5~~9: Allocation of Lungs from Deceased Donors at Least 18 Years Old

Classification	Candidates that are included within the:	And are:
1	OPO's DSA	At least 12 years old, blood type identical to the donor
2	OPO's DSA	At least 12 years old, blood type compatible with the donor
3	OPO's DSA	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: Less than 12 years old and blood type identical to the donor Less than 1 year old and blood type compatible with the donor Less than 1 year old and eligible for intended blood group incompatible offers

Classification	Candidates that are included within the:	And are:
4	OPO's DSA	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: At least 1 year old and blood type compatible with the donor At least 1 year old and eligible for intended blood group incompatible offers
5	OPO's DSA	Priority 2, blood type identical to the donor
6	OPO's DSA	Priority 2, blood type compatible with the donor
7	Zone A	At least 12 years old, blood type identical to the donor
8	Zone A	At least 12 years old, blood type compatible with the donor
9	Zone A	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: Less than 12 years old and blood type identical to the donor Less than 1 year old and blood type compatible with the donor Less than 1 year old and eligible for intended blood group incompatible offers
10	Zone A	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: • At least 1 year old and blood type compatible with the donor • At least 1 year old and eligible for intended blood group incompatible offers
11	Zone A	Priority 2, blood type identical to the donor
12	Zone A	Priority 2, blood type compatible with the donor
13	Zone B	At least 12 years old, blood type identical to the donor
14	Zone B	At least 12 years old, blood type compatible with the donor
15	Zone B	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: • Less than 12 years old and blood type identical to the donor • Less than 1 year old and blood type compatible with the donor • Less than 1 year old and eligible for intended blood group incompatible offers

Classification	Candidates that are included within the:	And are:
16	Zone B	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: At least 1 year old and blood type compatible with the donor At least 1 year old and eligible for intended blood group incompatible offers
17	Zone B	Priority 2, blood type identical to the donor
18	Zone B	Priority 2, blood type compatible with the donor
19	Zone C	At least 12 years old, blood type identical to the donor
20	Zone C	At least 12 years old, blood type compatible with the donor
21	Zone C	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: • Less than 12 years old and blood type identical to the donor • Less than 1 year old and blood type compatible with the donor • Less than 1 year old and eligible for intended blood group incompatible offers
22	Zone C	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: At least 1 year old and blood type compatible with the donor At least 1 year old and eligible for intended blood group incompatible offers
23	Zone C	Priority 2, blood type identical to the donor
24	Zone C	Priority 2, blood type compatible with the donor
25	Zone D	At least 12 years old, blood type identical to the donor
26	Zone D	At least 12 years old, blood type compatible with the donor
27	Zone D	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: Less than 12 years old and blood type identical to the donor Less than 1 year old and blood type compatible with the donor Less than 1 year old and eligible for intended blood group incompatible offers

Classification	Candidates that are included within the:	And are:
28	Zone D	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: • At least 1 year old and blood type compatible with the donor • At least 1 year old and eligible for intended blood group incompatible offers
29	Zone D	Priority 2, blood type identical to the donor
30	Zone D	Priority 2, blood type compatible with the donor
31	Zone E	At least 12 years old, blood type identical to the donor
32	Zone E	At least 12 years old, blood type compatible with the donor
33	Zone E	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: • Less than 12 years old and blood type identical to the donor • Less than 1 year old and blood type compatible with the donor • Less than 1 year old and eligible for intended blood group incompatible offers
34	Zone E	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: • At least 1 year old and blood type compatible with the donor • At least 1 year old and eligible for intended blood group incompatible offers
35	Zone E	Priority 2, blood type identical to the donor
36	Zone E	Priority 2, blood type compatible with the donor

~~10.4.D Allocation of Lungs from Deceased Donors 12 to Less Than 18 Years Old~~

~~Single and double lungs from deceased donors at least 12 years old to less than 18 years old are allocated according to *Table 10-6* below.~~

~~Table 10-6: Allocation of Lungs from Deceased Donors 12 to Less Than 18 Years Old~~

~~Classification~~	~~Includes Candidates that are within the:~~	~~And are:~~
~~1~~	~~OPO's DSA~~	~~12 to less than 18 years old, blood type identical to the donor~~
~~2~~	~~OPO's DSA~~	~~12 to less than 18 years old, blood type compatible with the donor~~

Classification	Includes Candidates that are within the:	And are:
3	OPO's DSA	Priority 1, blood type identical to the donor
4	OPO's DSA	Priority 1, blood type compatible with the donor
5	OPO's DSA	Priority 2, blood type identical to the donor
6	OPO's DSA	Priority 2, blood type compatible with the donor
7	OPO's DSA	At least 18 years old, blood type identical to the donor
8	OPO's DSA	At least 18 years old, blood type compatible with the donor
9	Zone A	12 to less than 18 years old, blood type identical to the donor
10	Zone A	12 to less than 18 years old, blood type compatible with the donor
11	Zone A	Priority 1, blood type identical to the donor
12	Zone A	Priority 1, blood type compatible with the donor
13	Zone A	Priority 2, blood type identical to the donor
14	Zone A	Priority 2, blood type compatible with the donor
15	Zone A	At least 18 years old, blood type identical to the donor
16	Zone A	At least 18 years old, blood type compatible with the donor
17	Zone B	12 to less than 18 years old, blood type identical to the donor
18	Zone B	12 to less than 18 years old, blood type compatible with the donor
19	Zone B	Priority 1, blood type identical to the donor
20	Zone B	Priority 1, blood type compatible with the donor
21	Zone B	Priority 2, blood type identical to the donor
22	Zone B	Priority 2, blood type compatible with the donor
23	Zone B	At least 18 years old, blood type identical to the donor
24	Zone B	At least 18 years old, blood type compatible with the donor
25	Zone C	12 to less than 18 years old, blood type identical to the donor
26	Zone C	12 to less than 18 years old, blood type compatible with the donor

Classification	Includes Candidates that are within the:	And are:
27	Zone C	Priority 1, blood type identical to the donor
28	Zone C	Priority 1, blood type compatible with the donor
29	Zone C	Priority 2, blood type identical to the donor
30	Zone C	Priority 2, blood type compatible with the donor
31	Zone C	At least 18 years old, blood type identical to the donor
32	Zone C	At least 18 years old, compatible with the donor
33	Zone D	12 to less than 18 years old, blood type identical to the donor
34	Zone D	12 to less than 18 years old, blood type compatible with the donor
35	Zone D	Priority 1, blood type identical to the donor
36	Zone D	Priority 1, blood type compatible with the donor
37	Zone D	Priority 2, blood type identical to the donor
38	Zone D	Priority 2, blood type compatible with the donor
39	Zone D	At least 18 years old, blood type identical to the donor
40	Zone D	At least 18 years old, blood type compatible with the donor
41	Zone E	12 to less than 18 years old, blood type identical to the donor
42	Zone E	12 to less than 18 years old, blood type compatible with the donor
43	Zone E	Priority 1, blood type identical to the donor
44	Zone E	Priority 1, blood type compatible with the donor
45	Zone E	Priority 2, blood type identical to the donor
46	Zone E	Priority 2, blood type compatible with the donor
47	Zone E	At least 18 years old, blood type identical to the donor
48	Zone E	At least 18 years old, blood type compatible with the donor

10.4.~~E~~D Allocation of Lungs from Deceased Donors Less than ~~12~~18 Years Old

Single and double lungs from deceased donors less than ~~12~~18 years old are allocated according to *Table 10-~~7~~10* below.

Table 10-~~7~~10: Allocation of Lungs from Deceased Donors Less than ~~12~~18 Years Old

Classification	Candidates that are included within the:	And are:
1	OPO's DSA, Zone A, or Zone B	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: • Less than 12 years old and blood type identical to the donor • Less than 1 year old and blood type compatible with the donor • Less than 1 year old and eligible for intended blood group incompatible offers
2	OPO's DSA, Zone A, or Zone B	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: • At least 1 year old and blood type compatible with the donor • At least 1 year old and eligible for intended blood group incompatible offers
3	OPO's DSA, Zone A, or Zone B	Priority 2, blood type identical to the donor
4	OPO's DSA, Zone A, or Zone B	Priority 2, blood type compatible with the donor
5	OPO's DSA, ~~or~~ Zone A, or Zone B	12 to less than 18 years old, blood type identical to the donor
6	OPO's DSA, or Zone A, or Zone B	12 to less than 18 years old, blood type compatible with the donor
7	OPO's DSA	At least 18 years, blood type identical to the donor
8	OPO's DSA	At least 18 years, blood type compatible with the donor
9	Zone A	At least 18 years old, blood type identical to the donor
10	Zone A	At least 18 years old, blood type compatible with the donor
~~**11**~~	~~Zone B~~	~~12 to less than 18 years old, blood type identical to the donor~~
~~**12**~~	~~Zone B~~	~~12 to less than 18 years old, blood type compatible with the donor~~
~~**13**~~**11**	Zone B	At least 18 years old, blood type identical to the donor
~~**14**~~**12**	Zone B	At least 18 years old, blood type compatible with the donor

Classification	Candidates that are included within the:	And are:
~~15~~13	Zone C	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: • Less than 12 years old and blood type identical to the donor • Less than 1 year old and blood type compatible with the donor • Less than 1 year old and eligible for intended blood group incompatible offers
~~16~~14	Zone C	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: • At least 1 year old and blood type compatible with the donor • At least 1 year old and eligible for intended blood group incompatible offers
~~17~~15	Zone C	Priority 2, blood type identical to the donor
~~18~~16	Zone C	Priority 2, blood type compatible with the donor
~~19~~17	Zone C	12 to less than 18 years old, blood type identical to the donor
~~20~~18	Zone C	12 to less than 18 years old, blood type compatible with the donor
~~21~~19	Zone C	At least 18 years old, blood type identical to the donor
~~22~~20	Zone C	At least 18 years old, blood type compatible with the donor
~~23~~21	Zone D	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: • Less than 12 years old and blood type identical to the donor • Less than 1 year old and blood type compatible with the donor • Less than 1 year old and eligible for intended blood group incompatible offers
~~24~~22	Zone D	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: • At least 1 year old and blood type compatible with the donor • At least 1 year old and eligible for intended blood group incompatible offers
~~25~~23	Zone D	Priority 2, blood type identical to the donor
~~26~~24	Zone D	Priority 2, blood type compatible with the donor
~~27~~25	Zone D	12 to less than 18 years old, blood type identical to the donor

Classification	Candidates that are included within the:	And are:
~~28~~26	Zone D	12 to less than 18 years old, blood type compatible with the donor
~~29~~27	Zone D	At least 18 years old, blood type identical to the donor
~~30~~28	Zone D	At least 18 years old, blood type compatible with the donor
~~31~~29	Zone E	~~Priority 1, blood type identical to the donor~~ Priority 1 and *one* of the following: • Less than 12 years old and blood type identical to the donor • Less than 1 year old and blood type compatible with the donor • Less than 1 year old and eligible for intended blood group incompatible offers
~~32~~30	Zone E	~~Priority 1, blood type compatible with the donor~~ Priority 1 and *one* of the following: • At least 1 year old and blood type compatible with the donor • At least 1 year old and eligible for intended blood group incompatible offers
~~33~~31	Zone E	Priority 2, blood type identical to the donor
~~34~~32	Zone E	Priority 2, blood type compatible with the donor
~~35~~33	Zone E	12 to less than 18 years old, blood type identical to the donor
~~36~~34	Zone E	12 to less than 18 years old, blood type compatible with the donor
~~37~~35	Zone E	At least 18 years old, blood type identical to the donor
~~38~~36	Zone E	At least 18 years old, blood type compatible with the donor

[*Subsequent tables will be renumbered as necessary.*]

5.3.E Pediatric Heart Acceptance Criteria to Receive Intended Blood Group Incompatible Hearts ~~from Donors of Any Blood Type~~

A transplant hospital may specify whether a candidate registered before two years of age is willing to accept a heart from an intended blood group incompatible deceased donor ~~of any blood type~~.

6.5 Heart Allocation Classifications and Rankings

6.5.A Allocation of Hearts by Blood Type

Within each heart status and geographical zone classification, hearts are first allocated to primary blood type candidates then to secondary blood type candidates according to the blood type matching requirements in Table 6-5 below:

Table 6-5: Blood Type Matching Prioritization for Heart Allocation

Hearts from Deceased Donors with:	Are Allocated to Primary Candidates defined as:	Then to Secondary Candidates, defined as:
Blood Type O	Blood type O *or* blood type B	Blood type A or blood type AB
Blood Type A	Blood type A or blood type AB	Not applicable
Blood Type B	Blood type B or blood type AB	Not applicable
Blood Type AB	Blood type AB	Not applicable

Pediatric candidates that are less than one year old at the time of the match run, including candidates ~~qualified~~ eligible to receive a heart from an intended blood group incompatible deceased donor ~~of any blood type~~, will be classified as a primary blood type match candidate.

Pediatric candidates that are at least one year of age at the time of the match run but registered before their second birthday and are eligible to receive a heart from an intended blood group incompatible deceased donor ~~of any blood type~~ will be classified as a secondary blood type match candidate, unless they are a primary blood type match candidate according to *Table 6-5*.

6.5.B Eligibility for Intended Blood Group Incompatible ~~Heart~~ Offers for ~~from~~ Deceased Donor~~s of Any Blood Type~~ Hearts

The candidate will be eligible for intended blood group incompatible heart offers ~~from deceased donors of any blood type~~ if the candidate meets at least *one* of the following conditions:

Candidate is less than one year old at the time of the match run, and meets both of the following:

a. Is registered as status 1A or 1B.
b. Has reported isohemagglutinin titer information for A or B blood type antigens to the OPTN Contractor within the last 30 days.

Candidate is at least one year old at the time of the match run, and meets all of the following:

a. Is registered prior to turning two years old.
b. Is registered as status 1A or 1B.
c. Has reported to the OPTN Contractor isohemagglutinin titers less than or equal to 1:16 for A or B blood type antigens from a blood sample collected within the last 30 days. The candidate must not have received treatments that may have reduced isohemagglutinin titers to 1:16 or less within 30 days of when this blood sample was collected.

Accurate isohemagglutinin titers must be reported for candidates eligible to accept an intended blood group incompatible heart ~~from a deceased donor of any blood type~~ according to Table 6-6 below, at *all* of the following times:

1. Upon initially ~~indicating~~ reporting that a candidate is willing to accept an intended blood group incompatible heart ~~from a deceased donor of any blood type~~.

2. Every 30 days after initially ~~indicating~~ reporting that a candidate is willing to accept an intended blood group incompatible heart ~~from a deceased donor of any blood type~~.

Table 6-6: Isohemagglutinin Titer Reporting Requirements for a Candidate Willing to Receive an Intended Blood Group Incompatible Heart

If the candidate's blood type is:	Then the transplant program must report the following isohemagglutinin titers to the OPTN Contractor:
A	Anti-B
B	Anti-A
O	Anti-A and Anti-B

Accurate isohemagglutinin titers ~~will~~ must be reported for recipients of ~~a heart with~~ an intended incompatible blood type heart, according to Table 6-7, as follows:

1. At transplant from a blood sample taken within 24 hours prior to transplant.
2. If graft loss occurs within one year after transplant from the most recent blood sample, if available.
3. If recipient death occurs within one year after transplant from the most recent blood sample, if available.

Table 6-7: Isohemagglutinin Titer Reporting Requirements for a Recipient of ~~a Heart from a Donor with~~ an Intended Blood Group Incompatible Heart ~~Blood Type~~

Deceased donor's blood type:	Recipient's blood type:	Isohemagglutinin titer reporting requirement:
A	B or O	Anti-A
B	A or O	Anti-B
AB	A	Anti-B
AB	B	Anti-A
AB	O	Anti-A and Anti-B

If a laboratory provides more than one isohemagglutinin titer value for a tested blood sample, the transplant program must report to the OPTN Contractor the highest titer value.

Table 6-8: Allocation of Hearts from Deceased Donors At Least 18 Years Old

Classification	Candidates that are within the:	And are:
1	OPO's DSA	Adult or pediatric status 1A and primary blood type match with the donor
2	OPO's DSA	Adult or pediatric status 1A and secondary blood type match with the donor
3	OPO's DSA	Adult or pediatric status 1B and primary blood type match with the donor
4	OPO's DSA	Adult or pediatric status 1B and secondary blood type match with the donor
5	Zone A	Adult or pediatric status 1A and primary

		blood type match with the donor
6	Zone A	Adult or pediatric status 1A and secondary blood type match with the donor
7	Zone A	Adult or pediatric status 1B and primary blood type match with the donor
8	Zone A	Adult or pediatric status 1B and secondary blood type match with the donor
9	OPO's DSA	Adult or pediatric status 2 and primary blood type match with the donor
10	OPO's DSA	Adult or pediatric Status 2 and secondary blood type match with the donor
11	Zone B	Adult or pediatric status 1A and primary blood type match with the donor
12	Zone B	Adult or pediatric status 1A and secondary blood type match with the donor
13	Zone B	Adult or pediatric status 1B and primary blood type match with the donor
14	Zone B	Adult or pediatric status 1B and secondary blood type match with the donor
15	Zone A	Adult or pediatric status 2 and primary blood type match with the donor
16	Zone A	Adult or pediatric status 2 and secondary blood type match with the donor
17	Zone B	Adult or pediatric status 2 and primary blood type match with the donor
18	Zone B	Adult or pediatric status 2 and secondary blood type match with the donor
19	Zone C	Adult or pediatric status 1A and primary blood type match with the donor
20	Zone C	Adult or pediatric status 1A and secondary blood type match with the donor
21	Zone C	Adult or pediatric status 1B and primary blood type match with the donor
22	Zone C	Adult or pediatric status 1B and secondary blood type match with the donor
23	Zone C	Adult or pediatric status 2 and primary blood type match with the donor
24	Zone C	Adult or pediatric status 2 and secondary blood type match with the donor
25	Zone D	Adult or pediatric status 1A and primary blood type match with the donor
26	Zone D	Adult or pediatric status 1A and secondary blood type match with the donor
27	Zone D	Adult or pediatric status 1B and primary blood type match with the donor
28	Zone D	Adult or pediatric status 1B and secondary blood type match with the donor

29	Zone D	Adult or pediatric status 2 and primary blood type match with the donor
30	Zone D	Adult or Pediatric Status 2 and secondary blood type match with the donor
31	Zone E	Adult or pediatric status 1A and primary blood type match with the donor
32	Zone E	Adult or pediatric status 1A and secondary blood type match with the donor
33	Zone E	Adult or pediatric status 1B and primary blood type match with the donor
34	Zone E	Adult or pediatric status 1B and secondary blood type match with the donor
35	Zone E	Adult or pediatric status 2 and primary blood type match with the donor
36	Zone E	Adult or pediatric status 2 and secondary blood type match with the donor

6.5.E Allocation of Hearts from Donors Less Than 18 Years Old

A heart from a pediatric donor will be allocated to a pediatric heart candidate by status and geographical location before being allocated to a candidate at least 18 years old according to *Table 6-9* below.

Table 6-9: Allocation of Hearts from Donors Less Than 18 Years Old

Classification	Candidates that are within the:	And are:
1	OPO's DSA or Zone A	Pediatric status 1A and primary blood type match with the donor
2	OPO's DSA or Zone A	Pediatric status 1A and secondary blood type match with the donor
3	OPO's DSA	Adult status 1A and primary blood type match with the donor
4	OPO's DSA	Adult status 1A and secondary blood type match with the donor
5	OPO's DSA or Zone A	Pediatric status 1B and primary blood type match with the donor
6	OPO's DSA or Zone A	Pediatric Status 1B and secondary blood type match with the donor
7	OPO's DSA	Adult Status 1B and primary blood type match with the donor
8	OPO's DSA	Adult Status 1B and secondary blood type match with the donor
9	Zone A	Adult Status 1A and primary blood type match with the donor
10	Zone A	Adult Status 1A and secondary blood type match with the donor
11	Zone A	Adult Status 1B and primary blood type match with the donor

Classification	Candidates that are within the:	And are:
12	Zone A	Adult Status 1B and secondary blood type match with the donor
13	OPO's DSA	Pediatric status 2 and primary blood type match with the donor
14	OPO's DSA	Pediatric status 2 and secondary blood type match with the donor
15	OPO's DSA	Adult status 2 and primary blood type match with the donor
16	OPO's DSA	Adult status 2 and secondary blood type match with the donor
17	Zone B	Pediatric status 1A and primary blood type match with the donor
18	Zone B	Pediatric status 1A and secondary blood type match with the donor
19	Zone B	Adult status 1A and primary blood type match with the donor
20	Zone B	Adult status 1A and secondary blood type match with the donor
21	Zone B	Pediatric status 1B and primary blood type match with the donor
22	Zone B	Pediatric status 1B, secondary blood type match with the donor
23	Zone B	Adult status 1B and primary blood type match with the donor
24	Zone B	Adult status 1B and secondary blood type match with the donor
25	Zone A	Pediatric status 2 and primary blood type match with the donor
26	Zone A	Pediatric status 2 and secondary blood type match with the donor
27	Zone A	Adult status 2 and primary blood type match with the donor
28	Zone A	Adult status 2 and secondary blood type match with the donor
29	Zone B	Pediatric status 2, primary blood type match with the donor
30	Zone B	Pediatric status 2 and secondary blood type match with the donor
31	Zone B	Adult status 2 and primary blood type match with the donor
32	Zone B	Adult status 2 and secondary blood type match with the donor
33	Zone C	Pediatric status 1A and primary blood type match with the donor

Classification	Candidates that are within the:	And are:
34	Zone C	Pediatric status 1A and secondary blood type match with the donor
35	Zone C	Adult status 1A and primary blood type match with the donor
36	Zone C	Adult status 1A and secondary blood type match with the donor
37	Zone C	Pediatric status 1B and primary blood type match with the donor
38	Zone C	Pediatric status 1B and secondary blood type match with the donor
39	Zone C	Adult status 1B and primary blood type match with the donor
40	Zone C	Adult status 1B and secondary blood type match with the donor
41	Zone C	Pediatric status 2 and primary blood type match with the donor
42	Zone C	Pediatric status 2 and secondary blood type match with the donor
43	Zone C	Adult status 2 and primary blood type match with the donor
44	Zone C	Adult status 2 and secondary blood type match with the donor
45	Zone D	Pediatric status 1A and primary blood type match with the donor
46	Zone D	Pediatric status 1A and secondary blood type match with the donor
47	Zone D	Adult status 1A and primary blood type match with the donor
48	Zone D	Adult status 1A and secondary blood type match with the donor
49	Zone D	Pediatric status 1B and primary blood type match with the donor
50	Zone D	Pediatric status 1B and secondary blood type match with the donor
51	Zone D	Adult status 1B and primary blood type match with the donor
52	Zone D	Adult status 1B and secondary blood type match with the donor
53	Zone D	Pediatric status 2 and primary blood type match with the donor
54	Zone D	Pediatric status 2 and secondary blood type match with the donor
55	Zone D	Adult status 2 and primary blood type match with the donor

Classification	Candidates that are within the:	And are:
56	Zone D	Adult status 2 and secondary blood type match with the donor
57	Zone E	Pediatric status 1A and primary blood type match with the donor
58	Zone E	Pediatric status 1A and secondary blood type match with the donor
59	Zone E	Adult status 1A and primary blood type match with the donor
60	Zone E	Adult status 1A and secondary blood type match with the donor
61	Zone E	Pediatric status 1B and primary blood type match with the donor
62	Zone E	Pediatric status 1B and secondary blood type match with the donor
63	Zone E	Adult status 1B and primary blood type match with the donor
64	Zone E	Adult status 1B and secondary blood type match with the donor
65	Zone E	Pediatric status 2 and primary blood type match with the donor
66	Zone E	Pediatric status 2 and secondary blood type match with the donor
67	Zone E	Adult status 2 and primary blood type match with the donor
68	Zone E	Adult status 2 and secondary blood type match with the donor
~~**69**~~	~~OPO's DSA or Zone A~~	~~Pediatric status 1A and blood type incompatible with the donor~~
~~**70**~~	~~OPO's DSA or Zone A~~	~~Pediatric status 1B and blood type incompatible with the donor~~
~~**71**~~	~~OPO's DSA~~	~~Pediatric status 2 and blood type incompatible with the donor~~
~~**72**~~	~~Zone B~~	~~Pediatric status 1A and blood type incompatible with the donor~~
~~**73**~~	~~Zone B~~	~~Pediatric status 1B and blood type incompatible with the donor~~
~~**74**~~	~~Zone C~~	~~Pediatric status 1A and blood type incompatible with the donor~~
~~**75**~~	~~Zone C~~	~~Pediatric status 1B and blood type incompatible with the donor~~
~~**76**~~	~~Zone D~~	~~Pediatric status 1A and blood type incompatible with the donor~~
~~**77**~~	~~Zone D~~	~~Pediatric status 1B and blood type incompatible with the donor~~

Classification	Candidates that are within the:	And are:
~~78~~	~~Zone E~~	~~Pediatric status 1A and blood type incompatible with the donor~~
~~79~~	~~Zone E~~	~~Pediatric status 1B and blood type incompatible with the donor~~

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