

Indeterminate AB Blood Type in Donors after Mass Transfusion: Safe Choice or Lost Opportunity?



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Purpose

Standard blood typing of organ donors is indeterminate when pretransfusion samples are unavailable often after mass transfusions. OPOs list the donor as AB or face serious consequences if mismatched to non-AB recipients. Due to the limited number of AB recipients this can result in kidney alone allocation often shipped to distant centers. Younger healthy donors are generally more represented in trauma and greater expected organ yield if the actual blood type could be determined. The goal of the study was to contrast donor populations of AB and mass transfused AB. Further we wished to assess improvement of organ yield of indeterminate AB donors if actual blood type could be determined.

Methods

We reviewed the indeterminate AB donors from 2016-2021 and compared them to actual AB donors over the same time period. We then modeled organ yield in the indeterminate AB for all blood types to see what the difference in expected yield would be.

The following table summarizes the Mass transfused indeterminate and actual AB donors.

	n	mn age	M/F	BMI	SCD/E/D	KDPI	O/D	Kd/Liv	Lu/H/Pan
Mass txf	10	27.2	5/5	25.2	8/0/2	29.2	3.3	20/7	2/2/1
AB test	25	42.2	20/8	29.9	14/4/8	55.3	2.2	40/13	1/3/1
t-test		0.13		0.17		0.026			

While the number of indeterminate ABO donors in our OPO was small, half occurred in the past two years. Compared to the true AB donors they were generally younger, had lower BMI, better match KDPI and higher O/D ratio. Due to limited AB lists most organs were sent to distant centers incurring greater CIT and costs. There were 5 donors with chest or abdominal trauma, but all had some discarded organs that were transplantable. As normothermic perfusion expands, trauma to organs may be possibly reversible.

Using the SRTR formula we simulated the ABO Mass transfusion group to A, B, and O blood types to determine the expected yield and compared it to the observed organ yield.

Organ	# Transplanted	# Expected	Observed (O) yield per 100 donors	Expected (E) yield per 100 donors	O per 100 - E per 100 (flag if < -10)	O/E (flag if < 0.9)
Kidneys	39	35	156	140.8	15.2	1.11
Heart	1	4	4	17.1	-13.1	0.23
Liver	13	12	52	47.7	4.3	1.09
Lungs	4	4	16	15.2	0.8	1.05
Pancreas	1	1	4	5.8	-1.8	0.69
Intestine	0	0	0	0.7	-0.7	0
Total	58	57	232	227.3	4.7	1.02

Organ	# Transplanted	# Expected	Observed (O) yield per 100 donors	Expected (E) yield per 100 donors	O per 100 - E per 100 (flag if < -10)	O/E (flag if < 0.9)
Kidneys	18	17	180	171.8	8.2	1.05
Heart	2	4	20	42.3	-22.3	0.47
Liver	7	6	70	62.2	7.8	1.13
Lungs	1	1	10	14.6	-4.6	0.68
Pancreas	1	1	10	12.6	-2.6	0.79
Intestine	0	0	0	1	-1	0
Total	29	30	290	304.6	-14.6	0.95

Organ	# Transplanted	# Expected	Observed (O) yield per 100 donors	Expected (E) yield per 100 donors	O per 100 - E per 100 (flag if < -10)	O/E (flag if < 0.9)
Kidneys	18	18	180	180.7	-0.7	1
Heart	2	6	20	56.9	-36.9	0.35
Liver	7	7	70	72.9	-2.9	0.96
Lungs	1	2	10	22.1	-12.1	0.45
Pancreas	1	3	10	26.6	-16.6	0.38
Intestine	0	0	0	1	-1	0
Total	29	36	290	360.2	-70.2	0.81

Organ	# Transplanted	# Expected	Observed (O) yield per 100 donors	Expected (E) yield per 100 donors	O per 100 - E per 100 (flag if < -10)	O/E (flag if < 0.9)
Kidneys	18	18	180	178.9	1.1	1.01
Heart	2	5	20	54.2	-34.2	0.37
Liver	7	7	70	72.5	-2.5	0.97
Lungs	1	2	10	20.2	-10.2	0.5
Pancreas	1	2	10	24.2	-14.2	0.41
Intestine	0	0	0	1	-1	0
Total	29	35	290	351	-61	0.83

Organ	# Transplanted	# Expected	Observed (O) yield per 100 donors	Expected (E) yield per 100 donors	O per 100 - E per 100 (flag if < -10)	O/E (flag if < 0.9)
Kidneys	18	18	180	179.1	0.9	1.01
Heart	2	5	20	53.7	-33.7	0.37
Liver	7	7	70	71.1	-1.1	0.99
Lungs	1	2	10	19.1	-9.1	0.52
Pancreas	1	2	10	24.2	-14.2	0.41
Intestine	0	0	0	1	-1	0
Total	29	35	290	348.1	-58.1	0.83

We met or exceeded yield expectations in renal donors in all groups. Noted in red are the flags for deficits for the extra-renal organs. In the known AB and assigned AB the number of deficits were less, reflecting more marginal donors in the former and the limited recipient pool in both groups. Conversely the higher expected yields in O, A and B blood group simulations represent increased potential of organs transplanted if blood group could be established pre-allocation.

Discussion

Per OPTN data AB candidates as of January 2022 were 2.5% of the list for all organs but 4.7% of transplants in 2020 likely due to the additional indeterminate AB donors. There is potential for greater organ yield if the AB blood type can be determined. ABO typing using DNA/PCR, Next Generation Sequencing is currently employed by some OPOs either using HLA facilities or commercial laboratories. The turnaround time is generally within 24 hours. There is no specific rule by UNOS, but a guidance paper in 2020 on the topic included molecular testing. We did not investigate transportation distance and associated costs, but both would likely be greater in AB donor organs.

Summary

We demonstrated a significant increase in extra-renal organ yield expectations if ABO typing could be determined prior to allocation. While every effort should be made to secure pretransfusion samples, in their absence, advanced molecular blood typing could be considered. Clearly written and executable protocols must be in place to deal with an indeterminate typing situation to avoid ABO incompatible allocation.