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Multiple listing for pediatric heart transplantation in the USA: Analysis of OPTN registry data from 1995 through 2009

Brian Feingold^{1,2}, Seo Y. Park³, Diane M. Comer⁴, Steven A. Webber⁵, and Cindy L. Bryce⁶

¹Pediatric Cardiology, Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA, USA

²Clinical and Translational Research, University of Pittsburgh, Pittsburgh, PA, USA

³Department of Medicine, Division of General Internal Medicine, University of Pittsburgh, Pittsburgh, PA, USA

⁴Center for Research on Health Care Data Center, University of Pittsburgh, Pittsburgh, PA, USA

⁵Pediatrics, Vanderbilt University, Nashville, TN, USA

⁶Health Policy Management, University of Pittsburgh School of Public Health, Pittsburgh, PA, USA

Abstract

Multiple listing is associated with shorter waitlist durations and increased likelihood of transplantation for renal candidates. Little is known about multiple listing in pediatric heart transplantation. We examined the prevalence and outcomes of multiple listing using OPTN data from 1995 through 2009. Characteristics and waitlist outcomes of propensity-score-matched single- and multiple-listed patients were compared. Multiple listing occurred in 23 of 6290 listings (0.4%). Median days between listings was 35 (0–1015) and median duration of multiple listings was 32 days (3–363). Among multiple-listed patients, there were trends toward less ECMO use (0% vs. 11%, $p = 0.1$) and more frequent requirement for a prospective cross-match (17% vs. 8%, $p = 0.08$). Multiple-listed patients more commonly had private insurance (78% vs. 56%; $p = 0.03$). Urgency status at listing was similar between groups (1/1A: 61% vs. 64%, 1B/2: 39 vs. 36%; $p = 0.45$) as were weight, age, diagnosis, ventilator/inotrope use, and median income (each $p = 0.17$). There was a trend toward increased incidence of heart transplantation for multiple-listed patients at three, six, and 24 months (50%, 65%, 80%) vs. single-listed patients (40%, 54%, 64%; $p = 0.11$). Multiple listing for pediatric heart transplantation in the USA occurs infrequently and is more common in patients with private insurance.

Brian Feingold, Children's Hospital of Pittsburgh of UPMC, 4401 Penn Avenue, Faculty Pavilion, 5th Floor, Pittsburgh, PA 15224, USA Tel.: +412 692 5541 Fax: +412 692 6991 brian.feingold@chp.edu.

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Keywords

pediatric heart transplant; waitlist mortality; Organ Procurement and Transplantation Network; socioeconomic factors

Multiple listing for transplantation is associated with shorter waitlist durations among renal and liver transplant candidates, as well as increases in the likelihood of transplantation and post-transplant survival for renal transplant candidates (1, 2). However, little is known about multiple listing for thoracic organ transplantation. While multiple listings account for 5–6% of renal and 3% of liver transplant listings, we could find only a single reference that indicated eight of 2749 patients (0.3%) listed for heart transplantation and nine of 1999 (0.5%) listed for lung transplantation in the USA as of January 31, 2009, were multiple listed (2). Because all solid organ transplant candidates face similar, chronic shortages in donor organ availability, factors like the severity of the candidate's clinical condition and knowledge about the possibility for multiple listing may drive the imbalance in multiple-listing practices across solid organs.

In this analysis, we sought to determine the prevalence and outcomes of multiple listing for pediatric heart transplantation in the USA. We also sought to explore patient, listing center, and UNOS region characteristics of multiple-listed patients. We hypothesized that multiple-listed candidates would have shorter waitlist durations and achieve transplantation more frequently than single-listed candidates and have similar post-transplant outcomes. We also hypothesized that second listings would more often occur in UNOS regions with shorter waitlist times to transplantation than the primary listing UNOS region.

Patients and methods

Data source, study population, and definitions

This study used data from the OPTN. The OPTN data system includes data on all donor, wait-listed candidates, and transplant recipients in the USA, submitted by the members of the OPTN, and has been described elsewhere. The Health Resources and Services Administration, US Department of Health and Human Services Administration, provides oversight to the activities of the OPTN contractor. Analyses were performed on a cohort of 6290 children (age <18 yr) listed for isolated heart transplantation in the USA from April 1, 1995, to December 31, 2009, which we have previously described (3). We defined multiple listing as candidate registration at 2 centers simultaneously for 14 days, or <14 days if the candidate died or was transplanted in that time. Candidates with <14 days of simultaneous waiting time at 2 centers who did not meet these criteria were considered as transferring waiting time between these centers and were excluded. Waitlist outcomes were censored at a maximum of two yr after listing, on the last day of observation (March 4, 2011) or upon delisting for 14 days. Candidates who were delisted for reasons other than transplantation and then relisted at the same center within 14 days were considered to have a single listing comprised of waitlist time from both listings. Date of death was recorded as the earliest death date in the OPTN data fields or the social security data file death date included with the dataset. Median income was obtained from zip code-level median household income US

Census data (4) according to each patient's home zip code at listing in the OPTN file. Distances were calculated from latitude and longitude coordinates determined from zip code (patient) or city and state (listing center) information (5).

Statistical analysis

Summary statistics are presented as mean $\pm$ standard deviation or number (percent). Baseline characteristics of all patients who were multiple listed were compared with patients who were single listed using Student's *t*-test, chi-square test, or Fisher's exact test, as appropriate. Because of the imbalances between the multiple- and single-listed groups in some baseline characteristics and to avoid possible selection bias when performing the waitlist outcome analysis of multiple- vs. single-listed patients, we then performed propensity score matching to identify single-listed patients for comparison with the multiple-listed group (6). For this analysis, a multivariable logistic regression model using 15 patient characteristics at listing (age, weight, sex, blood group, race/ethnicity, underlying cardiac diagnosis, preliminary cross-match requirement, year, use of ECMO, use of ventilator, use of inotropes, listing urgency status, UNOS region, median income, and primary payer) was used to generate a propensity score for each patient in the cohort. Single-listed patients were matched 20:1 to multiple-listed patients using optimal matching on the logit of the estimated propensity scores. We then excluded single-listed patients who did not have the same initial waitlist urgency status as their multiple-listed match and those with waitlist duration less than the duration from first to second listing for their multiple-listed match. We did this to ensure that any difference in favor of multiple-listed patients was not due to their time accrued/survival on the waiting list prior to becoming multiple listed. For each multiple-listed patient, we then selected the four matched single-listed patients with logit of the propensity score that was closest to their multiple-listed match and <7.5 . Using this strategy, we were unable to match any single-listed patients to three multiple-listed patients (one for time and two for listing status), and these multiple-listed patients were excluded from the outcome analysis. Thus, we analyzed outcomes for 20 multiple-listed and 67 matched, single-listed patients.

To assess whether regional variations in time to transplantation may have influenced the choice of location of the multiple-listing center, we determined both national and UNOS region-specific median times to transplantation in our OPTN cohort by era. Three eras (listing dates 4/1/95-1/19/1999, 1/20/1999-6/30/2006, and 7/1/2006-12/31/2009) were chosen to coincide with major changes in OPTN heart allocation policy on urgency status (1 separated into 1A and 1B) or sequence of heart allocation (7–9). We then compared era-specific, regional median times to transplantation for the primary and secondary listing centers for each multiple-listed patient.

Waitlist outcomes (death, transplantation, delisting, and still awaiting transplant) were depicted as competing outcome plots and compared using Gray's test (10). Post-transplant survival was assessed by Kaplan–Meier plot with log-rank test. Nonparametric methodology was used to compare observed median times to transplantation of each era–region combination to the median time to transplantation of 1000 randomly drawn samples of the same size from (i) era-specific national data and (ii) other era-specific regions. All tests were

two-sided with the significance level of 0.05. Data were analyzed with SAS v9.2 (SAS Institute Inc, Cary, NC, USA) and R (R Foundation for Statistical Computing, Vienna, Austria). The study was conducted with the approval of the University of Pittsburgh Institutional Review Board and OPTN.

Results

Prevalence and distribution of multiple listings

Multiple listing occurred in 23 of 6290 (0.4%) listings for isolated pediatric heart transplantation in the USA between April 1995 and December 2009. No candidate was listed at >2 centers simultaneously. The distribution of multiple listings by UNOS region and listing center is shown in Fig. 1. All multiple listings were among 26 centers, and 78% of multiple listings occurred between unique pairings of transplant centers. Five UNOS regions (2, 3, 5, 7, and 8) accounted for 76% of all multiple listings.

The number of listings by year and era is shown in Fig. 2. Thirty-nine percent of multiple listings occurred between 1995 and 1997, and 91% of multiple listings occurred prior to June 30, 2006, when UNOS allocation policy was amended to expand regional organ sharing. When standardized for time, there were 1.9 ± 1.2 multiple listings per year from April 1995 through June 2006 and $0.6 \pm 0.6/\text{yr}$ from July 2006 through December 2009 ($p = 0.057$).

Multiple-listed patient characteristics

Characteristics of the single- and multiple-listed patients are shown in Table 1. Among multiple-listed patients, there was a greater proportion of males (78% vs. 56%; $p = 0.03$) and private insurance (78% vs. 56%; $p = 0.03$). Also, use of ECMO was less common (0% vs. 11%, $p = 0.1$), and prospective cross-match requirement was more common (17% vs. 8%, $p = 0.08$) for multiple-listed patients, although neither reached statistical significance. Prospective cross-match requirement was also not associated with multiple listing in different UNOS regions (1 of 4 with a prospective cross-match requirement was listed in a different region vs. 12 of 17 without a prospective cross-match requirement were listed in different UNOS regions; $p = 0.9$). A difference in urgency status between the groups was observed, with a greater proportion of multiple-listed patients listed status 1. However, when categorized into statuses 1/1A, 1B, and 2/7, there was no significant difference in listing status between the groups ($p = 0.24$).

The median number of days from first to second listing was 35 (range 0–1015), and the median duration of multiple listings was 32 days (3–363). The median distance between multiple-listing centers was 390.9 miles (0–905.0). One-quarter of the patients were multiple listed at centers that were 100 miles apart, and 78% were multiple listed at centers 500 miles apart. Ten of 23 (44%) multiple-listed patients were transplanted at the primary listing center, and nine (39%) were transplanted at the secondary listing center.

Era–region analysis

Eight multiple listings were within the same UNOS region and 15 (65%) were in different UNOS regions. Among the 15 in different regions, five had their second listing in a region with a longer median time to transplantation than the region of their primary listing (56 vs. 32 days, $p = 0.009$; 48 vs. 36 days, $p = 0.043$; 53 vs. 33 days, $p = 0.005$; and for two patients 48 vs. 33 days, $p = 0.002$), while only one patient's second listing was in a region with a shorter time to transplantation (48 vs. 33 days; $p = 0.005$). There was no significant difference in regional median time to transplantation for the first and second listings for nine patients.

Outcomes for the propensity-score-matched cohorts

There were no significant differences in listing characteristics between the matched cohorts (Table 2). Fig. 3 shows the waitlist competing outcomes after multiple listing or equivalent amount of waitlist time accrued for matched, single-listed patients. There were no statistically significant advantages for patients who were multiple listed. Among the 17 multiple-listed and 44 single-listed patients who achieved transplantation, there was no statistically significant difference in post-transplant survival ($p = 0.18$; Fig. 4).

Discussion

In this analysis, we have shown that multiple listing for pediatric heart transplantation is rare, occurring in only 0.4% of listings between April 1995 and December 2009. Because of this low prevalence, we were limited in our ability to detect all but a large difference in outcomes. Thus, it is possible that the trend toward enhanced waitlist and post-transplant survival of multiple-listed patients observed here would be confirmed with a greater number of multiple-listed patients to analyze. This would be consistent with higher transplant rates observed in multiple-listed, adult renal and liver transplant candidates (1), which is the intended goal of multiple listing.

Males and those with private insurance were more common among multiple-listed candidates. This is interesting because it is consistent with the renal and liver experience on multiple listing despite the much lower prevalence of multiple listing in pediatric heart transplantation (0.4% vs. 3–6%) (1). One possible explanation is that the difference in insurance status signifies increased social and/or financial means of families of multiple-listed candidates. However, it is important to note that we did not observe a significantly greater median household income in multiple-listed candidates using zip code-based census data. We also observed a trend toward less ECMO support at listing among multiple-listed patients. This likely reflects severity of illness and thus an inability to be transported for evaluation (or transplantation) at another center. While our finding that multiple-listed patients more commonly had a requirement for a prospective cross-match might suggest that these patients sought to increase their chance of transplantation by having their serum available for a prospective cross-match at more than one center, we observed no difference in the proportions who listed within different UNOS regions among multiple-listed patients with and without a prospective cross-match requirement. We also found that a significant minority of patients (45%) were multiple listed in the same UNOS region and that regional

differences in time to transplantation (adjusted for era) did not influence the selection of the second listing center.

While multiple listing was allowed early in the US solid organ transplant experience, UNOS sought to ban the practice in 1988 over concerns that patients who received organs while listed at more than one center did so at the expense of single-listed patients (2). Due to the lack of public support, the proposed ban was ultimately not enacted. For a period of time, there continued to be debate over the practice, but it is now well established and supported to the extent that OPTN policy stipulates that all candidates must be informed of the option of multiple listing (OPTN policy 3.2.3). One possible reason that multiple listing is more common among renal and liver transplant candidates is that nearly all await transplantation as outpatients. This more easily allows for travel to multiple centers for transplant evaluation than for patients who are awaiting transplantation as an inpatient. Once hospitalized to await transplantation, it is virtually impossible to remain multiple listed due to the impracticability of urgent medical transport with no advance notice should an organ becomes available to the candidate at the center where he/ she is not hospitalized. In our own center's recent experience, we found this to be a significant practical barrier to multiple listing. Although our status 1A candidate who was on "high-dose" inotropic support was multiple listed in Pittsburgh and at a center on the east coast, in practice, she would have been unable to travel to the other center had an organ come available to her there. Also because US heart allocation policy currently favors transplantation of higher-status candidates across regions over lower-status candidates within region (10), the advantages of multiple listing for outpatient, lower-status heart candidates are diminished relative to renal and liver candidates. This is consistent with our finding that multiple listing was less common following the 2006 change in heart allocation policy designed to reduce waitlist mortality through geographically broader organ sharing.

While our own experience suggests that multiple listing at geographically remote centers for inpatient status 1A candidates is impractical due to the time constraints upon receipt of donor organ offer, it is possible that multiple listing could be beneficial for outpatient status 1A candidates who are listed in different UNOS regions. Such candidates would theoretically be able to maximize access to a broader pool of donor organs (via multiple listing at remote centers) while maintaining priority to organ offers (based on current allocation policy) and be able to travel to either listing center via pre-arranged "on-call" air transportation.

Important limitations of our analysis are its use of registry data and the relative infrequency of the event of interest, which severely limited our power to detect smaller differences. We sought to overcome the low event frequency by propensity score matching of multiple-listed patients up to 4:1 with single-listed patients. Because we also thought it was vital to control for urgency status at listing and to match only to single-listed patients who had accrued at least as much waiting time as their multiple-listed match, we were only able to include 20 multiple-listed patients and 67 matched single-listed controls. Nonetheless, we found a trend consistent with renal and liver experience with regard to decreased time to transplantation for the multiple-listed pediatric heart cohort. Also our use of the OPTN dataset enabled us to study the entire US experience of multiple listing for pediatric heart transplantation. Finally,

median income data were derived from zip code-level census data, the heterogeneity of which with respect to economic status (11) may have limited our ability to detect a true difference in income between the groups that could substantiate the difference in insurance status observed in this and other studies of multiple-listed candidates.

In summary, multiple listing for pediatric heart transplantation has occurred rarely in the USA since 1995, with a decrease in frequency since the 2006 change in allocation policy favoring regional sharing to the highest status candidates. Similar to renal and liver transplantation, multiple listing occurs more commonly in patients with private insurance. However, unlike renal and liver transplantation, we found only a trend toward improved waitlist survival and no statistically significant difference in post-transplant survival for multiple-listed patients. Because of the rarity of multiple listing, further registry analyses are unlikely to be informative, and alternative approaches, such as querying listing centers and candidates' families about perceived barriers to multiple listing, should be considered.

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Abbreviations

ECMO	extra-corporeal membrane oxygenation
OPTN	Organ Procurement and Transplantation Network
UNOS	United Network for Organ Sharing

References

1. Merion RM, Guidinger MK, Newmann JM, Ellison MD, Port FK, Wolfe RA. Prevalence and outcomes of multiple listing for cadaveric kidney and liver transplantation. *Am J Transplant*. 2004; 4:94–100. [PubMed: 14678039]
2. Ardekani MS, Orlowski JM. Multiple listing in kidney transplantation. *Am J Kidney Dis*. 2010; 55:717–725. [PubMed: 20189279]
3. Feingold B, Comer DM, Park SY, Webber SA, Bryce CL. Outcomes on the basis of a prospective XM in pediatric heart transplantation. *J Heart Lung Transplant*. 2013; 32:56–62. [PubMed: 23157944]
4. US Census Bureau. Census of Population and Housing, Summary File 3: Aggregate household income in 1999 (dollars). Washington, DC: 2000. Available at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_00_SF3_P054&prodType=table [accessed October 10, 2012]
5. Zwiefelhofer, DB. [accessed December 18, 2012] Batch geocoding: Find latitude and longitude. Available at: <http://www.findlatitudeandlongitude.com/batch-geocode/>
6. D'Agostino RB. Tutorials in biostatistics: Propensity score methods for bias reduction in the comparison of a treatment to a non-randomized control group. *Stat Med*. 1998; 17:2265–2281. [PubMed: 9802183]
7. Renlund DG, Taylor DO, Kfoury AG, Shaddy RS. New UNOS rules: Historical background and implications for transplantation management. *J Heart Lung Transplant*. 1999; 18:1065–1070. [PubMed: 10598729]

8. Nativi JN, Kfoury AG, Myrick C, et al. Effects of the 2006 U.S. thoracic organ allocation change: Analysis of local impact on organ procurement and heart transplantation. *J Heart Lung Transplant*. 2010; 29:235–239. [PubMed: 19782588]
9. Vega D. The change in heart allocation policy in the United States: Is it working as designed? *J Heart Lung Transplant*. 2010; 29:255–256. [PubMed: 20036163]
10. Fine JP, Gray RJ. A proportional hazards model for the sub-distribution of a competing risk. *J Am Stat Assoc*. 1999; 94:496–509.
11. Singh TP, Gauvreau K, Bastardi HJ, Blume ED, Mayer JE. Socioeconomic position and graft failure in pediatric heart transplant recipients. *Circ Heart Fail*. 2009; 2:160–165. [PubMed: 19808335]

Fig. 1. Multiple listings for heart transplantation in USA by listing center and United Network for Organ Sharing (UNOS) region from April 1995 through December 2009. Centers are indicated by arbitrary letter assignment. Centers that shared repeated pairings for multiple listings are shown in light gray (A and J, n = 2) and dark gray (A and C, n = 3).

Fig. 2.
Multiple listings for pediatric HTx in the USA from April 1995 through December 2009.

Fig. 3.
Waitlist outcomes for the multiple- and single-listed matched cohorts.

Fig. 4. Kaplan–Meier curve depicting survival after transplantation for the multiple- and single-listed matched cohorts.

Table 1

Patient characteristics at listing

Variable	Single listed (n = 6267)	Multiple listed (n = 23)	p
Male	3523 (56%)	18(78%)	0.03
Age	5.5 ± 6.1 2(0–17)	6.1 ± 6.7 4(0–17)	0.64**
Weight (kg)	23.4 ± 24.5 12(1.4–187)	26.5 ± 28.7 14(3.2–105)	0.55**
Listing year	2002 ± 4.3 2002(1995–2009)	2000 ± 4.3 2000(1995–2008)	0.022**
Blood group			
O	3058 (49%)	12(52%)	0.97
A	2214(35%)	7 (30%)	
B	761 (12%)	3 (13%)	
AB	234 (4%)	1 (4%)	
Race			
White	3676 (59%)	16(70%)	0.76
Black	1235(20%)	3 (13%)	
Hispanic	1045(17%)	3 (13%)	
Other	311 (5%)	1 (4%)	
Cardiac diagnosis			
Dilated cardiomyopathy	2470 (39%)	7 (30%)	0.53
Hypertrophic cardiomyopathy	161 (3%)	0 (0%)	
Restrictive cardiomyopathy	302 (5%)	1 (4%)	
Previous transplant	175(3%)	1 (4%)	
HLHS, unoperated	83(1%)	0 (0%)	
CHD without prior surgery	176(3%)	0 (0%)	
CHD with prior surgery	891 (14%)	2 (9%)	
CHD prior surgery unknown	1868(30%)	12(52%)	
Other	141 (2%)	0 (0%)	
UNOS status			
1	1076(17%)	9 (39%)	0.025
1A	2909 (46%)	5 (22%)	
1B	603(10%)	4 (17%)	
2	1639(26%)	5 (22%)	
7	40(1%)	0 (0%)	
Preliminary cross-match required	474 (8%)	4 (17%)	0.08
ECMO	667(11%)	0 (0%)	0.1
Ventilator	1698(27%)	5 (22%)	0.56

Variable	Single listed (n = 6267)	Multiple listed (n = 23)	p
Inotropes	3073 (49%)	8 (35%)	0.17
Primary payer*			
Public/Gov't insurance	2700 (45%)	5 (22%)	0.03
Private Ins	3374 (55%)	18(78%)	
Median income (USD)	43 272 ± 16 560	47 842 ± 19 337	0.19

CHD, congenital heart disease; ECMO, extra-corporeal membrane oxygenation; Gov't, government; HLHS, hypoplastic left heart syndrome; USD, US dollars.

* 193 single-listed patients have a primary payer other than public/Gov't or Private (i.e., self, donation, free care, pending, foreign government, or missing) and are not included.

** Student's *t*-test. Statistical comparison of medians and ranges was not performed.

Table 2

Patient characteristics at listing after propensity matching

Variable	Single listed (n = 67)	Multiple listed (n = 20)	p
Male	53 (79%)	16(80%)	0.93
Age	6.9 ± 6.7 5(0–17)	5.6 ± 6.5 2.5(0–17)	0.42*
Weight (kg)	31.1 ± 32.5 17.7 (2.5–140)	26.3 ± 30.1 13.6(3.2–105)	0.56*
Listing year	1999 ± 3.6 1998(1995–2009)	1999 ± 4.3 1998(1995–2008)	0.53*
Blood group			
O	38 (57%)	9 (45%)	0.73
A	16(24%)	7 (35%)	
B	11 (16%)	3(15%)	
AB	2 (3%)	1 (5%)	
Race			
White	48 (72%)	15(75%)	0.29
Black	13(19%)	1 (5%)	
Hispanic	4 (6%)	3(15%)	
Other	2 (3%)	1 (5%)	
Cardiac diagnosis			
Dilated cardiomyopathy	27 (40%)	5 (25%)	0.27
Restrictive cardiomyopathy	2 (3%)	1 (5%)	
Previous transplant	4(6)	1 (5%)	
CHD with prior surgery	1 (2%)	2(10%)	
CHD prior surgery unknown	33 (40%)	11 (55%)	
UNOS status			
1	34(51%)	9 (45%)	0.88
1A	11 (16%)	3(15%)	
1B	6 (9%)	3(15%)	
2	16(24%)	5 (25%)	
7	0 (0%)	0 (0%)	
Preliminary cross-match required	12(18%)	4 (20%)	0.83
ECMO	0 (0%)	0 (0%)	
Ventilator	9 (13%)	5 (25%)	0.22
Inotropes	20 (30%)	6 (30%)	0.99
Primary payer			
Public/Gov't insurance	16(24%)	4 (20%)	0.72
Private Ins	51 (76%)	16(80%)	
Median income (USD)	45 448 ± 17 095	47 213 ± 16 937	0.69

CHD, congenital heart disease; ECMO, extra-corporeal membrane oxygenation; Gov't, government; USD, US dollars.

* Student's *t*-test. Statistical comparison of medians and ranges was not performed.