

## SUPPLEMENTAL DIGITAL CONTENT

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### ***Risk-adjusted covariates per the per the Scientific Registry of Transplant Recipients (SRTR) adult 3-year heart transplant risk model [1] :***

BMI ratio (donor/recipient), donor age, total ischemic time, and the following recipient variables: most recent panel reactive antibody (%), age at transplantation, cardiac index (L/min/m<sup>2</sup>), diagnosis (cardiomyopathy, congenital, or other), height (cm), race (Black, Hispanic/Latino, Asian, White, other/unknown), serum creatinine (mg/dL), sex, weight (kg), diabetes (yes vs. no or unknown), and ventilator requirement preoperatively (yes/no). In accordance with the SRTR risk model documentation, a separate category for unknown values was created. Hazard ratio (HR) and 95% confidence interval (CI) were calculated as measures of strength of association and precision, respectively. The proportionality assumption was verified by assessment of Schoenfeld residual plots.

### ***Methods: Secondary Analysis – Pre-transplant Mortality***

In evaluating postoperative outcomes of IABP vs. dLVAD at the time of transplant, it is important to put this information in context of pre-transplant mortality. Therefore, a comparison of pre-transplant mortality in patients with dLVAD vs. IABP at the time of listing was performed. This population included all waitlist candidates regardless of whether or not transplantation was ultimately performed and was limited to patients with dLVAD or IABP at the time of listing (note that the primary analysis is based on the presence of dLVAD or IABP at the time of transplant, but the patients may or may not have had a device at the time of listing). Potential outcomes were: 1) died on waitlist (or became too sick for transplant), 2) transplanted, or 3) removed while well or alive on waitlist at last follow-up. Unadjusted comparisons were made using Pearson Chi-square test. Unadjusted waitlist survival was also quantified using Kaplan-Meier methods (censored at the time of transplant) and compared using the log-rank test.

Multivariable Cox's proportional hazards modeling was used to assess the simultaneous effect of circulatory support modality at the time of listing on risk of pre-transplant death, while adjusting for

potential confounders based on covariates per the SRTR heart waitlist mortality model.[2] These covariates were age, diagnosis (cardiomyopathy, valvular, congenital, or other), gender, race (Black, Hispanic/Latino, Asian, White, other/unknown), and listing status (1A, 1B, or inactive). In accordance with the SRTR risk model documentation, a separate category for unknown values was created. Hazard ratio (HR) and 95% confidence interval (CI) were calculated as measures of strength of association and precision, respectively. The proportionality assumption was verified by assessment of Schoenfeld residual plots.

***Results: Secondary Analysis – Pre-transplant Mortality with IABP vs. dLVAD at the time of listing***

From a total of 86,753 heart transplants candidates waitlisted in the UNOS database, 59,226 were outside the time-frame of our analysis, 5,304 were multi-organ, pediatric, or repeat transplants, 103 had missing, incomplete or conflicting data IABP/dLVAD data, and 18,672 did not require IABP or dLVAD therapy at the time of listing. This resulted in a total of 3,448 patients met inclusion criteria for the secondary analysis of IABP (n=1,095, 31.8%) vs. dLVAD (n=2,353, 68.2%) at the time of placement on waitlist. The IABP group was more frequently female (23.7% vs. 19.9%,  $p=0.013$ ), white (67.1% vs. 66.5%,  $p=0.003$ ), and had ischemic heart disease as the etiology of their heart failure (50.5% vs. 45.0%,  $p=0.003$ ) (Supplement Table 1). Additionally, the IABP group had a significantly higher proportion requiring intensive care, ventilator support, and inotrope support at the time of placement on the waitlist ( $p<0.001$  for all) (Supplement Table 1). The dLVAD group demonstrated a higher proportion of patients with blood type O (48.5% vs. 43.4%,  $p=0.005$ ) and a higher proportion with Medicare (15.2% vs. 9.9%) or Medicaid (26.8% vs. 24.9%) insurance status ( $p<0.001$ ) (Supplement Table 1).

Unadjusted waitlist survival was significantly shorter in patients with an IABP at the time of listing compared to the dLVAD group (Supplement Figure 1). Upon risk-adjusted multivariable Cox proportional hazard modeling, this relationship retained statistical significance (adjusted hazard ratio for IABP vs. dLVAD: 2.69, 95% CI: 2.25 - 3.22,  $p<0.001$ ) (Supplement Figure 1). A higher proportion of

patients in the IABP group died on the waitlist or became too sick for transplant (26.76% vs. 11.94%) and a lower percent were transplanted (59.54% vs. 65.11%) (Supplement Figure 2).

#### **REFERENCES:**

1. The SRTR Risk Model Documentation: Heart, Adult, Three-Year Patient Survival.  
<http://www.srtr.org/csr/current/Centers/201206/modtabs/Risk/HRADA3P.pdf>. Accessed 02/17/2014.
2. The SRTR Risk Model Documentation: Heart Waitlist Mortality Rates.  
<http://www.srtr.org/csr/current/Centers/201506/modtabs/Rate/HRd1.pdf>. Accessed 06/30/2015.

#### **SUPPLEMENTAL DIGITAL CONTENT LEGENDS:**

Risk-adjusted covariates per the per the Scientific Registry of Transplant Recipients (SRTR) adult 3-year heart transplant risk model.

Methods: Secondary Analysis – Pre-transplant Mortality.

Results: Secondary Analysis – Pre-transplant Mortality with IABP vs. dLVAD at the time of listing

Supplement Table 1. Survival analysis by circulatory support modality at the time of transplant.

Supplement Figure 1. Pre-transplant survival analysis by circulatory support modality at the time of listing.

Supplement Figure 2. Disposition of waitlist candidates by circulatory support modality at the time of listing.

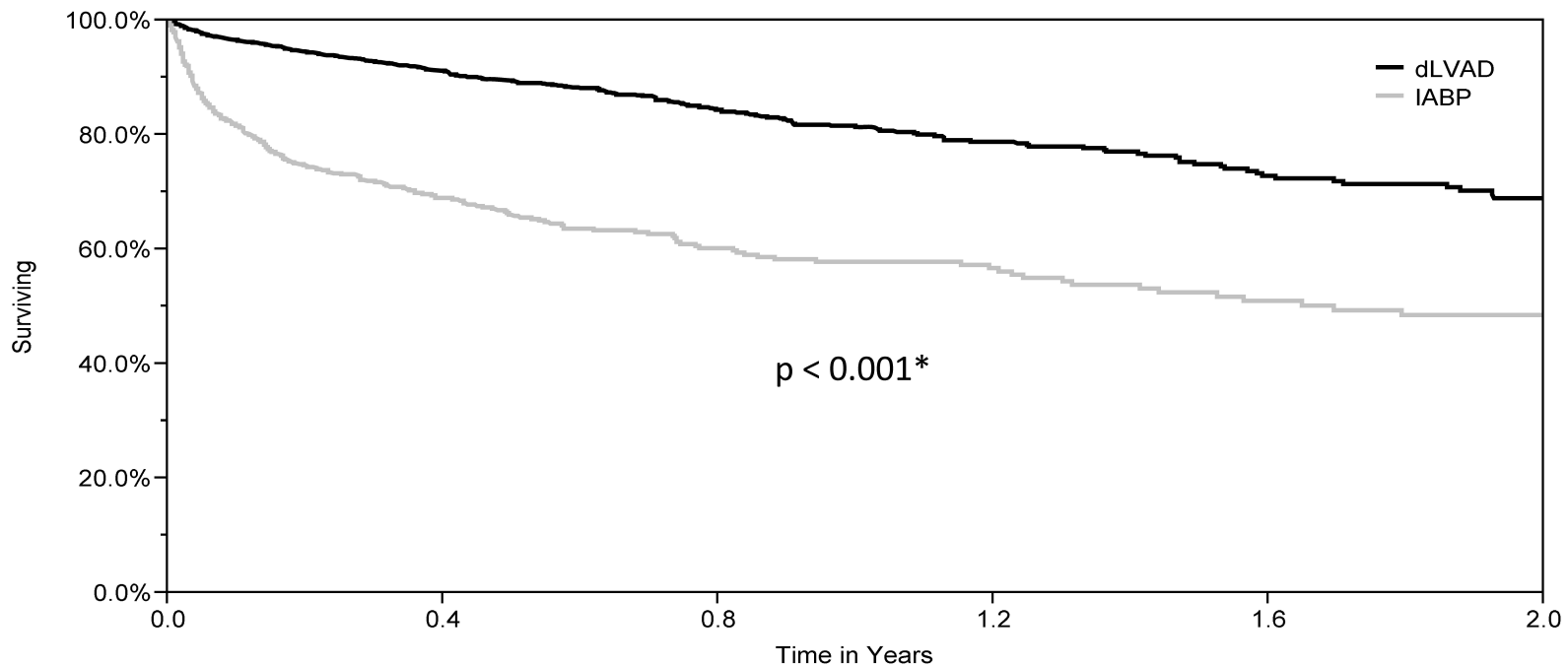
**Supplement Table 1. Baseline characteristics of waitlist candidates by circulatory support modality.**

Characteristic	Total Sample	Support Modality At the Time of Listing		
	All (n=3448)	IABP (n=1095)	dLVAD (n=2353)	p-Value
Age at listing	54 (45, 61)	55 (46, 61)	54 (45, 61)	0.475
Age ≥ 60	1,064 (30.9%)	339 (31.0%)	725 (30.8%)	0.931
Female Gender	728 (21.1%)	259 (23.7%)	469 (19.9%)	0.013 *
Race				0.003 *
White	2,300 (66.7%)	735 (67.1%)	1,565 (66.5%)	
Black	790 (22.9%)	223 (20.4%)	567 (24.1%)	
Other/Unknown	358 (10.4%)	137 (12.5%)	221 (9.4%)	
Etiology of Ischemic heart disease	1,610 (46.7%)	552 (50.4%)	1,058 (45.0%)	0.003 *
History of Diabetes	1,044 (30.5%)	320 (29.5%)	724 (31.0%)	0.362
Creatinine at Transplant (mg/dL)	1.2 (0.9, 1.6)	1.3 (1.0, 1.8)	1.2 (0.9, 1.5)	<0.001 *
BMI (kg/m <sup>2</sup> ) at Transplant	27.0 (24.1, 30.7)	26.1 (23.3, 29.1)	27.5 (24.5, 31.2)	<0.001 *
Requiring intensive care at listing	518/816(63.5%)	345/398(86.7%)	173/418(41.4%)	<0.001 *
Ventilator dependent at listing	318 (9.2%)	190 (17.4%)	128 (5.4%)	<0.001 *
Inotrope dependent at listing	957 (27.8%)	641 (58.5%)	316 (13.4%)	<0.001 *
Functional status requiring full assist	1,972/3,164(62.3%)	863/920(93.8%)	1,109 (49.4%)	<0.001 *
Recipient Blood Type O	1,617 (46.9%)	475 (43.4%)	1,142 (48.5%)	0.005 *
Primary Insurance Carrier				<0.001 *
Medicaid	465 (13.5%)	108 (9.9%)	357 (15.2%)	
Medicare	904 (26.2%)	273 (24.9%)	631 (26.8%)	
Private/Self pay	1,908 (55.3%)	658 (60.1%)	1,250 (53.1%)	
Other	171 (5.0%)	56 (5.1%)	115 (4.9%)	
Working for income at listing	71/2,065(3.4%)	6/579(1.0%)	65/1,486(4.4%)	<0.001 *

Median (interquartile range) for non parametric continuous variables. N (%) for categorical variables. If data is missing for > 5% of the study population, the denominator is give for categorical variables and "n" given for continuous variables. Wilcoxon signed-rank test for continuous variables. Pearson Chi-Square test for categorical variables. Abbreviations: IABP = intra-aortic balloon pump; dLVAD = durable, intracorporeal left ventricular assist device; BMI = body mass index.

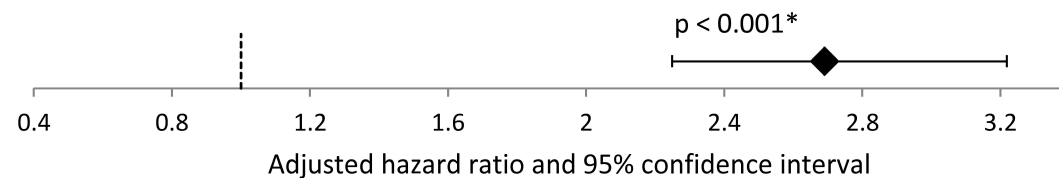
**Supplement Figure 1. Pre-transplant survival analysis by circulatory support modality at the time of listing.**

**Unadjusted Kaplan-Meier Survival Analysis**



	Number at Risk					
dLVAD	2,353	1,015	548	299	169	101
IABP	1,095	304	162	101	66	49

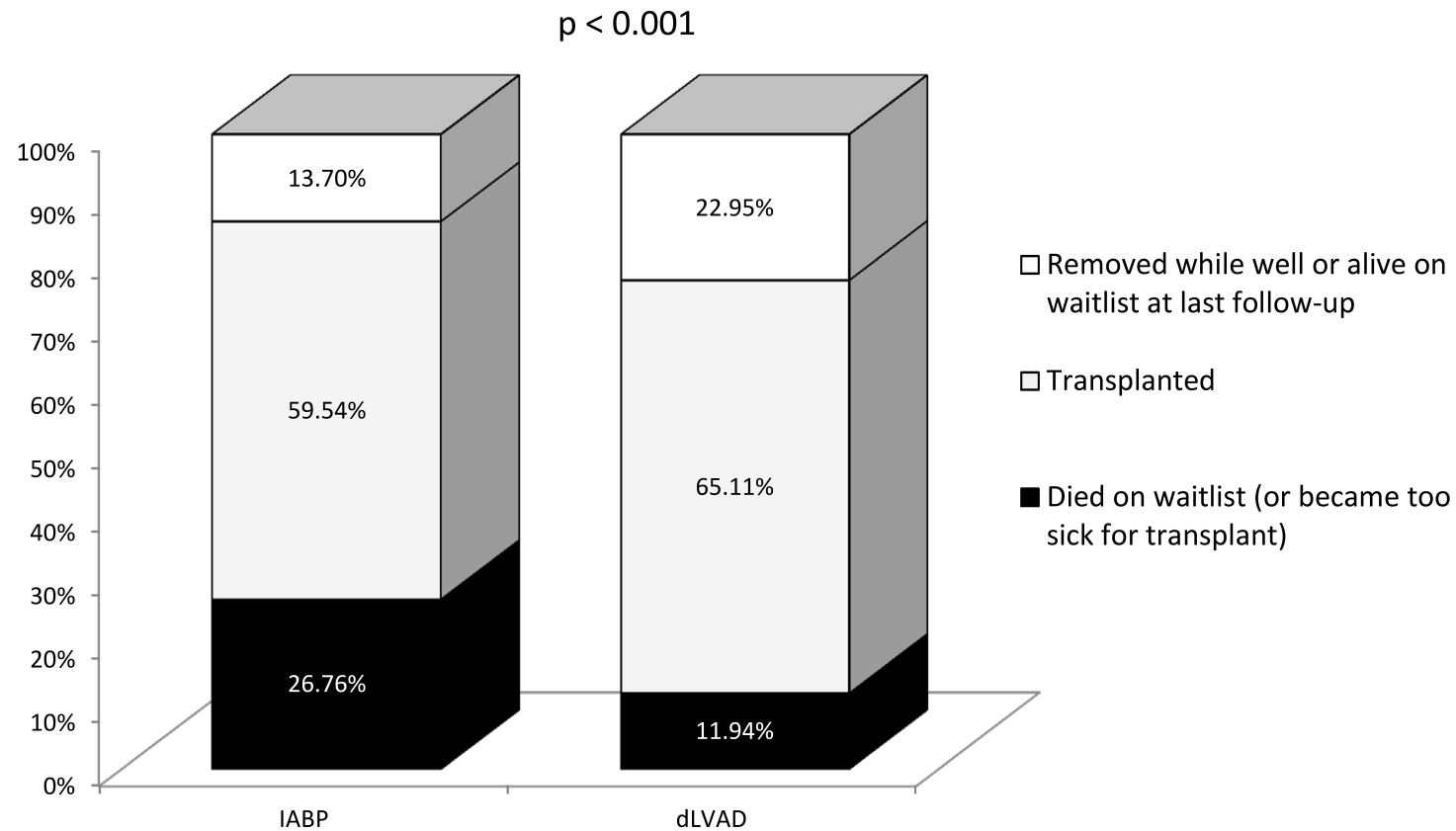
**Risk-Adjusted Cox Proportional Hazard Analysis [ref = dLVAD]**



Abbreviations: IABP = intra-aortic balloon pump; dLVAD = durable, intracorporeal left ventricular assist device.

\* indicates statistical significance.

**Supplement Figure 2. Disposition of waitlist candidates by circulatory support modality at the time of listing.**



Abbreviations: IABP = intra-aortic balloon pump; dLVAD = durable, intracorporeal left ventricular assist device.  
Statistical comparison made using Pearson Chi-Square test (unadjusted).