Minimally-Invasive, Temporary Left Ventricular Assist Device Bridging to Heart Transplantation in the United States

Nicholas R Hess MD[1], Gavin W Hickey MD[2], Mary E Keebler MD[2], David J Kaczorowski MD[1,2]

[1]Division of Cardiac Surgery, Department of Cardiothoracic Surgery, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, U.S.A.
[2]University of Pittsburgh Medical Center Heart and Vascular Institute, Pittsburgh, Pennsylvania, U.S.A.

INTRODUCTION

- Heart transplantation is the gold standard treatment of end-stage heart failure
- 2018 the United States revised its heart allocation policy with several impacts
  - Increased priority for temporary, non-dischargable mechanical support devices
  - Decreased priority for durable, dischargable support devices
- Of temporary support devices, minimally-invasive, peripherally-inserted temporary left ventricular assist devices (LVAD) have gained popularity among bridging strategies

STUDY PURPOSE

- The purpose of this study was to investigate the trends and outcomes of minimally-invasive, temporary LVAD bridging to heart transplantation before and after the United States 2018 heart allocation policy change

METHODOLOGY

- Retrospective analysis utilizing the United States Organ Network registry database
- ***Inclusion Criteria***
  - Adult (≥ 18 years) isolated heart transplant recipients
  - Bridged to transplantation with temporary LVAD
    - Impella 2.5, CP, 5.0, 5.5
- ***Exclusion Criteria***
  - Heterotopic heart transplants
  - Multi-visceral transplants

METHODOLOGY cont.

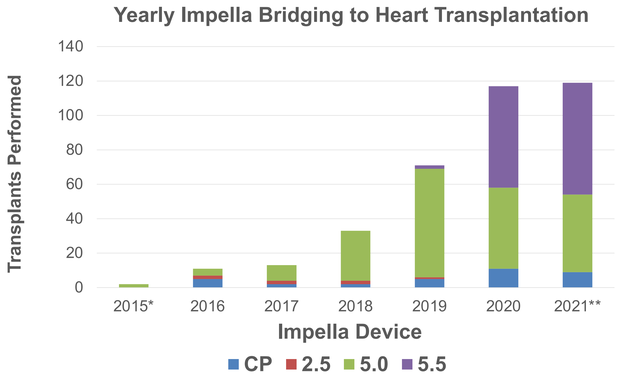
- **Study Cohorts**
  - Two, equal-length time periods before and after policy change
    - Old Policy: November 19, 2015 – October 17, 2018
    - New Policy: October 18, 2018 – September 30, 2021
- **Primary Outcomes**
  - One-year post-transplant survival
- **Secondary Outcomes**
  - Donor and recipient characteristics
  - Post-transplant complications
  - Yearly trends in device bridging

RESULTS

- 365 heart transplant recipients analyzed
  - 45 Old Policy
  - 320 New Policy

Table 1. Comparison of baseline recipient and transplant-related characteristics

	Old Policy N= 45	New Policy N=320	P-Value
Age, years	57 (47-62)	57 (45-65)	0.57
Heart failure etiology			
Non-Ischemic	28 (62.2%)	204 (63.7%)	0.97
Ischemic	12 (26.7%)	84 (26.2%)	
Female	18 (40.0%)	48 (15.0%)	<0.001
Mechanically ventilated at transplant	2 (4.4%)	4 (1.2%)	0.11
Intravenous inotropes	33 (73.3%)	213 (66.6%)	0.36
Waitlist time, days	28 (9-68)	14 (6-34)	0.008
Donor-recipient distance, miles	51 (19-324)	226 (104-406.5)	0.001
Graft cold ischemia time, hours	3.1 (2.5-3.8)	3.5 (2.9-3.9)	0.039



*includes patients November 19, 2015 and after
**includes patients September 30, 2021 and before

Figure 1. Yearly trends in temporary LVAD bridge to heart transplantation

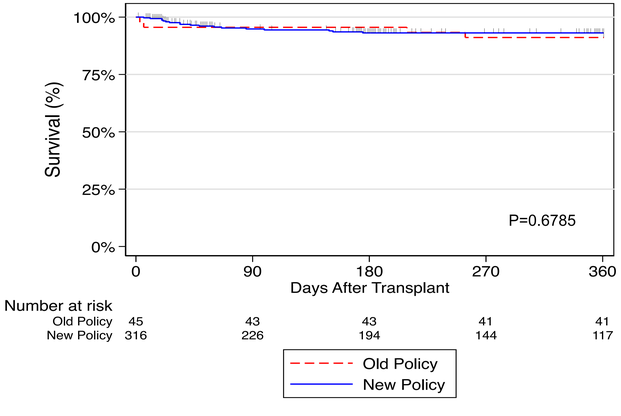


Figure 2. Comparison of one-year post-transplant survival

RESULTS cont.

Table 2. Comparison of post-transplant complications and outcomes

	Old Policy N=45	New Policy N=320	P-Value
Renal failure requiring dialysis	6 (13.3%)	43 (13.7%)	0.95
Stroke	4 (8.9%)	10 (3.2%)	0.064
Permanent pacemaker	0 (0.0%)	4 (1.3%)	0.45
Hospital length of stay, days	15 (10-21)	16 (11-21)	0.31
Treated acute rejection	2 (4.4%)	33 (10.5%)	0.20
30-day mortality	2 (4.4%)	7 (2.5%)	0.47

CONCLUSIONS

- Since the 2018 heart allocation system change, there has been a profound increase in temporary LVAD usage as a bridge to transplantation within the United States
- Since 2015, there has been a notable evolution in devices that are commonly used
- Despite the adoption of newer devices, outcomes appear to be consistent

ACKNOWLEDGEMENTS

- None

CONTACT INFORMATION

- Nicholas Hess, MD: hessnr@upmc.edu