Heart Transplantation 2024

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3/8/2024

University of Nebraska Medical Center

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Objectives

- Review UNMC Outcomes in Heart Tx
- Discuss Strategies to Improve Outcomes: Shock Team, Expanding the Donor Pool, Acute MCS as a bridge, OCS, Monitoring of Patients Post-Transplant

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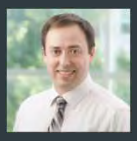
Heart Transplant Faculty


Scott Lundgren

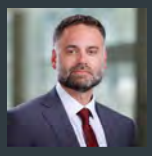

Marshall Hyden


Adam Burdorf


John Um


Chrissy Dunbar


Ron Zolty


Tony Castleberry


Robbie Garvin


Doug Stoller


Brian Lowes


Marian Urban

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Clinical Programs

- Heart Transplant
- Heart Failure Disease Management
- Pulmonary HTN
- LVADs & MCS
- Cardiovascular Genetics
- Cardiogenic Shock
- Cardio-Oncology

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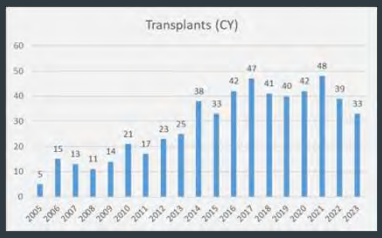
Fun Heart Transplant Facts

First successful heart 1967 (DCD)

Record 4,545 hearts nationally in 2023

NEUN 584 hearts



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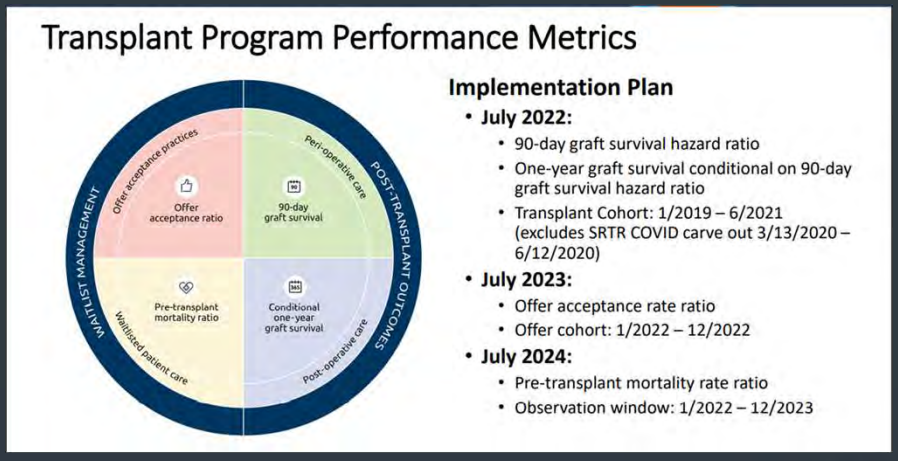
United Network Organ Sharing



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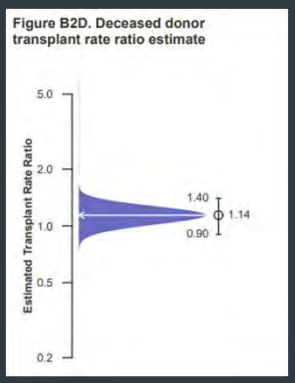
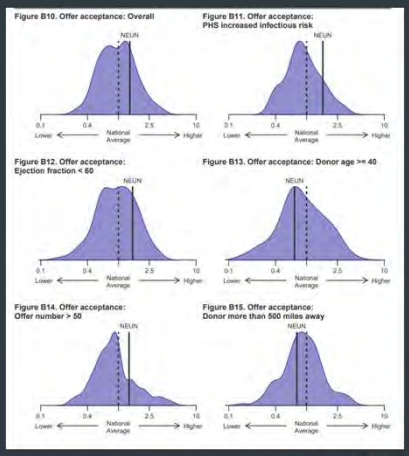
Acceptance Practices





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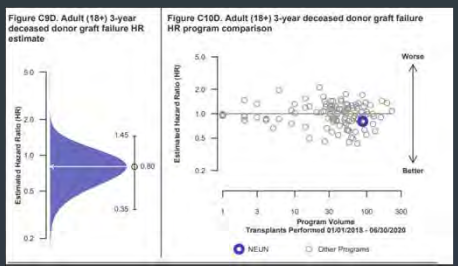
3 year Graft Survival

	NEUN	U.S.
Number of transplants evaluated	88	6,166
Estimated probability of surviving with a functioning graft at 3 years & [95% CI] (unadjusted for patient and donor characteristics)	92.86% [87.50%-98.54%]	84.99% [82.35%-87.72%]
Expected probability of surviving with a functioning graft at 3 years (adjusted for patient and donor characteristics)	84.89%	--
Number of observed graft failures (including deaths) during the first 3 years after transplant	6	543
Number of expected graft failures (including deaths) during the first 3 years after transplant	7.96	--
Estimated hazard ratio*	0.80	--
95% credible interval for the hazard ratio**	[0.35, 1.45]	--



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Historical Waitlist Mortality

July 2023

MPSC Review Section - Heart

MPSC Pre-Transplant Review Criteria (not public)*
Pre-transplant mortality between 01/01/2021 and 12/31/2022
Offer acceptance between 01/01/2022 and 12/31/2022

	Adult (18+)		Pediatric (<18)	
	Pre-Transplant Mortality	Offer Acceptance	Pre-Transplant Mortality	Offer Acceptance
Number***	34	363	0	--
Observed events	10	36	0	--
Expected events	4.555	21.600	0.003	--
Hazard Ratio (HR)	1.831	1.610	0.999	--
Probability HR > boundary**	0.523	0.000	0.135	--
Identified for review	Yes	No	No	--
Identified in Yellow-Zone	Yes	No	No	--

*This information is provided for your center's review only and will not appear on the public version of the PSRs at www.srtr.org. The information listed here is that used by the Membership and Professional Standards Committee (MPSC) to identify centers for review based on greater than 50% probability of meeting any of the following criteria.
(1) The center pre-transplant mortality rate ratio (HR) exceeds 1.75 - THIS CRITERION WILL NOT BE CONSIDERED BY THE MPSC UNTIL 2024
(2) The center offer acceptance rate ratio is lower than 0.3 for adults or 0.18 for pediatrics - THIS CRITERION WILL NOT BE CONSIDERED BY THE MPSC UNTIL 2023
(3) The center 90-day post transplant graft survival hazard ratio exceeds 1.75 for adults or 1.60 for pediatrics
(4) The center 1-year conditional on 90-day post transplant graft survival hazard ratio exceeds 1.75 for adults or 1.60 for pediatrics
** For offer acceptance outcomes this is the probability the HR > boundary
*** For pre-transplant mortality this is the number of patients on the waitlist at the start of the period. For offer acceptance, this is the number of offers made during the time period.

This data reported here were prepared by the Scientific Registry of Transplant Recipients (SRTR) under contract with the Health Resources and Services Administration (HRSA). See COVID-19 Guide for pandemic-related follow-up limits.

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Heart Transplant SRTR Adult 90-day Graft Failure

July 2023

Adult Heart Outcomes data updated through: 7/10/2023
SRTR COVID-19 ADJUSTED

Adult Heart Graft Failure - 90 DAY		Transplant Volume	Observed Graft Failure	Expected Graft Failure	Observed %	Expected %	LCI	Hazard Ratio
Time Period								
1/1/2016	6/30/2018	68	4		94.1%			
7/1/2016	12/31/2018	87	8		95.4%			
1/1/2017	6/30/2019	104	5		95.2%			
7/1/2017	12/31/2019	97	3		96.9%			
1/1/2018	6/30/2020	90	4		95.6%			
7/1/2018	12/31/2020	86	6		93.0%			
1/1/2019	6/30/2021	91	5	4.47	93.4%	94.4%	94.6%	1.19
7/1/2019	12/31/2021	91	9	4.83	90.1%	94.3%	94.6%	1.61
1/1/2020	6/30/2022	91	10	5.06	89.0%	94.1%	94.7%	1.7
7/1/2020	12/31/2022	98	8		91.8%			
1/1/2021	6/30/2023	95	5		94.7%			
7/1/2021	12/31/2023	71	5		93.3%			
1/1/2022	6/30/2024	52	2		96.2%			
7/1/2022	12/31/2024	32	0		100.0%			
1/1/2023	6/30/2025	16	0		100.0%			
7/1/2023	12/31/2025	0	0		0.0%			
1/1/2024	6/30/2026	0	0		0.0%			

**Orange Areas estimated off currently available information. Yellow areas are future cohorts

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NEUM: 90 day Mortality Analysis

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age in Years at Transplant	105	14	71	52.90	13.894
BMI at Transplant	105	12.2512	43.2357	28.576567	5.8549409
90-Day Mortality (Yes=1; No=0)	105	0	1	.10	.295
Donor Age	105	14	59	28.73	8.786
Total Ischemic Time (Hours) (HR,LU,HL,IN)	105	1.149902344	9.515625000	3.545768229	1.254492152
# Previous Sternotomies	105	0	4	.90	.909
# Pre-tx hospital days	105	0	64	5.85	10.963
Valid N (listwise)	105				

	90-Day Mortality (Yes=1; No=0)	
	Alive	Dead
	Mean	Mean
Total Ischemic Time (Hours) (HR,LU,HL,IN)	3.456219161	4.396484375

Report

Age in Years at Transplant

90-Day Mortality (Yes=1; No=0)	Mean	N	Std. Deviation
Alive	52.37	95	14.172
Dead	57.90	10	10.115
Total	52.90	105	13.894

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Strategies to Improve Outcomes

Pre-transplant Survival: Shock Team, Bridging with MCS

Offer Acceptance Ratio: Expanding Donor Pool with DCD

90 Day Conditional Survival: Organ Care Systems

1 year Conditional Survival: Rejection Monitoring & Molecular diagnostics

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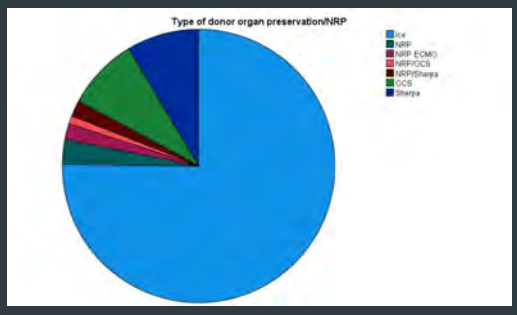
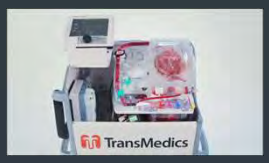
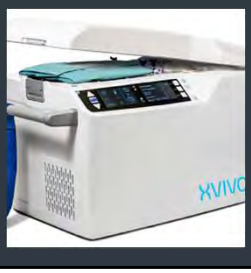
NEUM: Organ Care







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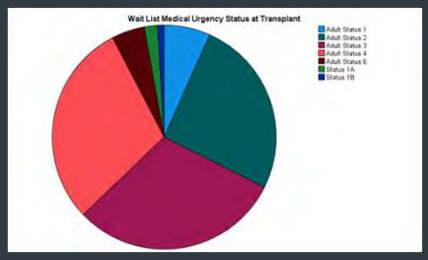
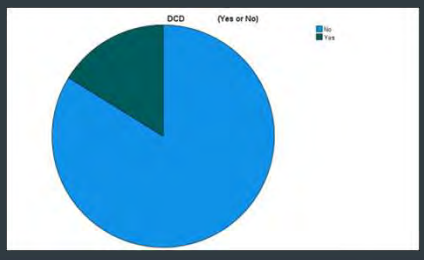
NEUM Medical Urgency and DCD





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CONSENSUS STATEMENT
HEART FAILURE RELATED CARDIOGENIC SHOCK: AN ISHLT CONSENSUS CONFERENCE CONTENT SUMMARY

Table 1A Tiers of Shock Centers and Shock Team Composition.

	Tier 4	Tier 3	Tier 2	Tier 1
Description	Non-PCI capable	24/7 Cath Lab Can do tMCS (IABP, Impella)	Tier 3 + CT surgery VA-ECMO Dedicated CCU	Tier 2+: LVAD/HT
CS goals	Identify CS Pharmacologic support and transfer	Identify and Stabilize CS +/- PCI +/- Initiate tMCS Identify refractory CS and transfer	Identify, Stabilize, and Manage CS PCI Initiate, Manage, and Escalate tMCS Bridge to Recovery Identify Refractory CS and Transfer	Identify, Stabilize, and Manage CS PCI Initiate, Manage, and Escalate tMCS Bridge to Recovery LVAD, OHT
Shock Team Needed	No	Yes (if patients will stay after tMCS implantation) +/- Consultation with Tier 2/1 Team	Yes	Yes
Shock Team Members		IC Intensivist	IC Intensivist HF CTS	IC Intensivist HF CTS
Notes	Needs relationships w/higher tier centers	Wide variation Needs relationships w/Tier 2		

Kanwar et al JHLTx 2023

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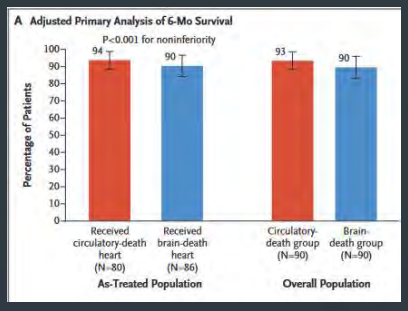
ESTABLISHED IN 1812 JUNE 8, 2023 VOL. 388 NO. 23

Transplantation Outcomes with Donor Hearts after Circulatory Death

J.N. Schroder, C.B. Patel, A.D. DeVore, B.S. Bryner, S. Casalinova, A. Shah, J.W. Smith, A.G. Fiedler, M. Daneshmand, S. Silvestry, A. Geirsson, V. Pretorius, D.L. Joyce, J.Y. Lim, F. Esmailian, K. Takeda, K. Mudy, Y. Shudo, C.T. Salerno, S.M. Pham, D.J. Goldstein, J. Philpott, J. Dunning, L. Lozonschi, G.S. Couper, H.R. Mallidi, M.M. Givertz, D.T. Pham, A.W. Shaffer, M. Kai, M.A. Quader, T. Absi, T.S. Attia, B. Shukrallah, B.C. Sun, M. Farr, M.R. Mehra, J.C. Madsen, C.A. Milano, and D.A. D'Alessandro

Table 2. Serious Adverse Events Associated with the Heart Graft in the 30 Days after Transplantation (As-Treated Population).*

Variable	Recipients of Heart from Circulatory-Death Donor (N=80)	Recipients of Heart from Brain-Death Donor (N=86)†
Occurrence per patient‡		
Mean (95% CI)	0.2±0.42 (0.1–0.3)	0.1±0.39 (0.0–0.2)
Median (range)	0 (0–1)	0 (0–2)
Primary graft dysfunction — no./total no. (%)		
Left or right ventricle, moderate or severe	18/80 (22)	8/84 (10)
Left ventricle, moderate	5/80 (6)	4/84 (5)
Left ventricle, severe	12/80 (15)	4/84 (5)
Right ventricle	1/80 (1)	0/84
Primary graft failure and retransplantation — no./total no. (%)	0/80	2/86 (2)



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Expand Trial : OCS to expand donor pool

- > 4 hours ischemic time
- > 2 hours + LVH, LVEF <50%, Age >55, down time >20 min

93 eligible hearts

UNOS match run 66 declines

75 of 93 hearts utilized

Average OCS time 6.3 hrs

30 day survival 95%

PGD 11%

Schroder et al JHLTx 2019

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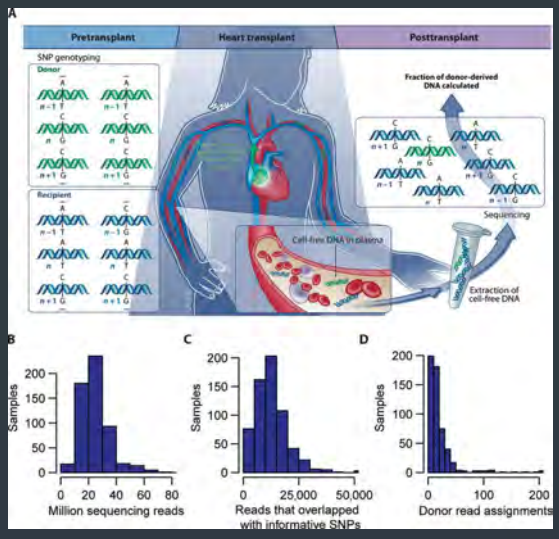
Monitoring for Rejection: dd-cf DNA



Vlaminck et al Science Translational Medicine 2014

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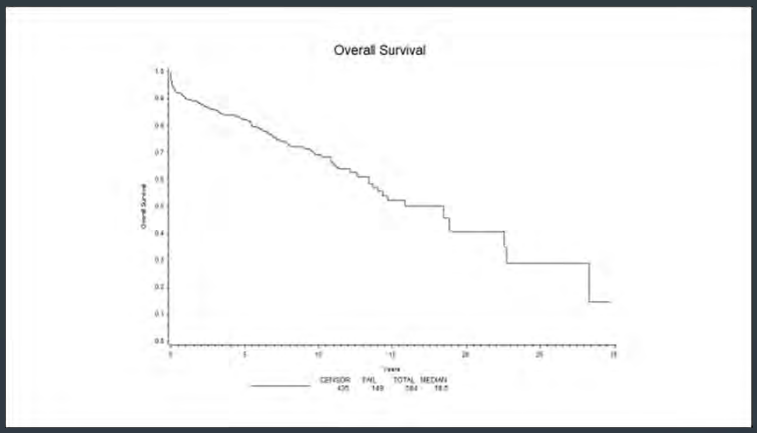
NEUN Survival



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Heart Transplant

Average Wait Time by Blood Type (Days)				
	A	AB	B	O
Status 1	2.6	NA	2.5	3.8
Status 2	5.7	10	7.3	13.6
Status 3	21.4	NA	92.8	93.8
Status 4	131.7	10.5	109.7	322.5
Status 5	184	NA	NA	NA
Status 6	183.7	NA	48.3	177
1A	8.7	20.5	20.5	9.7
1B	128.2	NA	141	200.6

Data Source: UNOS Custom Report. Pt transplanted 1/1/18 - 12/1/2023

Days Waiting at Most Recent Status Prior to Transplant

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Conclusions: Transplantation 2024

- Outcomes are transparent and there is a focus on quality improvement
- Increased utilization of temporary MCS and OCS
- Expanded donor pools, and transplantation of sicker patients
- Increased monitoring of patients post transplant with molecular diagnostics

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