

External Validation of the Minnesota Pectoralis Muscle Risk Score to Predict Mortality After Ventricular Assist Device Implantation

Rebecca Cogswell, MD

Thomas Murray, PhD, Raquel Araujo-Gutierrez, MD, Levi Teigen, RD, Barry Trachtenberg, MD,
Jessica Schultz, MD, Ranjit John, MD, Cindy M. Martin, MD, Jerry Estep, MD

HOUSTON
Methodist[®]
LEADING MEDICINE

 **HEALTH**SM
University of Minnesota
Medical Center



Relevant Financial Relationship Disclosure Statement

A Novel Model Incorporating Pectoralis Muscle Measures To Predict Mortality After Left Ventricular Assist Device
Implantation *Rebecca Cogswell, MD*

I WILL NOT discuss off label use and/or investigational use of drugs or devices

The following relevant financial relationships exist related to this presentation:

- Ranjit John: Abbott, Research Grant, Speakers Bureau
- Rebecca Cogswell, MD: Abbott, Speakers Bureau Medtronic: Heart Failure Advisory Board, consultant, speakers Bureau
- Jerry Estep, MD Abbott: Consultant , Medtronic: Heart Failure Advisory Board
- Barry Trachtenburg, MD Abbott consultant
- Thomas Murray, PhD Medtronic: Medtronic Biostatistics Faculty Fellow

BACKGROUND

- LVAD implantation extends survival of patients with end stage systolic heart failure
- Technological advances, experience → improved survival
- Subset of patients with high mortality, hospitalization rates on LVAD support
- Heart failure prevalence rising, era of shared decision making
- Important to predict an expected survival benefit after LVAD implantation

BACKGROUND

EMERGING INVESTIGATORS

Preoperative
and Attenuation
Tomographic
Predictors of
Ventricular

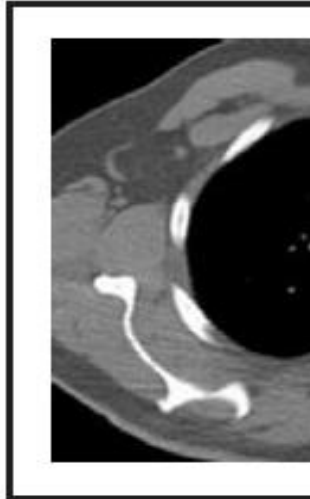
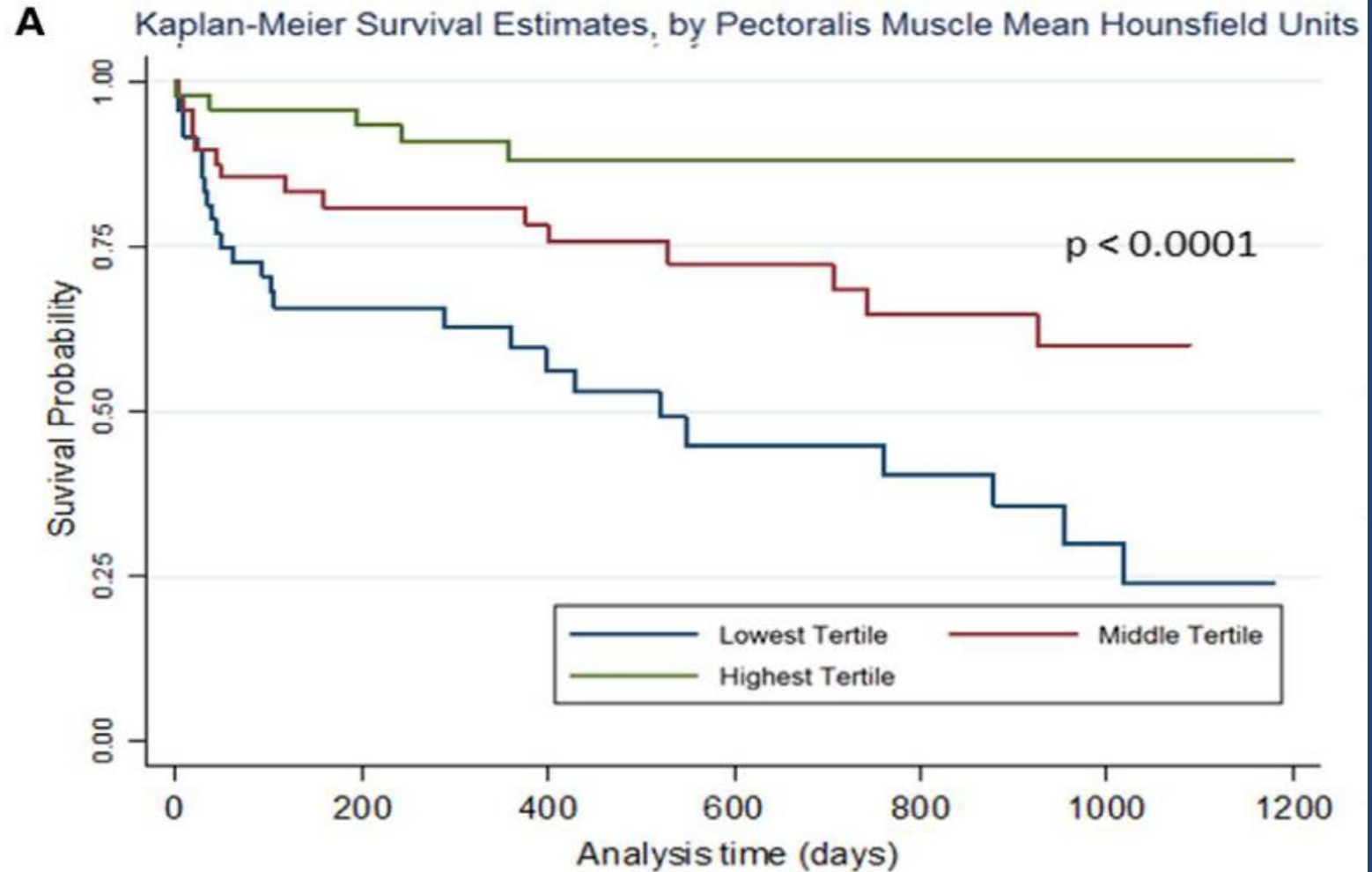


Figure 1. Axial CT scan demonstrating pectoralis muscle.



A Novel Model Incorporating Pectoralis Muscle Measures to Predict Mortality After Ventricular Assist Device Implantation

REBECCA COGSWELL, MD,¹ BARRY TRACHTENBERG, MD,² THOMAS MURRAY, PhD,³ JESSICA SCHULTZ, MD,¹
LEVI TEIGEN, PhD, RD,⁴ TADASHI ALLEN, MD,⁵ RAQUEL ARAUJO-GUTIERREZ, MD,² RANJIT JOHN, MD,⁶
CINDY M. MARTIN, MD,¹ AND JERRY ESTEP, MD⁷

Minneapolis, and Minnesota; Houston, Texas; and Cleveland, Ohio

MINNESOTA PECTORALIS RISK SCORE

African American?

- African American
 Non-African American

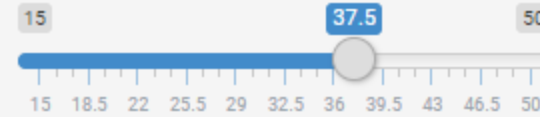
Bridge to Transplant Status

- Bridge
 Destination

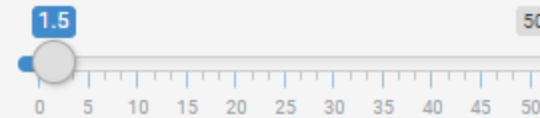
Contrast

- Present
 Absent

Body Mass Index (kg/m²)



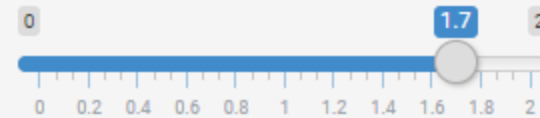
Pectoralis Hounsfield Unit Mean (HU)



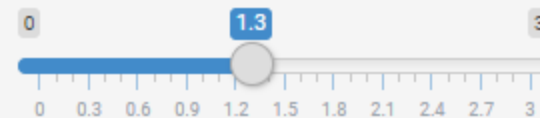
Pectoralis Muscle Index (cm²/m²)



Creatinine (mg/dL)



Total Bilirubin (mg/dL)



MPMRS	Group
3.53	High Risk

Factor	Units	Input
Race (AA)		Non-AA
BMI	kg/m ²	37.5
BTT		Destination
Contrast		Absent
PHUm	HU	1.5
PMI	cm ² /m ²	2.5
Creatinine	mg/dL	1.7
Total Bilirubin	mg/dL	1.3

PURPOSE

To evaluate the performance of the Minnesota Pectoralis Risk Score in a prospective cohort including the most contemporary LVADs

METHODS

- First time LVAD implants, post 2016
- University of Minnesota
- Chest CTs performed within 3 months prior to surgery (n=82)

METHODS

- Unilateral pectoralis muscle mass indexed to body surface area (PMI) and attenuation (approximated by mean Hounsfield units; PHUm) measured using Slice-O-Matic software
- Reader blinded to outcomes

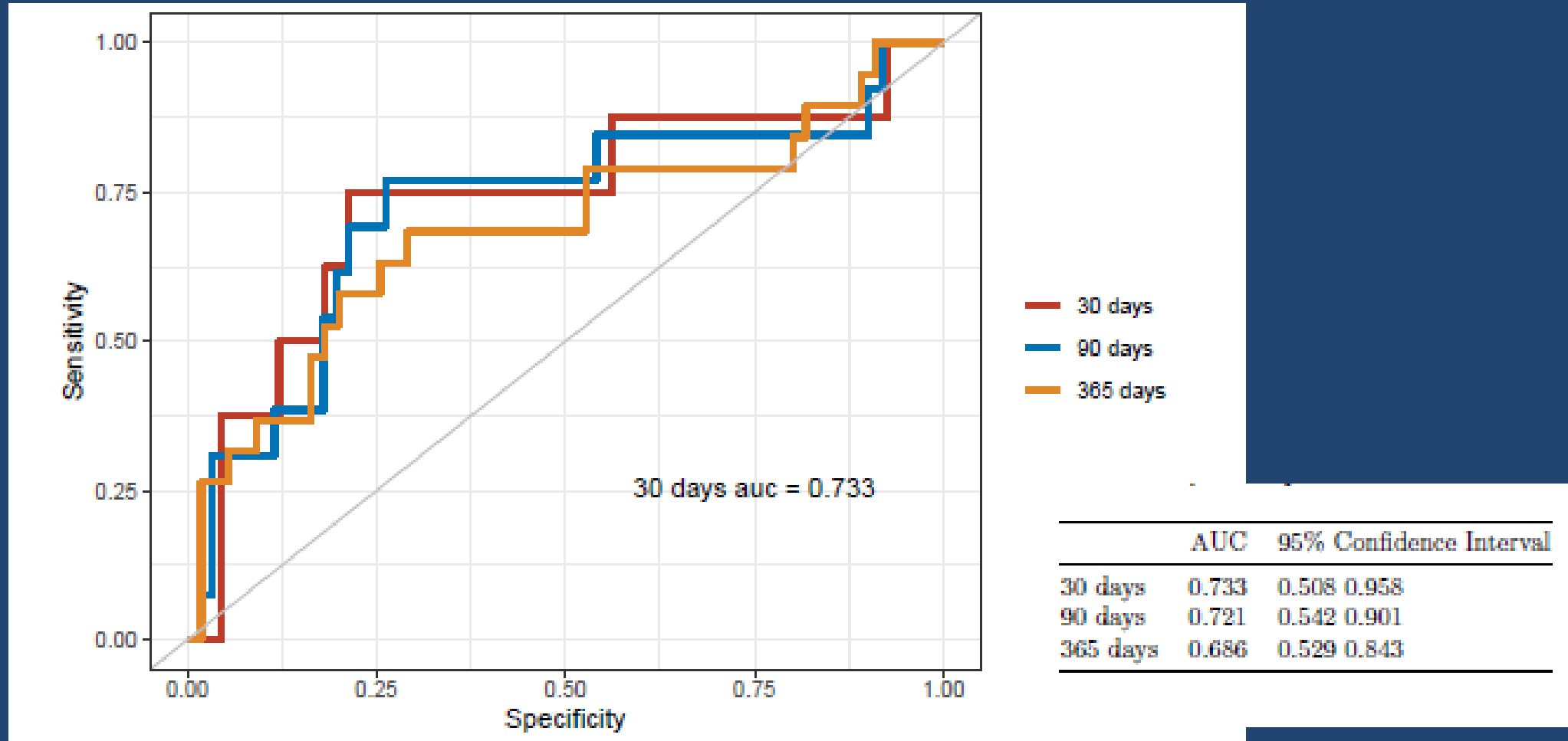
METHODS

- MPRS: calculated on all patients
- PHU_m , PMI, African American race, creatinine, total bilirubin, body mass index, bridge to transplant status, presence/absence contrast are the variables incorporated into models
- Cox regression analysis: MPRS and post-LVAD mortality
- Receiver-operating characteristic (ROC) curves were then generated to test model discrimination at 30 and 90 days post LVAD implantation

RESULTS

- 62 % HeartMate 3
- 17 % HVAD
- 20 % HeartMate 2 devices

ROC CURVES: MINNESOTA PECTORALIS MUSCLE RISK SCORE



HAZARD RATIOS

Each two point increase in MPRS associated with a 2.6 fold increase in the mortality after LVAD (HR 2.6, 95 % CI 1.3-5.4, $p=0.01$)

CONCLUSION

The Pectoralis Muscle Risk Score

- Favorable discrimination, contemporary prospective cohort
- Largely comprised of patients receiving HeartMate 3 devices
- Best at identifying high risk patients

THANK YOU