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## HVI Strives for Leadership in Academic Research

The UPMC Heart and Vascular Institute (HVI) has a significant presence in the world of academic medicine. Clinical-outcomes researchers in the HVI perform, analyze, and publish studies related to many aspects of cardiovascular care:

- Cardiac imaging
- Cardiac arrhythmia
- Coronary heart disease
- Aortic valve disease
- Mitral valve disease
- Heart failure
- Pulmonary hypertension
- Mechanical circulatory support
- Cardiac rehabilitation

We are extremely proud of the cutting-edge research performed across the Heart and Vascular Institute and will take this opportunity to share some of our published research findings from the past year. Due to space constraints, this document contains only a selection of highlights from the HVI research portfolio in 2017. For more information on other HVI research projects, active clinical trials, and other information, please visit [UPMC.com/HVIPublications](http://UPMC.com/HVIPublications).

### Coexistence of Obstructive Sleep Apnea and Heart Failure Indicates High Risk of Readmission



Gavin W. Hickey, MD

Patients with heart failure are one of the most challenging populations to treat, often carrying a substantial burden of comorbidities and thus a very high risk of hospital readmission.

In October 2017, a team of UPMC researchers published a report in *Clinical Cardiology* showing that obstructive sleep apnea (OSA) is highly prevalent in the heart failure (HF) population, and that HF patients with OSA have an increased risk of readmission. The team analyzed data from 344 heart-failure admissions, including 99 patients who had a diagnosis of obstructive sleep apnea. Multivariable analysis showed that a diagnosis of OSA carried a twofold increased risk of readmission within 90 days, even after accounting

for potential confounding variables and other comorbidities.

"Sleep apnea is an underdiagnosed and undertreated condition in the HF population," says heart-failure specialist **Gavin W. Hickey, MD**. "We hope that our findings will encourage the heart failure community to be highly vigilant in diagnosing and treating this important comorbidity."

**Citation:** Sommerfeld A, Althouse AD, Prince J, Atwood CW, Mulukutla SR, Hickey GW. Obstructive Sleep Apnea Is Associated With Increased Readmission in Heart Failure Patients. *Clin Cardiol.* 2017; 40(10): 873-878. PMID: 28586100.

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Affiliated with the University of Pittsburgh School of Medicine, UPMC Presbyterian Shadyside is ranked among America's Best Hospitals by *U.S. News & World Report*.

**UPMC** | HEART AND VASCULAR INSTITUTE

## Lung Transplant Can Be Performed Safely in Patients With Coronary Artery Disease



Suresh R. Mulukutla, MD

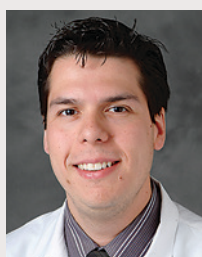
In the past, most people with coronary artery disease were not considered candidates for a lung transplant. Now, some individuals with coronary artery disease may be eligible for a lung transplant, thanks to data showing that the procedure is associated with minimal additional risk in patients with coronary disease.

In September 2017, the journal *Clinical Transplantation* published data from UPMC showing that coronary artery disease conferred no significant increase in risk for lung transplant recipients. Of 656 lung transplant recipients in the study, 324 had documented coronary disease, including 106 with obstructive coronary disease.

However, outcomes in the patients with obstructive coronary disease were not significantly different than outcomes in patients with no trace of coronary disease. “There is a perception that patients with coronary artery disease are poor candidates for lung transplant,” says **Suresh R. Mulukutla, MD**, an interventional cardiologist at the HVI. “Our data suggest that these patients are able to safely undergo lung transplant with reasonably good outcomes, even if they have advanced coronary disease.”

**Citation:** Khandhar SJ, **Althouse AD**, **Mulukutla S**, **Kormos R**, **Toma C**, Marroquin O, Volz E, Tefera L, Bermudez C. Post-operative Outcomes and Management Strategies for Coronary Artery Disease in Patients in Need of a Lung Transplantation. *Clin Transplant*. 2017; 31(9). PMID: 28658533.

## Continued Surveillance for Pulmonary Hypertension After Transcatheter Aortic Valve Replacement



João Cavalcante, MD

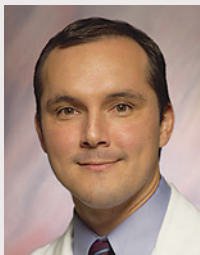
Elevated pulmonary arterial pressure, or pulmonary hypertension (PH), portends a high risk of morbidity and mortality. This complex condition requires specialized management and thus is important to screen for in patients referred for major cardiac procedures.

In September 2017, researchers at UPMC published data in the journal *Heart* studying the effects of sustained pulmonary hypertension on patients with severe aortic stenosis after undergoing transcatheter aortic valve replacement (TAVR). The team performed serial echocardiograms in a cohort of 407 patients who underwent TAVR at UPMC between July 2011 and January 2016. The research team measured pulmonary arterial pressure before the procedure and again one month after the procedure. They determined that it was common for the pulmonary pressure to remain high in this patient population. Cardiology fellow **Ahmad Masri, MD**, notes that, “Persistent moderate-severe pulmonary hypertension is not only common after TAVR but strongly associated with an increased risk of all-cause mortality.”

Senior author on the paper, **João Cavalcante, MD**, says, “In contrast, patients whose pulmonary pressures came down after TAVR had survival comparable to patients with no evidence of pulmonary hypertension. Therefore, further investigation is required to determine whether persistent PH beyond TAVR is a modifiable target for future therapies. As aortic valve procedures account for an increasingly large share of clinical volume, it will be crucial to identify meaningful therapeutic targets in this population.”

**Citation:** **Masri A**, Abdelkarim I, Sharbaugh MS, **Althouse AD**, Xu J, Han W, **Chan SY**, **Katz WE**, **Crock FW**, **Harinstein ME**, **Kliner DE**, **Navid F**, **Lee JS**, **Gleason TG**, **Schindler JT**, **Cavalcante JL**. Outcomes of Persistent Pulmonary Hypertension Following Transcatheter Aortic Valve Replacement. *Heart*. 2017 (Epub ahead of print). PMID: 28970276.

## Big Data Holds Tremendous Promise, But Use With Caution



Oscar Marroquin, MD

The HVI benefits greatly from the UPMC Clinical Analytics team, which provides the ability to tap into large amounts of data from historical electronic medical records (EMR). Investigators often use diagnosis codes in these administrative databases to identify cohorts of patients, because these databases provide powerful sources of information for exploring epidemiologic

trends, synthesizing hypotheses, and studying uncommon diseases. However, some studies show inconsistent results, likely due to a lack of consistency across time periods.

A report published in the *Annals of Internal Medicine*, examining 10 years' worth of heart failure data with ICD-9 codes, showed interesting trends. During the study period, encounters for heart failure of unspecified type decreased from 59.2 percent to 22.7 percent, whereas there were increases in encounters for

heart failure with preserved ejection fraction (from 16.4 percent to 33.8 percent), and heart failure with reduced ejection fraction (from 24.4 percent to 43.5 percent). This is a key insight, because researchers who are attempting to study these specific subpopulations may not realize that the parameters and codes have changed over time.

"Pulling large amounts of EMR data offers great promise, but this power must be used carefully and interpreted properly," says **Oscar Marroquin, MD**, vice president of Clinical Analytics. "Investigators who build clinical registries from EMR data must be cognizant of the challenges and make sure that their questions are carefully and properly defined."

**Citation: Masri A, Althouse AD, McKibben J, Lee JS, Mulukutla SR.** Limitations of Administrative Data for Studying Patients Hospitalized With Heart Failure. *Ann Int Med.* 2017; 166(12): 916-917. PMID: 28462427.

## Novel Technique in Pediatrics Shows Promise at Children's Hospital of Pittsburgh of UPMC



Victor Morell, MD

Thrombocytopenia-associated multiple organ failure (TAMOF) is a known risk factor for increased hospital mortality in children. Therapeutic plasma exchange (TPE) has been offered as a promising therapy for TAMOF. However, the therapeutic implications of this modality in children with critical heart disease and a clinical diagnosis of TAMOF have not been well described.

With one of the largest series of patients who have received this therapy, Children's Hospital of Pittsburgh of UPMC sought to provide some clarity on the subject. Recently published in *Frontiers in Pediatrics*, Children's Hospital researchers studied a series of 41 patients receiving TPE as an adjuvant rescue therapy while supported by extracorporeal membrane

oxygenation (ECMO). In the study population, the use of TPE was associated with strong improvements in the multi-organ failure index and increased platelet count. Further study is needed to validate the efficacy of this therapy, but the Children's Hospital experience lends promising data to suggest that TPE might be an effective adjuvant therapy in pediatric patients requiring ECMO support.

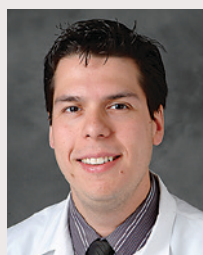
**Citation: Chong M, Lopez-Magallon AJ, Saenz L, Sharma M, Althouse AD, Morell VO, Munoz R.** Use of Therapeutic Plasma Exchange During Extracorporeal Life Support in Critically Ill Cardiac Children with Thrombocytopenia-Associated Multi-Organ Failure. *Front Pediatr.* 2017 (accepted).

# A Tradition of Strong HVI Presence at National Meetings Continues Throughout 2017

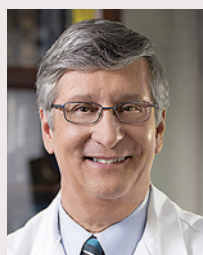
HVI experts regularly attend national meetings of major professional societies to present and disseminate their findings. A selection of highlights from the past year are discussed below.



Evan C. Adelstein, MD



João L. Cavalcante, MD



Robert L. Kormos, MD

The HVI had strong representation at the past year's **American College of Cardiology** meeting held in March 2017 in Washington, D.C. Highlights included:

- A presentation from UPMC cardiology fellow **Ahmad Masri, MD**, on the potential utility of technetium pyrophosphate scanning in patients with suspected cardiac amyloidosis.<sup>1</sup>
- Several projects led by director of Nuclear Cardiology **Prem Soman, MD**, were presented and included the repeatability of appropriate use criteria for nuclear imaging and the discriminatory power of pulmonary vascular resistance in patients referred for renal transplant.<sup>2,3</sup>
- UPMC cardiology fellow **Amber Johnson, MD**, presented on the persistence of gender disparities in the use of implantable cardioverter-defibrillator therapy.<sup>4</sup>
- **João L. Cavalcante, MD**, presented work showing the importance of evaluating right heart function as well as pulmonary hypertension in patients with aortic stenosis referred for transcatheter aortic valve replacement.<sup>5</sup>

April 2017 took several HVI experts to the **International Society for Heart & Lung Transplantation** meetings in San Diego, California. Several presentations from the HVI were part of the program, including work led by UPMC's Artificial Heart Program director **Robert L. Kormos, MD**, on adverse events in patients receiving left ventricular assist devices.<sup>6</sup>

- Cardiology fellow **Matthew Lander, MD**, presented on the utility of biomarkers such as neopterin to identify mechanical circulatory support patients at high risk for subsequent adverse events. Cardiology fellow **Chris Link, MD**, presented on the potential utility of gated blood pool SPECT imaging in patients referred for mechanical circulatory support.<sup>7,8</sup>

The HVI contributed several presentations at the **Heart Rhythm Society** annual meeting in May 2017 in Chicago, Illinois. Cardiac electrophysiologist **Evan C. Adelstein, MD**, represented the HVI with a presentation on amiodarone use in patients receiving cardiac resynchronization therapy. Another HVI-led presentation focused on work by director of Cardiac Electrophysiology **Samir Saba, MD**, who is investigating the impact of mitral regurgitation on atrial fibrillation patients treated with a rhythm control strategy.<sup>9,10</sup>

At the **American College of Sports Medicine** meeting, hosted in Denver, Colorado, in May 2017, several projects on the use of cardiac rehabilitation, led by geriatric cardiologist **Dan Forman, MD**, were presented. Dr. Forman's presentations included the determination of an appropriate care pathway for patients based on risk, as well as a comparison of results with home-based care versus facility-based care. Dr. Forman also presented on the impact of depression and anxiety on the likelihood of enrollment in cardiac rehabilitation programs.<sup>11-13</sup>



Prem Soman, MD

The **Society of Nuclear Medicine and Molecular Imaging** meeting took place in June 2017. This meeting featured work led by director of Nuclear Cardiology **Prem Soman, MD**, looking at the potential utility of phase analysis in patients eligible for cardiac resynchronization therapy, as well as a presentation on the relationship between dyssynchrony and right ventricular free wall function in patients referred for mechanical circulatory support.<sup>14,15</sup>



Gavin W. Hickey, MD

September 2017 brought two specialty society meetings. HVI was represented at the **Heart Failure Society of America** meeting in Dallas, Texas, by cardiologist **Gavin W. Hickey, MD**, who presented on differences in male versus female patients with heart failure at the time of their first presentation. Meanwhile, at the **American Society of Nuclear Cardiology** meeting in Kansas City, cardiology fellow **Ahmad Masri, MD**, presented the results of work led by director of Nuclear Cardiology **Prem Soman, MD**, on the accuracy of diagnosing cardiac amyloidosis, while another presentation from Dr. Soman's lab focused on the impact of using attenuation correction in nuclear imaging.<sup>16-18</sup>



Dan Forman, MD

In October 2017 at the **American Association of Cardiovascular and Pulmonary Rehabilitation** in Charleston, South Carolina, geriatric cardiologist **Dan Forman, MD**, and his team presented on the use of physical function for risk stratification, as well as on the impact of health literacy on cardiac self-efficacy in cardiac rehabilitation patients.<sup>19,20</sup>

At the 2017 **Transcatheter Cardiovascular Therapeutics** meeting, several HVI faculty, including **Gavin W. Hickey, MD**, presented on the effect of pulmonary vascular resistance in patients with pulmonary hypertension receiving transcatheter aortic valve replacement. Additionally, **João Cavalcante, MD**, presented results of a new staging system to determine the severity of aortic stenosis.<sup>21</sup>

The final major meeting of the year came at the **American Heart Association Scientific Sessions**, perhaps the premier meeting for cardiovascular researchers across various disciplines. Held this past November in Anaheim, California, the AHA meeting had significant representation from the HVI.

- HVI's population health research, led by **Suresh R. Mulukutla, MD**, Governor of the Pennsylvania Chapter of the American College of Cardiology, spawned two presentations: **Andrew D. Althouse, PhD**, presented a population-level analysis of cardiovascular health using data from the Behavioral Risk Factor Surveillance System, while **Michael S. Sharbaugh, MPH**, reported on the effect of cigarette taxes on smoking prevalence.<sup>22,23</sup>
- Cardiology fellow **Emily N. Guhl, MD**, presented collaborative work led by **Jared W. Magnani, MD**, on the relationship between socioeconomic status and health-related quality of life in atrial fibrillation.<sup>24</sup>
- Cardiology fellow **Ahmad Masri, MD**, extended prior work on gender differences in heart failure by looking at differences between genders in patients with preserved ejection fraction versus reduced ejection fraction.
- **João L. Cavalcante, MD**, presented data on the incidence of de novo pulmonary hypertension after transcatheter aortic valve replacement.<sup>25</sup>

*See References on Page 6.*

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## CME Courses for Physicians

The courses below are available for CME credit at [UPMCPhysicianResources.com/Heart](http://UPMCPhysicianResources.com/Heart).

### Update in Heart Failure for Clinicians of Older Patients

Daniel Forman, MD, gives a presentation on heart failure, a disease of aging. Currently there are 5.7 million Americans in the United States with heart failure, which is the leading cause of hospitalization in patients 65 years of age and older.

### CT Surgery Update: Advancements in Cardiothoracic Surgery

In this issue, we celebrate the accomplishments of our dedicated faculty and provide updates on upcoming events, clinical trials, and research initiatives. From the Division of Lung Transplant/Lung Failure, we share the innovative work of Chief Jonathan D'Cunha, MD, PhD, FACS, as he works to decrease instances of organ rejection in transplant patients. We explore

the determination of Victor Morell, MD, chief of the Pediatric Cardiothoracic Surgery Division and co-director of the UPMC Heart and Vascular Institute, to find better solutions for children requiring RVOT reconstruction. We also are pleased to share our progressive work with near-infrared fluorescence imaging and expertise with the POEM operation for achalasia. Additionally, this issue discusses TAVR for aortic stenosis and expanding the donor pool for heart transplant.

### Vascular Rounds — Vascular Trauma

In this issue of Vascular Rounds Fall 2017, several specialists join together to discuss topics that include Endovascular Therapy for Blunt Aortic Trauma, Shunting in Civilian Extremity Trauma, Pediatric Vascular Trauma, A RESCUE Stent for Non-Compressible Traumatic Hemorrhage, Traumatic Innominate Artery Injury, and Embolization of Arterial Injuries.

## Upcoming Conferences and Events: Save The Date

### 4th Annual Advanced Transradial and Complex Cardiac Interventions Symposium

**Saturday, March 24, 2018**

Hotel Monaco — Pittsburgh, Pennsylvania

This one-day CME event will feature a wide range of topics on the transradial approach to cardiac catheterization/PCI, case-based discussions, and videos presented by UPMC Heart and Vascular Institute faculty. Internationally recognized guest faculty lecturers will be featured.

#### Topics include:

- Benefits of transradial approach for diagnostic and PCI procedures
- Novel surgical and percutaneous options for mitral incompetence
- Patient selection, technical aspects, avoidance of complications, and economic issues

Panel discussions and audience participation will also be included.

#### Who Should Attend

This course is designed for cardiologists (both invasive and noninvasive), advanced practice providers, and cardiac cath lab nurses, as well as technologists and other interested health care professionals.

#### Course Directors

**John Schindler, MD, FACC, FSCAI**

**Krishna Tummalapalli, MD, FACC, FSCAI**

For more information, visit [UPMC.com/TransradialSymposium](http://UPMC.com/TransradialSymposium), or contact Pam Johnson at 412-647-7806 or [johnsonpj@upmc.edu](mailto:johnsonpj@upmc.edu).

### 15th Annual Pittsburgh Vascular Symposium and 19th Surgical & Radiological Endovascular Symposium (SRES)

**Thursday to Saturday, May 24 to 26, 2018**

Fairmont Pittsburgh Downtown — Pittsburgh, Pennsylvania

#### Sponsored By:

*UPMC Heart and Vascular Institute, Division of Vascular Surgery  
University of Pittsburgh School of Medicine Center for Continuing Education in the Health Sciences*

#### Who Should Attend

This course is designed for primary care providers, cardiologists, interventionalists, vascular surgeons, and other interested health care professionals who provide primary care services.

#### Overview

This 2½ day joint international CME conference will include discussion, case presentations, and care demonstrations. Presenters from academic and clinical settings will cover such topics as extremity arterial diseases, aortic aneurysms, thoracic aortic diseases and dissection, carotid artery stenosis, varicose veins, and vascular ultrasound. A multidisciplinary panel of national and international speakers from vascular surgery, vascular medicine, cardiology, interventional radiology, and nephrology will provide a state-of-the-art update on the treatment of vascular disease and discuss new innovations in the field. Question and answer sessions, panel discussions, and a dedicated vascular ultrasound course will also be incorporated.

Registration will be available in 2018 by visiting the Center for Continuing Education in the Health Sciences (CCEHS) website at: <https://ccehs.upmc.com/liveFormalCourses.jsf>.

For more information on this course, or to register, contact Mark Byrne at [byrneme@upmc.edu](mailto:byrneme@upmc.edu) or 412-802-3031.

## ABOUT THE UPMC HEART AND VASCULAR INSTITUTE

The **UPMC Heart and Vascular Institute** provides comprehensive cardiovascular care for patients and is helping to advance the field and improve patient outcomes through research.

- The **Cardiology Division** is one of the nation's largest, with more than 130 cardiologists and 100 PA/CRNPs who span over 20 hospital sites and 40 office locations. Our high-volume practice encompasses more than 23,000 diagnostic and interventional procedures per year, and the experts in our Center for Aortic Valve Disease have performed nearly 1,000 transcatheter aortic valve replacement (TAVR) procedures to date.
- The **Cardiac Surgery Division** provides a multidisciplinary approach to patient care in an environment that fosters the development and evaluation of innovative surgical techniques and therapies. Our staff, which includes more than 20 cardiac surgeons, are committed to clinical excellence as well as scientific inquiry, and represent a broad range of expertise in cardiothoracic surgical procedures.
- The **Vascular Surgery Division** of the UPMC Heart and Vascular Institute offers comprehensive arterial, endovascular, and venous care by a team of vascular experts. These professionals work together in the study, development, and implementation of new procedures and devices to deliver advanced, comprehensive vascular care. The surgeons of the Vascular Surgery Division specialize in minimally invasive procedures, which many of our faculty helped to pioneer for the treatment of the entire vascular system.

## ABOUT THE MANAGING EDITOR



**Andrew D. Althouse, PhD**, supervisor of Statistical Services, is the managing editor of the *Heart and Vascular Institute Research Update*. Dr. Althouse earned a master's degree in Applied Statistics en route to completing his doctorate in Epidemiology from the University of Pittsburgh's Graduate School of Public Health. Dr. Althouse authored several cardiovascular outcomes papers from the BARI 2D study as part of his graduate work, and since has presented at national meetings hosted by the American Diabetes Association, American Heart

Association, American Statistical Association, and the International Biometrics Society, as well as writing for *Significance* magazine and a number of peer-reviewed journals on topics related to cardiovascular disease, diabetes, exercise, and maternal and child health. Current research interests of Dr. Althouse include general cardiology, heart failure, transcatheter therapies, aortic valve replacement, mitral valve repair and replacement, and ventricular assist devices.

To learn more, visit  
[UPMCPhysicianResources.com/Heart](http://UPMCPhysicianResources.com/Heart).

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please call UPMC's 24-hour  
physician OnDemand service  
at **1-866-884-8579**.

A \$17 billion world-renowned health care provider and insurer, Pittsburgh-based UPMC is inventing new models of patient-centered, cost-effective, accountable care. UPMC provides more than \$900 million a year in benefits to its communities, including more care to the region's most vulnerable citizens than any other health care institution. The largest nongovernmental employer in Pennsylvania, UPMC integrates 80,000 employees, more than 30 hospitals, 600 doctors' offices and outpatient sites, and a more than 3.2 million-member Insurance Services Division, the largest medical insurer in western Pennsylvania. As UPMC works in close collaboration with the University of Pittsburgh Schools of the Health Sciences, *U.S. News & World Report* consistently ranks UPMC Presbyterian Shadyside on its annual Honor Roll of America's Best Hospitals. UPMC Enterprises functions as the innovation and commercialization arm of UPMC, and UPMC International provides hands-on health care and management services with partners on four continents. For more information, go to [UPMC.com](http://UPMC.com).