

HEART AND VASCULAR

UPDATE

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HVI Analytics: Leveraging Big Data to Identify Opportunities to Improve Patient Care



UPMC is home to one of the nation's largest cardiology divisions, with more than 100 cardiologists working at the 40 hospitals in the UPMC system and various office locations.

These clinicians perform more than 23,000 diagnostic and interventional procedures each year. In the process, they generate a massive quantity of clinical data, which is stored in the electronic health record (EHR). **Suresh Mulukutla, MD**, an interventional cardiologist in the UPMC Heart and Vascular Institute (HVI), is the Director of Analytics for the HVI-Cardiology. Dr. Mulukutla and his team integrate inpatient and outpatient data from across the UPMC system, aggregate this data, and use it to identify opportunities to improve care.

When Dr. Mulukutla first participated in the National Heart, Lung, and Blood Institute (NHLBI) Dynamic Registry in the early 2000s, he began what he describes as a "long-standing relationship with data." He and Oscar Marroquin, MD, a cardiologist in the HVI and chief clinical analytics officer, UPMC Health Services Division, recognized the opportunity to replicate the power of the NHLBI multicenter registry within UPMC. According to Dr. Mulukutla, clinical analytics allows us to "integrate and harmonize all of the data across the health system," and provides a host of opportunities to understand cardiac pathologies and

improve care. In the HVI analytics division, Dr. Mulukutla oversees clinical data specialists and data managers who develop programs to draw out information that the clinicians request and help them visualize it. The HVI analytics division partners closely with UPMC Clinical Analytics, which is headed by Dr. Marroquin. The HVI also employs a team of statisticians proficient in the sophisticated analyses required to decipher big data sets.

Harnessing the Power of the EHR

Although the EHR was not specifically created for physicians to use to learn and improve, it houses a wealth of information.¹ UPMC has invested in transforming the utility of the EHR through the clinical analytics program. Business application tools sit on the EHR and allow Dr. Mulukutla to visualize inpatient, outpatient, pharmacy, and laboratory data and toggle between different ways of viewing this data in real time. Dr. Mulukutla and his analytics team can stratify patients by condition, by patient characteristics, or by operational aspects. With such a large system and so many different providers, there is inherent variability in care. However, using clinical analytics, this variability can be used to identify opportunities. When differences are identified that lead to better outcomes, they can then be applied systemically at all UPMC facilities for heart and vascular care.

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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*.

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HVI Analytics (Continued from Page 1)

There are several challenges to large-scale data mining from the EHR. The sheer volume of data is one challenge; this data volume also is a tool. The incredible volume of data that Dr. Mulukutla and his colleagues can access is key to their success. Variability in care is a challenge but allows them to identify opportunities. Additionally, knowing which measures are the most helpful and how to tease out subtle differences is essential. UPMC is unique in its support of helping physicians use data from the EHR. Additionally, many other hospitals lack either the integrated data or the patient volume available at UPMC.

The HVI analytics division can select specific patient populations with conditions of interest for analysis. They can quickly determine how many patients are seen by UPMC physicians during a given period for the condition in question and then examine differences in hospitalization rates, mortality, and other outcomes measures.

For example, in the past, it would take weeks to compile a list of UPMC patients who had undergone a coronary intervention, such as stent placement, who also have diabetes and heart failure. Now this information can be compiled within a day. Translating published data from clinical trials into real-world practice

normally can take months or years. The use of clinical analytics and large EHR data sets has the potential to speed up this process. For example, the HVI clinical analytics division can narrow down the data to identify groups of patients with high cardiovascular risk who also may meet specific criteria to be eligible for novel therapies.

Projects in MV-CAD, Atrial Fibrillation (AFib), and Valvular Intervention

One population that HVI analytics has examined in detail is patients with multivessel coronary artery disease (MV-CAD). Coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) are both safe and established treatment options for MV-CAD, and the optimal treatment is still a matter of debate. Multiple factors drive the decision of which therapy to use, but there have been few studies directly comparing the outcomes of CABG and PCI in routine clinical practice in patients with cardiac disease of varying complexity and with differing comorbidities.

Dr. Mulukutla and his team, in collaboration with Arman Kilic, MD, from the Department of Cardiothoracic Surgery, leveraged the

ability to dissect the vast data available from the EHR at UPMC and studied outcomes after treatment of MV-CAD in more than 6,000 patients at five UPMC hospitals. Mortality, hospital readmissions, and major adverse cardiovascular events (MACE) were compared after CABG and PCI in two propensity-matched groups of more than 800 patients who would be eligible for either therapy. Dr. Mulukutla and his colleagues found that CABG had a mortality benefit in the overall population (estimated one-year mortality of 11.5% for PCI and 7.2% for CABG, $p < 0.001$) and in every subset population examined independent of the comorbidities of diabetes and heart failure.² CABG also resulted in fewer readmissions (38.4% vs. 28.1%, $p < 0.001$), fewer patients who required revascularization (6.7% vs. 1.0%, $p < 0.001$), and fewer adverse cardiovascular events.

Prior data supported directing patients with MV-CAD and diabetes or heart failure to CABG. Dr. Mulukutla's study provided an important analysis of outcomes under real-world conditions with contemporary treatment options and suggests that CABG should be considered more

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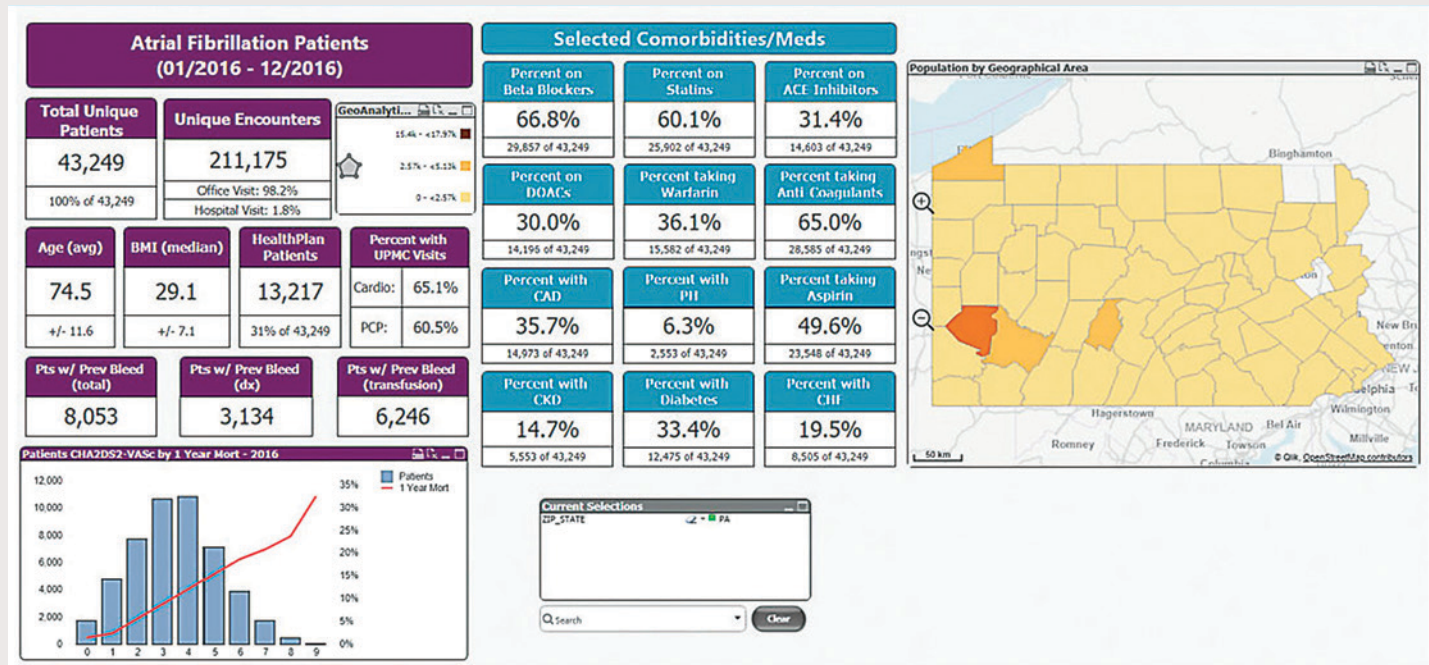


Figure 1. AFib clinical analytics dashboard. This tool allows patient populations to be identified and analyzed to, among other things, find individuals who may not be receiving optimal anticoagulation therapy to minimize their stroke risk.

Valve Disease Population

11/11/2018 to 11/11/2019

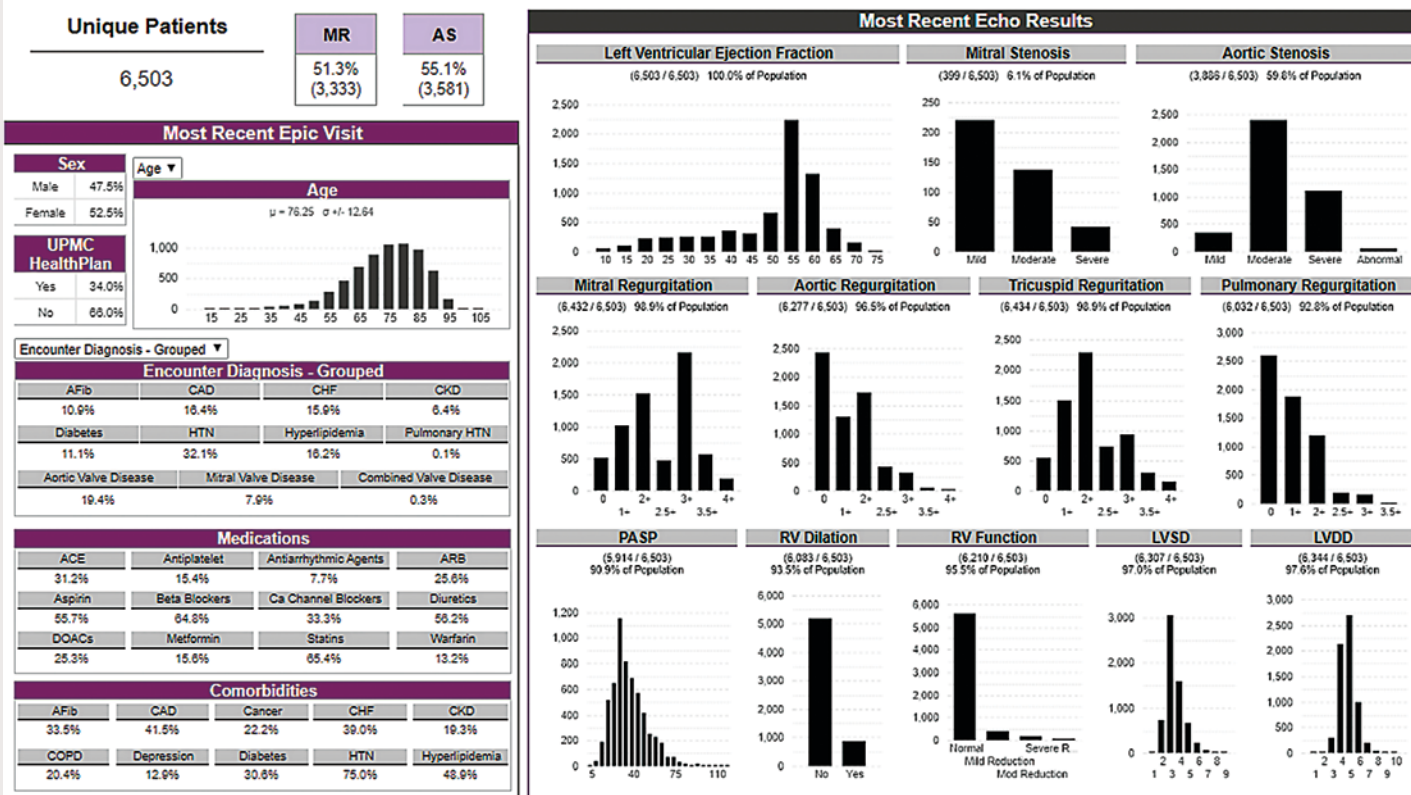


Figure 2. Valve Disease Population. This dashboard illustrates the HVI ability to identify patients with various valvular heart disease conditions across the health system.

PCI Encounters

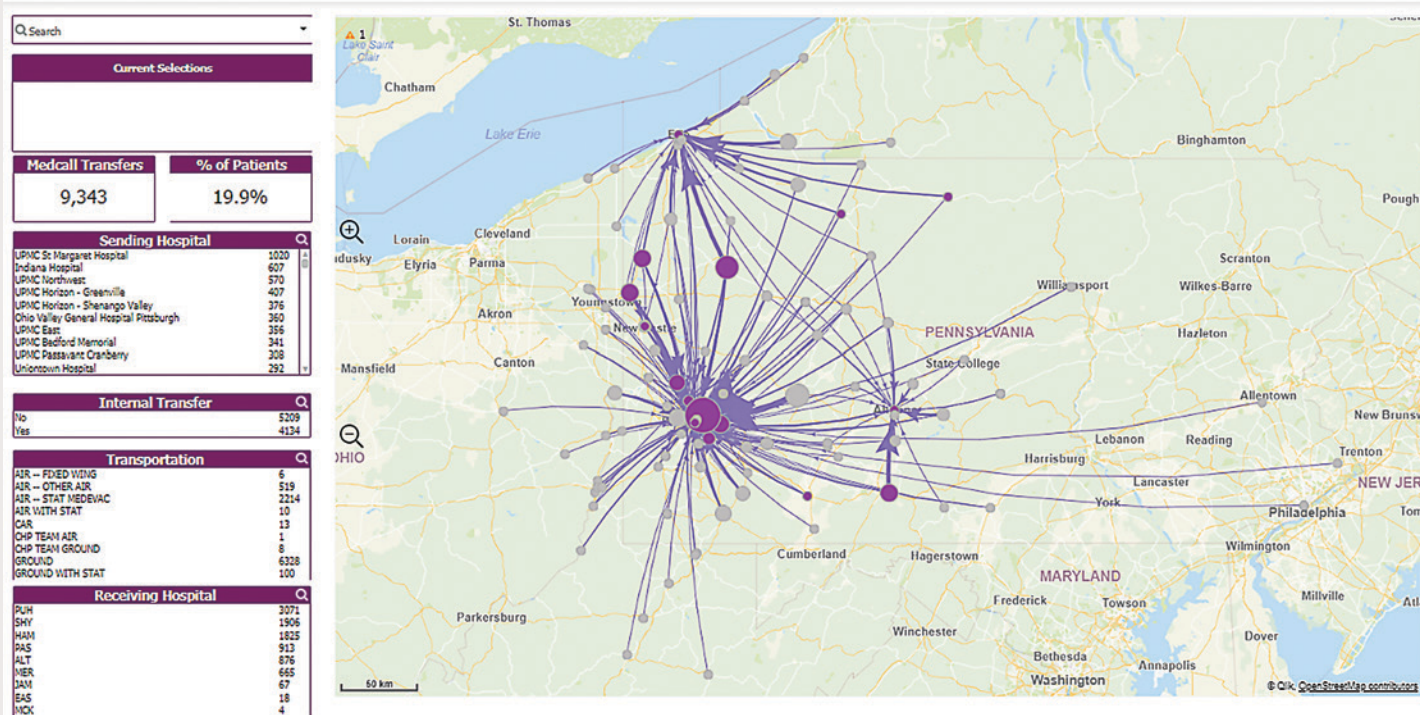


Figure 3. Hospital-Hospital Transfers. Evaluation of patients who are transferred between facilities allows for optimization of care and to ensure that patients are transferred to facilities that can best accommodate their care needs.

Geroscience: Frontiers in the Biology of Aging



Can we discover and understand the basic biological mechanisms and pathways that regulate the aging process? Moreover, by fundamentally understanding how and

why processes of aging occur, can we devise the tools and technologies that will allow us to intervene, modulate, or perhaps reverse the full range of age-related diseases and disabilities that occur as consequences of the biology of aging?

This is the field of geroscience, and UPMC and the University of Pittsburgh are investing heavily in the pursuit of answers that will unlock the mysteries and complex processes of how and why human beings age, and ultimately how we can intervene to more effectively improve and extend one's quality of life for as long as possible.

Helping to lead these emerging efforts in geroscience is **Toren Finkel, MD, PhD**, director of the Aging Institute, professor of medicine in the Division of Cardiology, and the G. Nicholas Beckwith III and Dorothy B. Beckwith chair in translational medicine. Dr. Finkel arrived at the University of Pittsburgh and UPMC in June 2017 after a distinguished 25-year career with the National Institutes of Health, where he was the chief of the Center for Molecular Medicine in the National Heart, Lung, and Blood Institute (NHLBI) immediately preceding his arrival in Pittsburgh.

"The support and commitment from both the University of Pittsburgh and UPMC to grow into one of the premier basic biology of aging and translational research centers in the world was what really attracted me to come to Pittsburgh — to pursue my own research in the biology of aging front but also to help lead this effort with so many dedicated faculty across many disciplines," says Dr. Finkel.

Understanding and Modifying the Basic Biology and Pathways of Aging

We know much about the basic biology of aging and its pathways, but significant gaps remain to be explored and understood. At the molecular level, it is known that accumulated nuclear DNA damage, shortening of the telomeres, problems with mitochondria, protein aggregation issues, and a host of quality control mechanisms can go awry as individuals age. Yes, there are multiple aspects or hallmarks of aging, and it's certainly complex, "But that is not to say these processes are not regulated or cannot in some sense be malleable to interventions on the cellular or molecular level. We know, for example, in simple organisms that modifications to certain genes or proteins can have profound effects on both lifespan and health span. Similar modifications are what we hope to accomplish with human aging and age-related conditions such as Alzheimer's disease," says Dr. Finkel.

Fundamentally, Dr. Finkel and the groups working on these problems believe that once we more fully understand the basic mechanisms that drive aging, we will be in a position to develop new drugs that can regulate those mechanistic processes, leading to effective treatments for a wide range of age-related diseases.

A Translational Approach to Modifying Aging Processes Driving Disease

Cardiovascular disease, cancer, neurodegenerative diseases — these all have a powerful age-related component. Until now, most of the strategies for treating these broad categories of illness have been very disease-specific with some successes and equivalent number of failures. The approach that Dr. Finkel and colleagues are taking — the geroscience approach — means that, "We are not necessarily looking for or hoping to develop disease-specific therapies per se. We are interested in the molecules and processes that underlie the biology of aging, which,

if we can intervene in, we think will prevent these sorts of illnesses from happening in the first place," says Dr. Finkel.

The Aging Institute, which Dr. Finkel now leads, has begun to expand its research focus and capabilities to pursue many avenues of basic and translational research with respect to the goals of geroscience writ large.

"In the end, we will have approximately 15 different laboratories all working on various aspects of aging biology, so the work here will be incredibly diverse. Coupled with the basic science labs will be a high throughput screening facility that will help significantly in our mission to develop entirely new classes of anti-aging drugs. We also hope to repurpose existing FDA-approved compounds that we think might be beneficial or applicable in modifying processes of aging," says Dr. Finkel.

In the domain of basic science research, the laboratories of the Aging Institute are looking at such things as the connections between autophagy and mitophagy and their roles in removing or eliminating damaged proteins or organelles from the body and how this may contribute to aging itself. Other aspects of research will be focused on DNA damage repair, protein folding processes, mitochondrial and telomere research, and inflammation and its role in aging processes, among others. For the testing of FDA-approved compounds, several projects are already in the planning phases, and the efforts from a broad perspective will be spearheaded by Anne B. Newman, MD, and **Daniel Forman, MD**.

"Dr. Newman recently joined the Aging Institute as our clinical director, and she, along with Dr. Forman, who specializes in geriatric cardiology, will be leading many of our efforts to try and repurpose FDA-approved molecules for new, anti-aging uses," says Dr. Finkel.

The diabetes drug metformin will be analyzed in an internally led study in the setting of elective surgery with older adults.

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Daniel Forman, MD, Assumes New Supporting Leadership Role at Aging Institute



Earlier this year, **Daniel Forman, MD**, was named as the new Director of Emerging Therapeutics at the Aging Institute of UPMC Senior Services and the University of Pittsburgh.

A cardiologist and geriatrician, Dr. Forman, who also is a professor of medicine in the Division of Cardiology and chair of the Section of Geriatric Cardiology, was recruited to the University of Pittsburgh four years ago from Brigham and Women's Hospital in Boston to launch a new geriatric cardiology program that extends from his areas of expertise. That program has flourished, and Dr. Forman has advanced as a national leader in efforts to broadly integrate geriatric precepts into specialty medicine in order to better achieve care that responds to the distinctive needs of older adults. Management of a specific disease process is coupled to expanding insights regarding associated frailty, comorbidity, cognitive decline, falls, and other health care challenges that become pervasive with age and that commonly

confound standard medications, procedures, and assessments. His leadership in the American College of Cardiology, the American Heart Association, the American Geriatrics Society, and the National Institutes of Health have catalyzed more novel holistic approaches to patient care, and have even sparked funding initiatives to further grow the field.

Dr. Forman's research on older adults at the University of Pittsburgh is multifaceted, extending from novel approaches of clinical care in older adults to cellular and subcellular mechanisms, all with prevailing goals of enhancing function and quality-of-life in older adults. His expertise in cardiovascular disease and clinical care is complemented by broad expertise in pertinent cellular science.

Soon after coming to Pittsburgh, Dr. Forman received funding from the Aging Institute to pursue a novel pilot study of nitrite supplementation in older heart failure patients. The study showed that nitrites improved bioenergetics in skeletal muscle mitochondria and boosted exercise performance. These data have subsequently led to multiple NIH studies and an expanding body of work.

While much of Dr. Forman's initial research focused on older adults with cardiovascular disease, his studies have expanded to include those with and without cardiovascular disorders. He is the principal investigator of a cardiac rehabilitation trial that will advance strategies to better enable older patients who are weakened and debilitated after hospitalization to regain function, confidence, and independence. Simultaneously, he is leading multiple studies that target biological mechanisms underlying physical decline and novel strategies to remedy them. Body composition, nutrition, and inflammation are among the factors considered in this work.

"I am thrilled to be part of the Aging Institute and its work," says Dr. Forman. "I see it as an exceptional crucible for ideas, insight, and energy among idealistic and dazzling colleagues, which seems certain to propel innovation in the care of older adults." As the Aging Institute's first director of emerging therapeutics, he will help organize and lead its translational program.

Geroscience *(Continued from Page 4)*

"The goal is to see if metformin taken prior to surgery provides benefits, including improved survival or reduced hospitalization time. There is also a large, multicenter, NIH-proposed study of metformin in aging in which we will be part of here at Pitt."

Other areas of focus will likely look at reducing the nonspecific inflammatory responses seen in older adults.

"If you look at markers of inflammation, for example circulating interleukin-6 levels, it's probably one of the best predictors of who is or is not going to live as they become elderly. It's a marker of frailty and a sign of bad things to come. We are very interested in knowing whether biological agents that have been developed for other inflammatory conditions like rheumatoid

arthritis or Crohn's disease can be repurposed in a safe and effective way in older adults. Our hope is to negate or modify frailty and the propensity for disease that this nonspecific inflammatory response belies."

The Emerging Paradigm of the Health Span

While a long life is generally desirable by most individuals, what is an extended length without commensurate quality? Much discussion is now focused on the idea of the health span — the length of time that one remains disease free and able to sustain a sufficient quality of life.

There is this observation that people who have incredibly long lives generally are relatively free from various morbidities. This theory, called the compression of morbidity, says that if as you extend life, you can also shrink the period of time an individual is suffering from morbidities.

"This is sort of the Holy Grail — to extend a person's life span but compress the time period where they are incapacitated or debilitated. We think that it has to do with what's driving the aging process, and again we are very optimistic about this approach and the research contributing to it. This is a new way of thinking about diseases, not in a disease-specific context but one whereby you modify aging itself," says Dr. Finkel.

Estes Joins UPMC Heart and Vascular Institute



Mark A. Estes, MD, FACC, FHRS, joined the UPMC Heart and Vascular Institute (HVI) in 2018 as a professor of medicine in the UPMC Cardiac Electrophysiology Program. Before joining

UPMC, Dr. Estes was the decades-long director of the New England Cardiac Center in Boston. Dr. Estes is a world-renowned cardiac electrophysiologist, a master clinician, and a great mentor to a generation of cardiac arrhythmia specialists who trained under him, many of whom now hold key leadership positions at prestigious academic institutions.

Dr. Estes received his medical degree from the University of Cincinnati in 1977 before moving to Boston where he completed his internal medicine residency at the then New England Deaconess Hospital, now Beth Israel Deaconess Medical Center. Dr. Estes then completed his training in cardiovascular diseases at Tufts-New England Medical Center, followed by a

year of training focused on the then-nascent field of cardiac electrophysiology at Massachusetts General Hospital. In 1983, Dr. Estes was recruited to Tufts-New England Medical Center (now the Tufts Medical Center) to establish an arrhythmia management service. Within a short time, Dr. Estes established the New England Arrhythmia Center (NEAC). Under his leadership, the NEAC achieved a leading stature in the Boston area and nationwide recognition for its impeccable quality of care.

Dr. Estes is a recognized leader in cardiology on the world-stage with numerous achievements, honors, and awards collected during his impressive career. He has authored more than 250 peer-reviewed manuscripts published in high-impact medical journals such as the *New England Journal of Medicine* and the *Journal of the American Medical Association*. Of note, Dr. Estes also has co-authored 60 guideline and consensus statement manuscripts, an achievement that highlights his considerable

influence in shaping the clinical practice of cardiac electrophysiology over the past three decades.

This influence has been further advanced though Dr. Estes's deep involvement with the work and task force committees of the American Heart Association (AHA), American College of Cardiology (ACC), and Heart Rhythm Society (HRS). His involvement at the national level has earned him many awards and positions, including president of HRS from 2008-2009, chair of the Council of Clinical Cardiology of the AHA, and the special distinction of having won both the American Heart Association Distinguished Achievement Award and Distinguished Leadership Award.

In his new role within the UPMC HVI, Dr. Estes will continue to provide excellent clinical expertise in the care of patients, mentorship to trainees and junior faculty, and research that will guide the evolution of cardiac electrophysiology clinical practice.

UPMC Physician Resources

For the latest news, events, videos, and free CME courses presented by UPMC clinicians and researchers, visit UPMCPhysicianResources.com/Heart.

Current CME Courses Include:

Artificial Intelligence and Machine Learning in Cardiovascular Health Care

Presented by Arman Kilic, MD

Vascular Grand Rounds

Presented by Efthymios Avgerinos, MD, et al

Select Presentations From the 2019 Transradial Symposium

Presented by John Schindler, MD

Atrial Fibrillation Ablation: Focus on Comprehensive Care of AF

Presented by N.A. Mark Estes III, MD, FHRS

Distal Radial Approach

Presented by Krishnamurthy V. Tummalapalli, MD

Frontiers in Cardiac Intensive Care: Critical Illness and Neurodevelopment

Presented by Justin Yeh, MD

Hypertension Assessment in Primary Care

Presented by Sean D. Stocker, PhD, FAHA

Arrhythmogenic Right Ventricular Cardiomyopathy: Prediction and Prevention of Sudden Death

Presented by N.A. Mark Estes III, MD, FHRS

Video Rounds

Video Rounds is a series of short, informative, and educational videos created for physicians and covering a variety of medical and surgical disciplines. Current topics in cardiology and cardiothoracic surgery include:

Advances in Aortic Aneurysm Repair – Michael Singh, MD

Atrial Fibrillation and Stroke Prevention – Raveen Bazaz, MD

Effectively Treating Coronary Total Occlusion – Catalin Toma, MD

Advances in Atrial Fibrillation Treatment – Samir Saba, MD

Hypertrophic Cardiomyopathy – Timothy C. Wong, MD

Women's Cardiology – Kathryn Berlacher, MD, MS

HVI Analytics (Continued from Page 3)

frequently for patients with MV-CAD. A multidisciplinary approach from a revascularization heart team may help patients make the best decisions regarding their treatment options.³

Dr. Mulukutla is working with Sandeep Jain, MD, director of the Atrial Fibrillation Center of Excellence, in using clinical analytics to ensure that UPMC patients are treated according to evidence-based guidelines that have been put forth by professional societies in cardiovascular medicine. One example is using large-scale data mining to increase the proportion of patients with AFib who are on anticoagulation therapy, which is recommended by several clinical guidelines to reduce the risk of a cerebrovascular accident (CVA, stroke).^{4,5} The EHR is being queried for all patients with AFib who are not being treated with anticoagulation therapy. Although some patients may have a valid reason to abstain from anticoagulation therapy, an opportunity is present to evaluate all patients to see if they are receiving the correct care. Dr. Mulukutla can identify these patients and then access scheduling information to know when they will next be seen by a primary care doctor or specialist in the UPMC system. His team then will contact physicians and ask them to evaluate the patient's care in light of their AFib and anticoagulation therapy status.

Similarly, the HVI analytics division is working on identifying patients who would likely benefit from a valvular intervention or a defibrillator based on evidence-based guidelines. Historically, these patients present to the cardiology clinic after a referral from another physician. This is not a proactive approach to delivering care that will likely improve the patient's health; it requires the cardiologist to wait for actions both by the patient and by another physician. If the EHR can be used to identify patients meeting guideline criteria for a valvular intervention, the cardiologist can then contact the primary care providers and facilitate an evaluation of the patients.

The HVI analytics team currently is determining the best ways to collaborate with primary care physicians and help them efficiently care for their patients. HVI analytics is developing a process that does not overload busy physicians but allows them to have directed information for these patients.

Combatting Unplanned Readmissions

Another example of how Dr. Mulukutla and his colleagues have used data to care for patients in a smarter way is by developing a tool to assess the risk of unplanned hospital readmission at the outset of a hospital stay. Unplanned readmissions are a big challenge for every hospital, and the UPMC team has focused on lowering seven-day and 30-day readmission rates.

Dr. Mulukutla, Dr. Marroquin, and their colleagues found that if patients are seen in the clinic within 30 days of discharge, there is a 50% reduction in rehospitalization within 30 days.⁶ Using data from the EHR, Dr. Mulukutla and colleagues can identify patients at high-risk for readmission when they are first admitted and intervene before they are discharged. At several UPMC hospitals, discharge planning has become more efficient. Follow-up appointments in the clinic can be scheduled as early as the first day of a hospital admission. Readmission rates have since declined for cardiology patients. Additionally, these efforts allow UPMC to better use its resources. Larger implementation, further analysis, and publication of these results are in progress.

Conclusion

Currently, Dr. Mulukutla is using the power of HVI analytics to address the important issue of improving patient access to UPMC cardiologists. UPMC is looking for opportunities at an operational level to serve more patients. Using big data from the EHR, Dr. Mulukutla is addressing ways that UPMC can run outpatient clinics to accommodate more patients and locating subpopulations within the community

who may not have easy access to the UPMC outpatient clinics. The results of these analyses will allow UPMC to strategically grow and provide cardiology care to more patients.

HVI analytics and UPMC Clinical Analytics reflect the combined commitment of UPMC to developing cutting-edge technology that harnesses patient-derived EHR data to improve clinical care and outcomes.

References and Further Reading

1. Masri A, Althouse AD, McKibben J, Lee JS, Mulukutla SR. Limitations of Administrative Data for Studying Patients Hospitalized With Heart Failure. *Ann Intern Med.* 2017; 166(12): 916-917.
2. Mulukutla SR, Gleason TG, Sharbaugh M, Sultan I, Marroquin OC, Thoma F, et al. Coronary Bypass Versus Percutaneous Revascularization in Multivessel Coronary Artery Disease. *Ann Thorac Surg.* 2019; 108(2): 474-480.
3. Sanchez CE, Dota A, Badhwar V, Kliner D, Smith AJ, Chu D, et al. Revascularization Heart Team Recommendations as an Adjunct to Appropriate Use Criteria for Coronary Revascularization in Patients With Complex Coronary Artery Disease. *Catheter Cardiovasc Interv.* 2016; 88(4): E103-E12.
4. January CT, Wann LS, Calkins H, Chen LY, Cigarroa JE, Cleveland Jr JC, et al. 2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol.* 2019; 74(1): 104-132.
5. January CT, Wann LS, Alpert JS, Calkins H, Cigarroa JE, Cleveland Jr JC, et al. 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol.* 2014; 64(21): e1-76.
6. Hagland M. At UPMC, Turbo-Charging Quality Improvement Efforts Through Data Analytics. *Healthcare Innovations.* 2018.
7. Galetsi P, Katsaliaki K, Kumar S. Values, Challenges and Future Directions of Big Data Analytics in Healthcare: A Systematic Review. *Soc Sci Med.* 2019; 241: 112533.



UPMC HVI 2020 Conferences

6th Annual Transradial and Complex Cardiac Interventions Symposium

Save the Date: March 21, 2020 • Pittsburgh, Pa.

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 the UPMC Heart and Vascular Institute faculty. Internationally recognized guest lecturers will be featured.

Additional Information

For more information, please contact Brenda Smith at 412-647-6816 or smithb2@upmc.edu or visit UPMC.com/TransradialSymposium.

17th Annual Pittsburgh Vascular Symposium

*Save the Date: Thursday, May 21 to
Saturday, May 23, 2020 • Pittsburgh, Pa.*

This CME conference will provide an evaluation and critique of the current and future standards of care in the treatment of the vascular patient. A multidisciplinary panel of national and international speakers will discuss updates on the treatment of vascular disease and new innovations in the field.

Additional Information

For more information, or to register, please contact Mark Byrne at byrneme@upmc.edu or visit UPMC.com/VascularSymposium.



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 more than 1,200 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.

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For consults and referrals to cardiology or cardiac surgery, please call UPMC's 24-hour physician OnDemand service at **1-866-884-8579**.

To refer a patient to the UPMC Division of Vascular Surgery, call **412-802-3333**.

A \$20 billion health care provider and insurer, Pittsburgh-based UPMC is inventing new models of patient-centered, cost-effective, accountable care. The largest nongovernmental employer in Pennsylvania, UPMC integrates 89,000 employees, 40 hospitals, 700 doctors' offices and outpatient sites, and a nearly 3.6 million-member Insurance Services Division, the largest medical insurer in western Pennsylvania. In the most recent fiscal year, UPMC contributed \$1.2 billion in benefits to its communities, including more care to the region's most vulnerable citizens than any other health care institution, and paid \$587 million in federal, state, and local taxes. Working in close collaboration with the University of Pittsburgh Schools of the Health Sciences, UPMC shares its clinical, managerial, and technological skills worldwide through its innovation and commercialization arm, UPMC Enterprises, and through UPMC International. *U.S. News & World Report* consistently ranks UPMC Presbyterian Shadyside on its annual Honor Roll of America's Best Hospitals and ranks UPMC Children's Hospital of Pittsburgh on its Honor Roll of America's Best Children's Hospitals. For more information, go to UPMC.com.

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