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Cardiovascular Medicine

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Getting to the Heart of the Issue

Every week, newspaper headlines seem to tell of a new drug, device or test that can help patients with cardiovascular disease. But the stories rarely seem to mention just how much the new pill, gadget or diagnostic aid will actually cost—nor whether it will bring better results that can justify that cost.

Fortunately, U-M researchers are tackling that crucial issue in key areas of heart care. And leading the charge is a young cardiologist who is also trained in the kind of analytic techniques that can reveal the economic truth of a medical advance.

This year, Cardiovascular Medicine Division fellow Paul Chan, MD, MSc, (above) and his colleagues published and presented several key findings about two expensive and increasingly popular heart treatments: implanted cardioverter defibrillator (ICD) devices to prevent sudden cardiac death, and radiofrequency (RF) catheter ablation to treat the heart rhythm condition called atrial fibrillation.

ICDs, which are small devices implanted in the chest, can restart a stopped heart immediately, especially in patients who have survived a prior heart attack or have heart failure. For several years, Medicare and other insurers have covered their $35,000 cost, potentially adding billions to heart care spending.

The U-M team—Chan, Cardiovascular Medicine faculty Kim Eagle, MD and Brahmajee Nallamothu, MD, MPH, and General Medicine faculty Rodney Hayward, MD, and Sandeep Vijan, MD—this year showed that the devices truly are effective in real-world populations. But they also demonstrated a simple way for society to get the most for its money: a $400 heart-rhythm test called MTWA (for microvolt t-wave alternans) that can effectively tell which heart failure patients can benefit most from an ICD. In fact, they found, Medicare could save $690 million a year if it only approved ICDs for patients who have an abnormal or inconclusive MTWA result. This year, that research won Chan the Parmley Prize from the American College of Cardiology.

Turning to atrial fibrillation, Chan and his colleagues have used their techniques to assess the cost-effectiveness of RF ablation, which essentially cures the vast majority of patients and may greatly reduce their risk of having a stroke. U-M has become a leader in providing this treatment. But Chan worked with U-M heart rhythm specialists Hakan Oral, MD and Fred Morady, MD to create a computer model that addressed a fundamental question: which patients will get enough long-term benefit from RF ablation to justify its cost and risks?

In general, they found, it’s far more cost-effective to perform the procedure on younger patients who have additional risk factors for stroke such as high blood pressure, diabetes, heart failure or prior strokes. The advantage isn’t so clear in older patients, nor in those who don’t have other risk factors. This kind of analysis is sure to help guide patient selection as RF ablation increases in use at U-M and internationally.
Confronting an Inherited Killer

Some families seem cursed with especially bad heart health, losing members of several generations in sudden, tragic deaths at young ages.

But for many of these families, the ‘curse’ may actually be an inherited genetic disease that makes the heart muscle grow abnormally thick—and increases the risk of sudden cardiac death or other heart problems.

As many as one in every 500 Americans have this condition, called hypertrophic cardiomyopathy or HCM, and many do not know they have it. Over time, it can progress to cause breathlessness, an irregular heartbeat, and chest pain upon exertion, as the heart muscle thickens, stiffens, and interferes with the flow of blood out of the heart to the body.

This year, Cardiovascular Medicine launched a new, comprehensive Hypertrophic Cardiomyopathy Clinic to help patients, and their families, understand their risk and receive effective treatment. It’s one of only 11 programs of its kind in the country.

Directed by cardiologist and HCM researcher Sharlene Day, MD, (below) the program unites a broad range of U-M physicians and others who currently treat hundreds of HCM patients each year. The new coordinated approach to testing, diagnosis, and treatment gives patients access to the full range of options—including genetic testing and counseling, surgery, and implanted cardioverter defibrillators, or ICDs, which can detect sudden severe heart arrhythmias, and immediately shock the heart back into rhythm.

“HCM is a complex disease, but we know so much more about it than we used to, including its genetic roots and effective treatments,” says Day, who has treated many HCM patients while also studying the disease in the laboratory with Joseph Metzger, PhD, Professor of Internal Medicine and of Molecular and Integrative Physiology. “This new approach gives patients and their families access to care that incorporates new knowledge and tools for diagnosis and treatment. It will also help families participate in research that seeks to improve HCM care for the future.”

The HCM team includes adult and pediatric cardiologists, cardiac surgeons, radiologists, geneticists and genetic counselors who cooperate to evaluate and treat HCM patients and their family members.

Among the Cardiovascular Medicine faculty taking part are William Armstrong, MD, a leader in echocardiography, the ultrasound test that is used to diagnose HCM, Todd Koelling, MD, who specializes in treating the heart failure that HCM can cause, Mauro Moscucci, MD, who is experienced in performing minimally-invasive procedures to pare down the thickened heart muscle, and Eric Good, DO, who specializes in treating problems of the heart’s electrical system, which is often disturbed by HCM. Mark Russell, MD, Pediatrics, directs the program’s pediatric clinical and research effort.

Most cases of HCM aren’t severe enough to pose a high risk of sudden death—but the difficulty comes in identifying which patients’ risks are highest. Intriguingly, many people with HCM have only mild symptoms, but may still be at increased risk of dying suddenly without warning.
More than 400 mutations in genes that affect the development, function and organization of heart muscle cells have been found to cause HCM. The severity of the disease varies greatly among members of the same family, even if they all carry the same genetic mutation.

U-M is one of the few centers that can offer, and educate families about, genetic testing. Such testing aids in diagnosis, may help to guide treatment, and enables family members to be screened for the same mutation to identify which of them are at risk of developing the disease.

Currently, U-M researchers are recruiting HCM patients, and healthy people with at least one relative who has HCM, for a study aimed at finding out more about the genetics of HCM. More information about this study can be found at www.med.umich.edu/engage.

Day, Metzger, Russell and others are pursuing laboratory research that looks at what goes wrong in the heart muscle cells of HCM patients, and tests new strategies for reversing or slowing the process. Meanwhile, as the clinic continues to grow, researchers will analyze data from large numbers of HCM patients to look for patterns and determine what treatments are most effective.

A Map of Heart Attack Care’s Future?

Emergency angioplasty has proven to be the best front-line treatment for the most common kind of heart attack, and most Americans now live an ambulance ride away from a hospital that performs it, according to a new analysis led by U-M cardiologists Brahmajee Nallamothu, MD, MPH, (below) and Eric Bates, MD. In a separate study, they also found that patients do best when they receive emergency angioplasty at a hospital that has the staff and systems needed to perform it around the clock, not just during business hours. Taken together, they say, these findings add to the argument that heart-attack care should be transformed into a regional system—just like trauma care has become in many areas of the country. But doing so will present major logistical challenges that need to be overcome—including a shift away from the current system of taking heart-attack patients to the nearest hospital, which can keep them from receiving emergency angioplasty fast enough. This year another paper by the team and U-M trauma surgeons examined the specific challenges facing regional systems.

Left: MRI image and illustration of a healthy heart and a heart with hypertrophic cardiomyopathy, which causes the walls of the heart to thicken—especially the wall between the heart’s two lower chambers or ventricles. As the walls harden and decrease the size of the ventricles, the heart’s ability to pump blood out to the body may be hampered. 

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