

Cardiovascular **Physician**

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20 years of TAVR:

From the fringes,
to the frontline,
to a new frontier.



Also inside:

**Robotic cardiac
surgery**

**First dual-chamber
leadless pacemaker**

**New heart failure
management guidelines**

**Cardiometabolic
clinic**

Table of contents



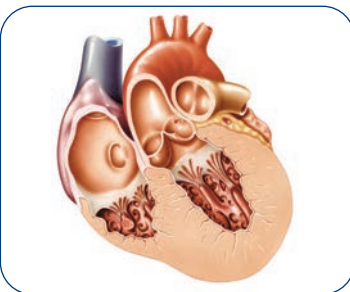
4
20 years of TAVR
Past, present, and future



8
Robotic cardiac surgery
New program launches at MedStar Washington Hospital Center



10
The next generation of pacemakers
Leadless devices for cardiac arrhythmias



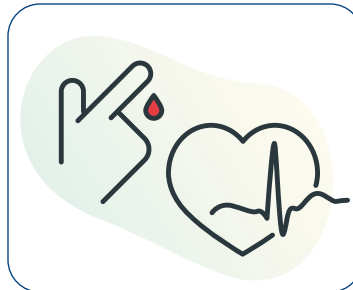
12
New heart failure management guidelines
Definitions, stages, and treatments



14
Cardiogenetics
Genetic counseling in cardiovascular medicine



16
The e-consult program
Novel method to deliver data-driven and person-centered care to hospitalized heart failure patients



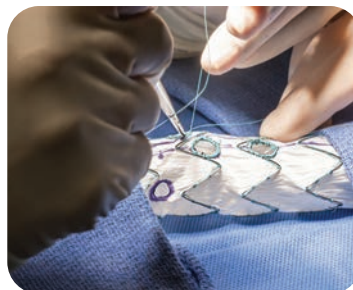
17
Cardiometabolic clinic
Coordinated care for comorbidities



18
Palliative care
Unprecedented penetration into the spheres of cardiovascular disease



19
News & notes
MedStar Washington Hospital Center rises to 28th in the nation for cardiology and cardiac surgery



19
News & notes
Cutting-edge therapy for fenestrated and branched endovascular aortic intervention now available through MedStar Union Memorial Hospital

Perspective from Stuart F. Seides, MD, physician executive director, MedStar Heart & Vascular Institute

Established expertise and groundbreaking exploration.



In this issue of *Cardiovascular Physician*, we are both humbled and justifiably proud to share news of several significant medical and interventional innovations that we continue to spearhead. Providers at MedStar Heart & Vascular Institute have built consistent experience and volumes through proven methodology while continuing to ask questions about what can be done to improve and expand patient care. It is this established expertise that permits participation in groundbreaking exploration, as detailed within this issue. Notably, each of the innovations you'll read about are all team-based. We celebrate the effectiveness and value of our team members—the inventive providers and their brave patients, alike.

Our cover story recognizes the 20th anniversary of the first transcatheter aortic valve replacement (TAVR), looks back on the intervention's remarkable progress, and considers what is on the horizon. This milestone holds particular meaning for MedStar Health. Our physicians—and importantly, our patients—have been on the forefront of every phase of development for TAVR, stretching all the way back to balloon aortic valvuloplasty. In 1987, I went to Rouen, France to learn the dilatation technique from the team who would ultimately implant the world's first TAVR. Since then, thanks to courageous patients and operators, the trajectory and complexity in technology has been incredible, especially when compared to the early days when physicians were only imagining the promise. In this story, you'll read accounts from some of the interventional cardiologists who were on the cutting edge of TAVR decades ago, and from those who continue to refine the technique today.

On page 8, we share details of our newly launched robotic cardiac surgery program, led by Dr. Yuji Kawano, recruited from Emory Healthcare in Atlanta. Robotic cardiac surgery is yet another technology that is emerging from a relatively small niche, practiced by just a few experts under limited circumstances, to one with broader expertise and application. Dr. Kawano's considerable experience and palpable passion, in the context of our dedicated surgical team, offer patients in the region an exciting new option in the field of cardiac surgery.

Another promising new treatment innovation comes from our cardiac electrophysiologists. MedStar Health is the only program in the region to participate in the Aveir DR i2i clinical trial for the first, dual-chamber leadless pacemaker; we implanted our first devices this summer. Building on our high-volume experience in single-chamber leadless pacemakers, we are well-positioned to expand safer and more comfortable options for the many patients in need of these more complex systems. See page 10.

Our multidisciplinary heart failure team also continues expanding possibilities in all stages of the growing "epidemic" of congestive heart failure. On page 12, two of our prominent advanced heart failure specialists discuss the newly released guidelines for the management of heart failure. On page 14, Hillary Porter, the system's new cardiovascular genetic counselor, shares how her role on the heart failure team contributes some of the most basic underpinnings of health and disease—genetic makeup and predictability—and how these may impact screening, diagnosis, and treatment decisions. See page 16 to learn about the ways in which we are implementing scientific data analytics to optimize medical therapy for our hospitalized patients. On page 17, you'll read about how our recently launched cardiometabolic clinic identifies individuals at risk for heart disease and works to ameliorate progression by offering myriad services in a community setting. And finally, on page 18, you'll read about how our trailblazing palliative care program thoughtfully and holistically addresses the needs of patients for whom disease-specific treatment may no longer be appropriate. We don't let these patients fall out of our care; we embrace them and we help make their lives pleasant, productive, and rewarding, using a different set of skills and therapeutic approaches.

20 years of TAVR:

From the fringes, to the frontline, to a new frontier.



Not too long ago, patients with severe aortic stenosis had only one option: cardiac surgery via open sternotomy. Those who couldn't sustain the operation were simply out of luck.

"We had absolutely nothing to offer patients who were poor surgical candidates because of advanced age or comorbidities," says Itsik Ben-Dor, MD, an interventional cardiologist at MedStar Washington Hospital Center and Associate Director of its Cardiac Catheterization Laboratory. "The only thing we could do was send them home."

But in Rouen, France, a French interventional cardiologist was working on a novel idea: *Why not replace faulty cardiac valves percutaneously and avoid surgery altogether?*

That idea laid the foundation for what would become transcatheter aortic valve replacement (TAVR). After a few years of trial and error, the new technique was successfully employed in the first-in-human test in 2002.

MedStar Health—always an early adopter—quickly followed in 2007 becoming one of the first centers in the United States to perform TAVR. From those early beginnings to today, we have contributed to every major development in TAVR's history and continue to lead its evolving technology.

"It'll never work."

While TAVR is now the standard of care, it was initially controversial, especially within the European medical community. At the time, the idea of pursuing a transcatheter, percutaneous procedure for the heart was derided as "a waste of time and money," "crazy," "premature," and "irresponsible."

Our team, however, was intrigued, thanks to the leadership and experience of Augusto Pichard, MD, then-chief of MedStar Washington Hospital Center's Cardiac Catheterization Laboratory, who learned the technique from the device's founder. When the opportunity to participate in the first U.S. clinical trial presented itself, we embraced it enthusiastically.

"We were one of the first PARTNER trial participants to perform TAVR, and by the study's end, had recruited 50 patients altogether, more than any other site," says Dr. Pichard. "That achievement laid the foundation for MedStar Health's continuing prominence in the field, and helped move the life-saving technology from the fringes to the front line, changing the world of cardiology forever."

TAVR takes over.

After the PARTNER trial established TAVR's safety and efficacy for patients at high risk for surgery, we participated in trials that validated its use for patients at moderate and low risk. And in 2016, for the first time, the number of TAVR cases nationwide surpassed open surgical procedures.

Today, TAVR accounts for 80 percent of all aortic stenosis procedures. Our team is one of the most experienced and highest volume TAVR centers in the United States, performing an average of 500 cases each year systemwide.

"Our patient volume is a direct result of our team's experience and expertise, much of it gained through research," says Ron Waksman, MD, associate director of Cardiology and director of Cardiovascular Research and Advanced Education. "Since 2007, we've participated in nearly every clinical trial for every TAVR device currently on the market."

1985-1989

Initial TAVR concept developed by Dr. Alain Cribier.¹

1990s

Physicians evaluated percutaneous transcatheter aortic valvuloplasty (PTAV) as a solution for non-operable patients with severe aortic stenosis. Its shortcomings were soon recognized, and work continued to find a technology that could provide safe, consistent outcomes and long-term durability.

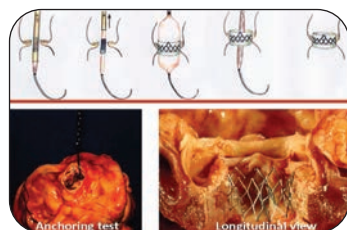


2002

First-in-human TAVR performed by Dr. Cribier in Rouen, France.²



1980s



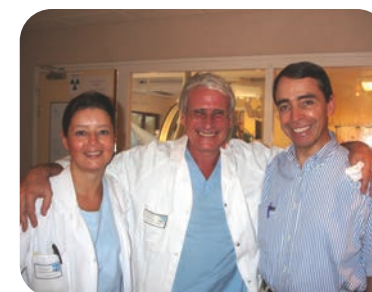
1990s



1989

The first course in Interventional Cardiology with live cases for percutaneous treatment of aortic stenosis takes place at MedStar Washington Hospital Center, with cases performed by Drs. Pichard and Cribier.

2000s



2007

Dr. Pichard performs the first two TAVRs at MedStar Washington, assisted by Drs. Satler, Waksman, Ben-Dor, and Bernardo, initiating the PARTNER I Randomized Clinical Trial in the U.S. to study high-risk surgical patients.

MedStar Washington soon becomes the highest enroller for the study in the nation.

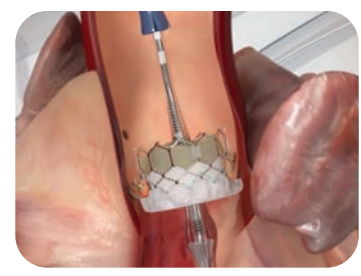
Timeline continues →



(l to r) MedStar Washington Hospital Center Interventional Cardiologists Augusto Pichard, MD (emeritus); Lowell Satler, MD; Toby Rogers, MD; Itsik Ben-Dor, MD; and Ron Waksman, MD

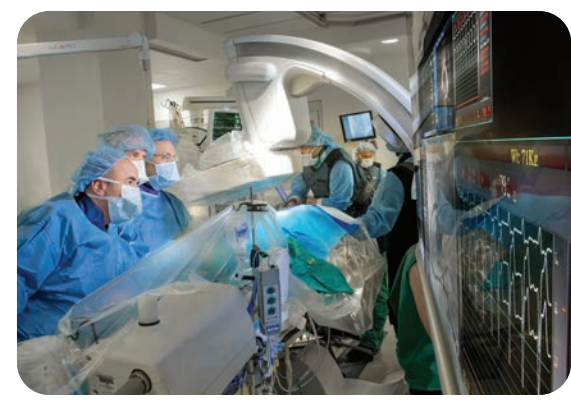


(l to r) MedStar Union Memorial Hospital Interventional Cardiologists Antony Kaliyadan, MD; Nauman Siddiqi, MD; and John Wang, MD



2011
Trials for intermediate-risk surgical patients.

2016
FDA approval for intermediate-risk surgical population.



Future



2011
FDA approval for high-risk surgical population.



2019
Trials and FDA approval for low-risk surgical patients.

Long-term follow-up continues, along with new studies to examine durability in younger patients, use of the technology for other conditions, including aortic regurgitation, and newer valve-in-valve TAVR techniques for patients who outlive their tissue valves.

Edwards Lifesciences PARTNER trials (balloon expandable valves) and Medtronic CoreValve® /Evolut™ Trials (self-expanding valves)

Dr. Waksman was the lead investigator in the first U.S. study of low-risk surgical patients treated with TAVR in an investigator sponsored study approved by the FDA. In this study, we enrolled nearly 400 patients, providing initial support on the feasibility and safety of TAVR in low-risk and younger populations. Currently, we are testing the fourth and latest generation of the original device.

“Each new version offers some improvement, whether it’s a smaller delivery system, more customizable features, or has some other advantage,” says John C. Wang, MD, chief of the Cardiac Catheterization Laboratory at MedStar Union Memorial Hospital and scientific director for Cardiovascular Research in the Baltimore region. Dr. Wang is principal investigator for the pivotal ALLIANCE trial (recently awarded to MedStar Union Memorial) that evaluates the new Edwards SAPIEN X4 valve.

Other studies we’re involved with are looking at expanding TAVR-like approaches to severe aortic regurgitation and other conditions, (JenaValve Technology’s ALIGN-AR Pivotal PMA trial to study the Trilogy™ Heart Valve System), as well as potential applications for the mitral and tricuspid valves.

“Our work is keeping MedStar Health at the frontier of percutaneous procedures,” says Toby Rogers, MD, PhD, an interventional cardiologist and scientific lead for the Structural Heart Disease program. “We’re committed to staying on top of new developments and moving the field forward.”

New opportunities and challenges.

Twenty years after TAVR’s debut, the procedure is now an established part of the armamentarium. Yet specialists admit they still have lot to learn about transcatheter therapy.

“Now that younger and healthier patients are eligible for the procedure, one of the most pressing questions is, ‘What happens if TAVR fails?’” says Lowell Satler, MD, director of the Cardiac Catheterization Laboratory at MedStar Washington.

That wasn’t an issue in the early days, when the average patient age was 86, and most patients did not outlive their valves.

“TAVR valves last around 10 to 15 years, similar to surgically implanted tissue valves,” says Dr. Satler, who participated in the PARTNER trials and has been pioneering the evolution

ever since. “As such, the device’s lifespan is probably not an issue for patients in their late 70s or 80s—our original cohort. But now, patients in their 50s are requesting the procedure. We need to anticipate the needs posed by this new population and determine the best way to manage them.”

Despite the challenges, TAVR continues its remarkable progress, and is a testament to how ingenuity and technological advances can transform care.

“In a little over two decades, TAVR has gone from concept to first-in-human to clinical trials to approval for high-, moderate- and low-risk patients,” says Dr. Wang. “We now have a solution for just about every patient, when previously there was only one.”

To reach our interventional cardiology specialists, call: MedStar Washington Hospital Center: 202-877-5975 MedStar Union Memorial Hospital: 410-554-6550.

Some photos were made available under CC BY 4.0 license.

¹ de Jaegere, P., de Ronde, M., den Heijer, P., Weger, A., Baan, J. (2020). The history of transcatheter aortic valve implantation: The role and contribution of an early believer and adopter, the Netherlands. *Netherlands Heart Journal*, Vol. 28, 128-135. doi:10.1007/s12471-020-01468-0

² Cribier, A. (2016). The development of transcatheter aortic valve replacement (TAVR). *Global Cardiology Science & Practice*, Vol. 2016, No 4. doi:10.21542/gcsp.2016.32

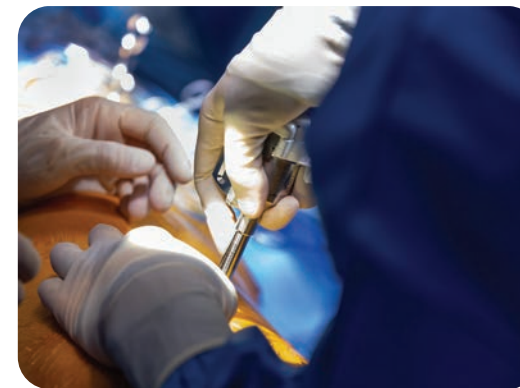


The development of new catheter-based technologies has benefitted enormously from a tradition of open-mindedness and support on the part of our cardiac surgeons (pictured left). It has been a longstanding, collaborative effort that continues unabated.

Robotic cardiac surgery launches at MedStar Washington Hospital Center.



Robotic ports are carefully placed on the right chest



Each port requires only an 8mm hole



Peripheral cannulation for the cardiopulmonary bypass



Full view of the robotic accesses

Using the da Vinci® surgical system, Dr. Kawano accesses the heart from the right or left side of the chest through tiny incisions, without violating the thoracic cage. This approach reduces the incidence of serious complications such as blood loss, infection, and stroke. Patients are usually able to ambulate, free of intravenous lines the day after surgery, further accelerating the healing process. Patients return to the care of their cardiologists and advance their recovery with less pain over the course of a few weeks, versus the months it may take following the conventional sternotomy approach.

With all the promising advances that robotic cardiac surgery brings, Dr. Kawano is quick to point out that the robotic approach is just one of the innovative tools utilized by cardiac surgeons at MedStar Health.

“As a part of a program that has a long history of constant innovation with a mission to provide the best possible option for each unique patient, this new approach is a complement to the wide range of treatments we offer,” he says.

While robotic surgery has provided very good outcomes even in high-risk patients, Dr. Kawano is thoughtful when determining candidacy. The process requires more pre-op studies than the standard approach. When Dr. Kawano receives a referral, he reviews all available information, examines the patient, answers their questions, and obtains further imaging studies to ensure feasibility. Although all patients may be considered for robotic surgery, this access may not be optimal for certain individuals. In these circumstances, our cardiac surgeons take a team approach to determine the best surgical option.

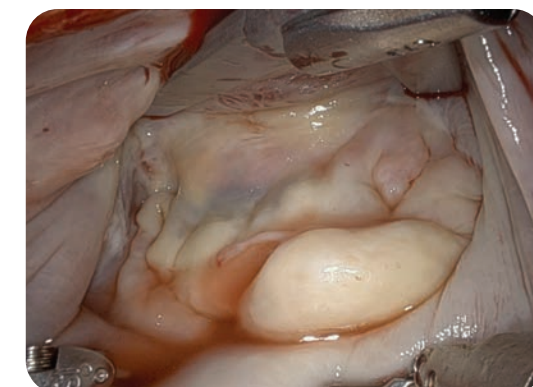
Dr. Kawano and the comprehensive team of MedStar Health cardiac surgeons will evaluate your patient and recommend the most appropriate procedure for them. To make a referral, please call 202-877-7464.



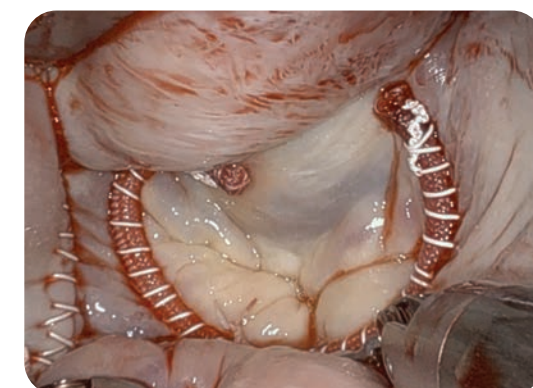
Docking the robot



Operation is done from the robotic console



P2 prolapse mitral valve pre-repair



No residual regurgitation post-repair

MedStar Washington Hospital Center is now one of the few sites in the mid-Atlantic region to offer robotic cardiac surgery. Launched this spring, the program has grown rapidly, with more patients and their referring cardiologists exploring the possibilities that robotics offers—shorter recovery times, less post-surgical pain, and fewer surgical complications—without compromising excellent clinical results.

Yuji Kawano, MD, director of the new program, joined MedStar Health in 2021, charged with spearheading the robotics initiative. Prior to his arrival, he completed an advanced robotic cardiac surgery fellowship at Emory University Hospital—one of only a handful of such programs in the United States—where he received the full spectrum of training under one of the first, and most experienced, robotic cardiac surgeons, worldwide.

Dr. Kawano, who has performed more than 200 robotic heart surgeries and over 2,000 procedures overall, set about the task of forming an elite surgical team to conduct the first cases at MedStar Washington.

“We selected interested and experienced MedStar Health nurses, techs, and other staff based on their existing skill sets that could translate to robotics,” he explains. “We traveled to Emory together, where they received specialty, peer-to-peer training, and spent time observing cases and interacting with the expert team. In addition, we completed many ‘wet lab’ training sessions before launching the program.”

As of this summer, our robotics team has successfully performed mitral valve replacement, mitral valve repair, cardiac myxoma removal, and coronary artery bypass. As the team grows in proficiency and experience, the plan is to expand robotic surgery as an option for patients with more complex valvular disease.

“As a part of a program that has a long history of constant innovation with a mission to provide the best possible option for each unique patient, this new approach is a complement to the wide range of treatments we offer.”

—Yuji Kawano, MD



The next generation of pacemakers: Leadless devices for cardiac arrhythmias.

Our physicians are leading the way in delivering the next generation of permanent pacemakers. The first, dual-chamber leadless pacemaker, the Aveir™ DR, is undergoing a worldwide clinical trial sponsored by Abbott, and MedStar Washington Hospital Center was the only hospital in the region selected to participate. In July 2022, the MedStar Health cardiac electrophysiology team was the first to implant this device in the Baltimore-Washington region.

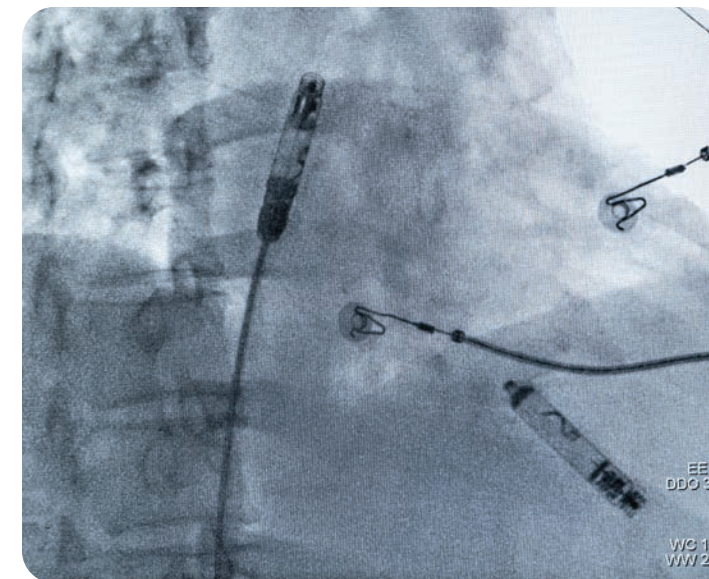
“This major leap forward offers patients an excellent option to treat bradycardia,” says Zayd Eldadah, MD, PhD, director of Cardiac Electrophysiology at MedStar Health and principal investigator of the Aveir™ DR i2i™ clinical trial. “No wires implanted in veins, no metal device under the skin, and not even a surgical incision means the potential for less risk, greater comfort, and fewer post-procedure restrictions.”

The leadless system consists of two mini capsules, each smaller than a AAA battery, that are delivered via minimally invasive femoral venous access. Under X-ray guidance and

without any incisions, the small devices are secured within the right atrium and right ventricle, respectively. The result is synchronized, beat-to-beat sensing and pacing of the atria and ventricles.

Compared to traditional pacing, leadless technology can eliminate inflammation, scars, and long-term problems such as wire insulation breaks, vein blockage, and infection. The procedure typically takes less than an hour, and patients can go home the same day. Battery life is 10-to-15 years, similar to that of traditional pacemakers, and the devices have been designed to be readily retrieved and removed if needed.

“The pacemaker’s impressive battery life is a key benefit,” said Cyrus Hadadi, MD, associate director of Cardiac Arrhythmia Research at MedStar Washington Hospital Center. “The system design also offers a real-time mapping capability that allows physicians to measure heart electric signals, offering options for improved positioning of the devices.”



Cardiac electrophysiologists Cyrus Hadadi, MD (left), and Zayd Eldadah, MD (right)

This breakthrough advancement follows shortly after our providers began implanting the Abbott Aveir™ VR leadless single-chamber pacemaker. It received U.S. Food and Drug Administration approval in April 2022, and now, we have one of the country’s highest implantation volumes of the commercial device.

“Leadless pacemakers are optimal for any patient needing pacing, but superior for patients who either can’t tolerate a device under the skin or prefer the cosmetic appeal,” explains Dr. Hadadi. “With a leadless pacemaker, you can’t feel it and you can’t see it.”

Most patients needing pacemaker therapy require dual-chamber systems to maintain atrial-ventricular synchrony. “In place of wires, the Aveir uses the patient’s own blood to transmit electrical information between the heart’s upper and lower chambers—a very clever and energy-efficient innovation,” added Dr. Eldadah, who performed the region’s first implant. “This device has the potential to be a transformational advance for patients—perhaps the medical equivalent of graduating from a rotary-dial landline to a smartphone.”

The Aveir DR i2i study is designed to assess the safety and effectiveness of the Abbott Aveir DR Leadless Pacemaker System in patients with abnormal heart rhythms. Patients enrolled in the Aveir DR i2i IDE Study will receive Abbott’s Aveir DR leadless pacemaker device through a minimally invasive catheter-based procedure. It will enroll up to 550 patients at up to 80 sites worldwide and data collected will be submitted to support global regulatory approvals.

Cardiac electrophysiologists at MedStar Washington Hospital Center and MedStar Union Memorial Hospital routinely implant single-chamber leadless pacemakers. Schedule a patient consult by calling 202-877-7685 (Washington) 410-554-6727 (Baltimore).

To learn more about the dual-chamber, Aveir DR i2i pacemaker trial, please contact study coordinator, Dr. Nebu Alexander, at nebu.alexander@medstar.net.

New guidelines update heart failure definitions, stages, and treatments.

Q&A

The 2022 update to the American Heart Association/American College of Cardiologists/Heart Failure Society of America guidelines for the management of heart failure (HF) provides a variety of new and updated recommendations aimed at improving quality of care, while aligning with patients' interests.

Mark Hofmeyer, MD, medical director of the Advanced Heart Failure Intermediate Care Unit and program director of the Advanced Heart

Failure and Transplant Cardiology Fellowship Program at MedStar Washington Hospital Center, along with Erika Feller, MD, director of heart failure outreach for MedStar Health's Baltimore region, share their thoughts on the guidelines' key points, and what they mean for guidance-directed medical therapy (GDMT).

The new guidelines revise some of the definitions and terminology used to describe heart failure (HF). Why is this important?

Heart failure is a very complicated condition that doesn't lend itself to a classical clinical definition. We want to approach HF as a spectrum of conditions based on left ventricular ejection fraction (EF) but also recognize that the classifications accurately reflect responses to ongoing treatment, rather than static conditions. The new guidelines emphasize the use of "reduced," "mildly reduced," "improved," and "preserved" EF—which offers more dynamic terminology.

Is that why there are also revised definitions for the stages of HF?

Yes, the stages of HF were, in part, adjusted to emphasize risk factors and provide more timely diagnosis. Patients with risk factors for heart disease are now considered at-risk (Stage A). Pre-HF (Stage B) now includes patients who are asymptomatic but show evidence of disease, such as structural changes or certain biomarkers. The other stages are symptomatic HF (Stage C) and advanced HF (Stage D).

What does this mean for various treatment strategies?

A great deal, as the availability of more proven treatment options has grown since the last major HF guideline update in 2013. For example, for patients with reduced EF, the new guidelines strongly recommend angiotensin receptor II blockers-neprilysin inhibitors (ARNi) ahead of angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs).

ARNi were the subject of an update in 2017. Why is it being mentioned again?

Although studies have shown ARNi medications to be highly effective since they were approved in 2015, many patients are still reluctant to make the switch. That's certainly understandable since they may have grown comfortable with their current regimen, but guidelines now give the strongest recommendation to implement ARNi as the initial course of treatment, with ACE and ARB as reasonable alternatives if ARNi are not tolerated.

How about sodium-glucose cotransporter-2 inhibitors (SGLT2i)?

This may well be the most exciting part of the new guidelines, as it provides a fourth option for treating reduced EF. Originally developed a decade ago for diabetes management, SGLT2i have been found to reduce hospitalization and improve survival rates for HF patients, as well. These findings were released a couple of years ago, but were quickly overshadowed by COVID, so there is ongoing education needed for providers and patients, alike.

There's also emerging data that SGLT2i can significantly benefit patients with preserved EF—decreasing hospitalization and improving survival. The guideline recommendation is not as strong in this case, as clinical studies are still underway, but they are certainly worth considering.

What about patients with other EF classifications?

For patients with improved EF, the guidelines strongly recommend continuing guidance-directed medical therapy (GDMT) at optimal doses to maintain normal heart function. Otherwise, according to research evidence, the decreased



Advanced Heart Failure Specialist Mark Hofmeyer, MD



Advanced Heart Failure Specialist Erika Feller, MD

function will recur. And while we have fewer trials involving patients with only mildly reduced EF than we do patients with low EF, they do suggest that there is benefit. In other words, it is not unreasonable to try ARNi or ARB, but evidence to support their use one way or the other is still coming in.

What do the guidelines say about prevention and comorbidities that can complicate HF?

This ties back to the revised classes of HF mentioned earlier. As before, blood pressure control is recommended for all at-risk individuals (Stage A), including those with hypertension, obesity, and diabetes. For patients in what is now called "pre-HF" (Stage B), the guidelines recommend starting treatment before structural changes or indications of decreased heart function occur. There are also updated recommendations for HF patients with comorbidities, such as iron deficiency, anemia, hypertension, sleep disorders, type 2 diabetes, atrial fibrillation, coronary artery disease, and malignancy.

How can we expect these guidelines to evolve over time?

The presentation and delivery of guidelines are reevaluated and modified in response to evolving technologies and other factors. What's exciting is that some of the research and clinical trials that may contribute to any new treatment recommendations for general and advanced HF are being conducted at MedStar Health hospitals.

Any last thoughts?

It's important to remember that the guidelines are intended to define practices meeting the needs of patients in most circumstances and should not replace clinical judgment. GDMT is a proven way to reduce morbidity and mortality, but should always be applied in a way that aligns with each patient's best interests. This is a reason why it's so critical to work with an experienced advanced heart failure team, backed by a broad, multidisciplinary range of resources.

The guidelines now formally recommend that some patients, particularly those with later-stage disease, be managed by advanced heart failure specialists with access to multidisciplinary resources. Our specialists can help evaluate and optimize a GDMT strategy, or collaborate with interventional and surgical teams, when needed. We have extensive expertise in applying new diagnostic, monitoring, and treatment technologies, from right-heart catheters, ICD implantation, the next generation of left ventricular assistance devices (LVADs), through transplantations. Our imaging capabilities are some of the most advanced in the country.

With the patient at the center of our care model, we also collaborate closely with referring cardiologists, who are an integral part of the treatment team.

Our team provides multiple ambulatory and hospital locations across a large geographic area, offering convenient access for patients and their community providers.

To arrange a patient consult with our advanced heart failure service, call 202-877-4698 (Washington region) or 410-554-6550 (Baltimore region).

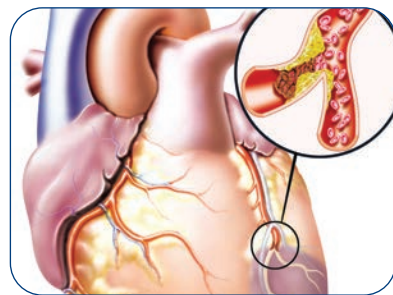
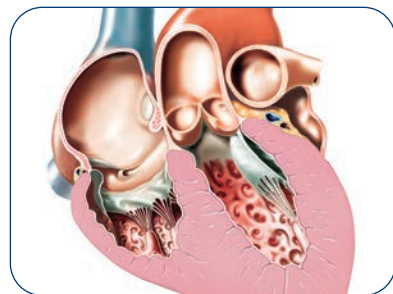
The increasing impact of genetic counseling in cardiovascular medicine.

At MedStar Heart & Vascular Institute, cardiogenetics has become standard-of-care in many of our cardiovascular services. With an increasing number of inherited diseases, including some cardiomyopathies, arrhythmias, aortopathies, and lipidemias, genetic testing and counseling plays an important role in the comprehensive management of our patients.

Genetics, though, is a nuanced field. It is rarely straightforward and requires expertise in interpretation—both for the benefit of the patient and for the physicians treating them. Cardiovascular Genetic Counselor Hillary Porter, serves on our multidisciplinary teams to help construct a complete picture of a patient's case, where appropriate.

The process begins when a cardiologist identifies a patient who may benefit from genetic testing. Reasons for referral may include:

- Idiopathic cardiomyopathy
- Suspicious arrhythmia, suggesting Brugada or long QT syndrome
- Family history of coronary artery disease
- Diagnosis of heart failure at age 40 or younger
- Fainting or palpitations during exercise
- Multiple family members with the same heart condition
- Sudden, unexpected death in the family due to heart disease
- Congenital heart disease



Hillary's first step is an initial phone conversation with the patient to provide background and what to expect at the appointment.

"Often, the patient has some hesitancy or confusion about what we're testing for and how the information will be used. We work through those questions and concerns right off the bat," she explains. "If they agree, we then set up an appointment—sometimes in the office, but often via telehealth."

She reviews personal and family medical history, imaging, disease progression, childhood illness, and lifestyle practices.

"I investigate beyond the cardiovascular system, looking for patterns or abnormalities throughout the anatomy. Aortic aneurysms, for example, may be indicative of a connective tissue disorder."

Her review, used in conjunction with the referring physician's assumptions, informs which testing is needed. The tests can be taken at the counseling appointment with a simple cheek swab, saliva sample, or blood draw. For remote consults, at-home testing kits are mailed to the patient's home for self-collection. Hillary works with the patient's insurance provider and the laboratory to ensure minimal-to-no out-of-pocket costs.

"Before the results come in, the patient and I discuss what the possibilities are and what they mean," Hillary says. "I always ask them what result they hope to get—what is 'good news' to them. That answer is very subjective and important to identify early on."



Results may have important implications for long-term treatment strategy, so Hillary consults with the referring physician to review options. Amyloidosis TTR, for example, has hereditary forms and as biopsies may not always identify the gene, genetic testing typically offers the best confirmation. For people who appear to have sarcoidosis—without a confirmatory biopsy—it can look like inherited cardiomyopathy and be managed differently. For other conditions such as hypertrophic cardiomyopathy or heart failure, genetic status may contribute to the timing of when to recommend an implantable cardioverter defibrillator (ICD), among other devices and treatments. In each instance, providers are better equipped to make decisions that lead to optimal outcomes.

The health of the patient's family is also a major motivation—and benefit—for testing. If a gene is identified, then screening protocol can be established for their close family members, potentially catching a condition in its early stages. The patient can find closure for questions of "why" they have a condition or cardiac event. It helps them better understand their prognosis and course of treatment. Hillary finds that with this information, patients feel more prepared to communicate about their condition and advocate for their care.

The field of cardiogenetics is growing. In fact, more than 50 preliminary genes—those that we suspect but have not yet confirmed—can now be included in some lab tests. Hillary encourages patients who receive results with variants of uncertain significance to come back in a few years, as it's likely there will be more precise information on those genetic variations in the future.

"As we continue to move forward in precision medicine, we see cardiogenetics integrating into many new areas of cardiovascular care," she says. In fact, Hillary is receiving more referrals from specialists beyond general cardiology and cardiac electrophysiology. Patients from the LVAD or cardio-oncology services, women with peripartum cardiomyopathy, or those with high cholesterol or lipid disorders are increasingly common.

"We continue to learn how these genes change the mechanisms and physiology of the heart, and what treatments can best target them. The more we learn, the greater the possibilities are for custom treatment based on an individual's genetics."



Hillary Porter, CGC, holds a master's degree in genetic counseling from Boston University. Prior to joining MedStar Health, she practiced as a pediatric clinical genetic counselor at Children's National Hospital in Washington, D.C.

If you'd like to learn more about the referral process for genetic counseling, or to determine if testing is appropriate for your patient, please contact her at hillary.m.porter@medstar.net.

The 'e-consult' program:

Novel method to deliver data-driven and person-centered care to hospitalized heart failure patients.

As guidelines for the treatment of heart failure continue to evolve (see previous pages 12-13), so too do our methods for decision making and care delivery.

To that end, we've implemented the "e-consult" program for our hospitalized patients with heart failure. The multipronged goals are to reduce hospital length-of-stay and readmissions, ensure medications are optimized, and eliminate variability of care. Using analytics from electronic medical records, we can quickly and automatically identify at-risk patients and make necessary adjustments. It's a novel approach to delivering expertise at a consistent level in a highly efficient manner, across most acute care MedStar Health hospitals.

How it works.

Each day, an algorithm runs across our EMR and pharmacy records to create a data repository of the entire inpatient population of MedStar Health, identifying patients who have heart failure and are at risk for long hospitalization and readmission. It pulls elements including recent labs, weight trends, medications, ICD codes, BNP and creatinine levels, along with EKGs, stress tests, and other study results.

At that point, nurse practitioner Lauren Skowera (pictured top right) reviews each patient record in detail, focusing specifically on home medications, current inpatient medications, labs, and vitals. If the patient is not on optimal, guideline-directed medical therapy, Skowera will page the inpatient care team to make the recommendation along with adding a note to the patient's medical record so that the information is easily available for the community physician.

"This practice is similar to how we work proactively to prevent sepsis within our inpatient population," says Allen Taylor, MD, (pictured bottom right) regional chief of cardiology for the Washington region. "By using data to determine who is at risk, we can respond more rapidly. This protocol establishes a model of care and provides novel ways to use implementation science."

Evidence-based change.

"Our initial goal for the e-consult program was to review and recommend candidates for angiotensin receptor/neprilysin inhibitors (ARNi), a class of heart failure medications announced in 2015," explains Skowera. "There was a real need to educate providers on this groundbreaking new medication, as well as to help determine insurance eligibility for patients."

The application has since expanded to SGLT2 inhibitors, as well—another promising new class of medications for people with heart failure. After about eighteen months of tracking,



Skowera has seen a quick adaptation and use rate of these drugs—more than 50 percent of patients are now discharged on SGLT2i when indicated than before the program was implemented. "It's become more standard-of-care," she says. "Our physicians and advanced practice providers are following this standard on their own when they receive a new patient on their service."

Now, the initiative has evolved beyond just medication optimization.

"Using this method, we are able to stay ahead of the guidelines and continue expanding our algorithm to include a larger pool of patients—identifying and providing better management for those with declining kidney function, for example," says Dr. Taylor. "In addition, we are able to do a better job with discharge planning and pinpointing the best resources for each person as they return to the community."

Dr. Taylor sees this protocol allowing MedStar Health providers to evolve care at a more rapid clip, for heart failure and potentially beyond.

"We can envision ways of using our data for other diagnoses in the future, ensuring that every patient entrusted to our care is seen as a whole person, and treated as such," he says. "No one falls through the cracks."

New cardiometabolic clinic offers coordinated care for comorbidities.

MedStar Health has established a new cardiometabolic clinic designed to provide integrated, coordinated care to patients with type 2 diabetes and related cardiovascular and renal comorbidities. Based at MedStar Good Samaritan Hospital in Baltimore, the clinic will enhance our ability to provide state-of-the-art, evidenced-based care for patients with diabetes and heart disease.

More than just a physical location, the clinic represents a collaborative model of care that eliminates process and other systematic hurdles that sometimes hinder treatment.

"Our approach offers a coordinated care delivery model that puts the patient at the center of treatment," explains Kerunne Ketlogetswe, MD, who, with endocrinologist Malek Cheikh, MD, directs the clinic. "Patients benefit from having endocrinology and cardiology working in tandem. Everything is at one place, eliminating the often time-consuming process of specialist referrals."

The cardiometabolic clinic also provides patients with immediate access to critical support services—physician assistants, dietitians, pharmacists, and others who contribute to delivering goal-directed, evidence-based treatment methods.

"We also have a convenient referral system in place, and coordinate treatment with each patient's primary cardiologist," Dr. Ketlogetswe says. "We make sure they're closely involved at every step."

Dr. Ketlogetswe says the need for this coordinated treatment approach has never been greater, given the continual growth in the number of patients with dual conditions, as well as those cardiometabolic syndrome risk factors—high blood sugar, hypertension, elevated cholesterol



(l to r) Endocrinologist Malek Cheikh, MD, and Cardiologist Kerunne Ketlogetswe, MD, directors of the new cardiometabolic clinic at MedStar Good Samaritan Hospital.



levels, and excessive belly fat—that can greatly increase their risk of developing heart disease.

"We also have a large, historically underserved population with those dual conditions, including those with food insecurity issues," she says, adding that having the clinic based at MedStar Good Samaritan Hospital will help them benefit from access to MedStar Health's Food Rx, an evidence-based medically tailored food and nutritional support program.

To ensure the new clinic continually optimizes its practices and treatment methods, MedStar Health is a charter member of the Cardiometabolic Center Alliance (CMCA), a nationwide multi-hospital collaboration established to enhance participants' ability to measure outcomes, improve processes, and expand research opportunities.

Dana Frank, MD, chairman of Medicine for MedStar Good Samaritan Hospital and MedStar Union Memorial Hospital, says the Alliance will benefit patients in multiple ways.

"Not only will we improve their lives, but we will be able to study the optimal way to implement this across our system and to other systems as well," he says. "The potential for research collaboration with our partners in the Cardiometabolic Consortium represents an opportunity to further refine and improve the care we deliver."

Patients treated under the CMCA care model experience rates of optimal guideline-directed medical therapy substantially above the national average. This ensures that patients with type 2 diabetes receive care targeted to both optimize diabetes management and provide comprehensive cardiovascular risk reduction with therapies proven to improve outcomes.

"We've always strived to provide the best treatment possible for patients with multiple conditions," says Dr. Ketlogetswe, who also serves as MedStar Harbor Hospital's vice chair of Cardiology. "That we can now better access and synchronize expertise from throughout MedStar Health will be a huge benefit."

For more information about the cardiometabolic clinic, please contact kerunne.s.ketlogetswe@medstar.net. To refer a patient to the clinic, call 443-444-5463.



Palliative care's unprecedented penetration into the spheres of cardiovascular disease.

By Hunter Groninger, MD, director of palliative care at MedStar Washington Hospital Center, and scientific director for MedStar Health Palliative Care (pictured above with Anne Keleman, social worker).

In 2015, a small group of palliative care specialists at MedStar Washington Hospital Center were assigned to collaborate with the advanced heart failure service. Still a relatively young field grown out of oncology and geriatrics, people had begun thinking about palliative care in terms of other disease states, cardiac being at the forefront.

Seven years later, we've developed a fully embedded model with advanced heart failure, working 'hand-in-glove' to provide comprehensive and holistic care to their patients. In fact, at any given time, we're following about one-third of all heart failure patients throughout the MedStar Health system. It's a very special model and not one that is seen broadly at other centers.

Our deeply interprofessional team—comprised of physicians, advanced practice providers, social workers,

chaplains, and clinical pharmacists—sees highly complex patients across the cardiology spectrum—complex from both a physiological and an emotional standpoint. Services may include acute and chronic pain management around major surgical procedures; ongoing management of dyspnea, weakness, and fatigue; dealing with emotional health challenges; advanced care planning; providing caregiver support; and assistance with complex medical decision-making.

An early palliative care model viewed progression of disease as very linear. But, of course, cardiovascular disease is not linear at all, so we must be quite nimble. Our team can ramp up services quickly or step back until the need arises again. I believe we have been successful because of our willingness to do that. We've learned to engage with cardiac programs collaboratively and flexibly, expecting that prognosis can change. We ride that rollercoaster with patients for many, many years—truly embodying the 'continuity of care' concept.

What began with an initial focus on LVAD patients, now has a much broader scope. The collegiality that was established with heart failure broke down some barriers and helped to build trust with other specialties. General cardiologists, cardiac surgeons, and cardiac intensivists have become increasingly interested in engaging our services earlier and more frequently. The depth of penetration into the spheres of cardiovascular medicine is unprecedented. For example, we automatically engage with any patient who is in the cardiovascular intensive care unit for four days or more. The same goes for any patient put on ECMO. (The pandemic really put a spotlight on this particular topic. Our early work on palliative care for COVID-19 patients on ECMO was published in the *American Journal of Hospice and Palliative Care Medicine*® in March 2021.)

We are always actively looking for new opportunities to develop further clinical research. We're studying ways to manage pain without opioids, using virtual reality for symptom management, co-developing guidelines for planned deactivation of LVADs, and becoming more involved in the experience of patients with infiltrative cardiomyopathy.

Another key area of our service's growth is that of telehealth. At MedStar Health, palliative care teams are deployed across the system's hospitals, embedded in the inpatient units and onsite clinics. But we are also in the process of expanding a robust telehealth program—allowing us to manage patients' ongoing physical symptoms and support their emotional needs without requiring them to make unnecessary trips to the hospital.

The key takeaway here is that good palliative care is need-based, not prognosis-based—people should be able to access the service regardless of their disease state. Our model of early co-management and co-collaboration builds trust with patients and their families, providing strong clinical outcomes and patient/family satisfaction. When your patient is receiving advanced cardiovascular care at MedStar Health, we will be there to provide support.

News and notes.

MedStar Washington rises to 28th in the nation for cardiology and heart surgery.



MedStar Washington Hospital Center has again achieved national ranking for Cardiology & Heart Surgery in the 2022-2023 U.S. News & World Report "Best Hospitals" rankings. It moved up to No. 28, from No. 30 in 2021 and No. 37 in 2020. It is the only nationally recognized heart program of its kind in the Washington, D.C. metropolitan area. MedStar Washington also received the highest rating possible in aortic valve surgery, heart attack, heart bypass surgery, heart failure, and transcatheter aortic valve replacement.

"In the face of the numerous challenges facing all of us in health care, this progressive recognition of excellence remains a notable tribute to the remarkable teamwork and dedication of our physicians and associates who put our patient's care and well-being first and foremost every day," says Stuart F. Seides, MD, physician executive director of MedStar Heart & Vascular Institute. "We continually strive to merit the trust of those patients, their families, physicians, and the entire Washington regional community whom we are privileged to serve."

Cutting-edge therapy for fenestrated and branched endovascular aortic intervention now available at MedStar Union Memorial Hospital.

A unique aortic therapy using fenestrated and branched graft technology for patients with juxtarenal, pararenal, and thoracoabdominal aortic aneurysm, as well as thoracoabdominal aortic aneurysm secondary to aortic dissection, is now available to patients at MedStar Union Memorial Hospital.

Vascular Surgeon Javairiah Fatima, MD, has an FDA-approved Investigational Device Exemption (IDE) to implant physician-modified endografts with fenestrations and branches that are tailored specifically to each patient's individual anatomy. Dr. Fatima has been performing this technique at MedStar Washington Hospital Center and now will work with Raghu Vallabhaneni, MD, and other Baltimore-based MedStar Health vascular surgeons to offer this novel technology through MedStar Union Memorial.

These endografts extend our ability to offer minimally invasive aortic repair to patients who are considered high risk for open thoracoabdominal aortic repair using commercially available stent grafts. All of our patients are cared for by the complex aortic multidisciplinary team to ensure the best outcome possible.

For more information on this therapy or to refer a patient, please call 410-544-2950 (MedStar Union Memorial) or 202-877-0275 (MedStar Washington).





Cardiovascular Physician is a publication of MedStar Health. It is a forum to share clinical, research, and teaching information in cardiology, cardiac surgery, and vascular care.



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9 a.m. to noon, Virtual
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This course will cover complex coronary, structural, intravascular imaging, and physiology topics. Attendees will learn out-of-the-box techniques, tips, and tricks to handle complications and upgrade their knowledge of conducting and interpreting imaging, physiology studies, and CMD. Educational content will be delivered by world-renowned master operators in a live interactive setting through live cases, panel discussions, technical demonstrations, didactic presentations, and debate.

To register please go to crtvirtual.org.

DMV Cath Lab Case Review

Thursdays
7:15 p.m., Virtual

Colleagues from hospitals in D.C., Maryland, and Virginia engage in thought-provoking conversation regarding unique, interventional cardiology case reviews.

To request an invitation, please email lowell.f.satler@medstar.net.

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Visit us at MedStarHealth.org/Services/Heart-and-Vascular.

Some of the photos in this publication were taken prior to the COVID-19 pandemic. Photo editing techniques were used to create some group photos. All patients and providers are expected to follow the current MedStar Health guidelines for safety including proper masking and physical distancing where appropriate. Learn more at MedStarHealth.org/Safe.