



Cardiac Implantable
Electronic Device (CIED)

INFECTION SUMMIT



American Heart Association
National CIED
Infection Initiative

Bridging Gaps in Awareness, Detection and
Appropriate Treatment of CIED Infections



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INTRODUCTION

The use of cardiac implantable electronic devices is becoming more and more common. Between 1993 and 2008, more than 4.2 million primary implantations of pacemakers and implantable cardioverter-defibrillators took place, according to an analysis of ICD-9-CM procedure codes.¹ While these devices extend and improve people's lives with minimal problems in most cases, for patients who experience infections related to their devices, gaps and delays in care can lead to preventable illness, disability and death.

The American Heart Association (AHA) launched an initiative to improve awareness, detection, diagnosis and treatment of [CIED infection](#) through a two-year effort including a National CIED Infection Summit and a National Health Care Professional Education Plan. At the same time, patient advocacy groups [Arrhythmia Alliance](#)

and [Mended Hearts](#) launched a patient-facing educational initiative, also supported by Philips Image Guided Therapy, to identify the issues patients face in detection and treatment of CIED infection.



In March 2022, the AHA led by a nine-member planning committee convened multidisciplinary stakeholders at the in-person [CIED Infection Summit](#) and identified three major problems to solve and three preliminary actionable solutions:

PROBLEMS TO SOLVE

- CIED infections are rising, despite advances in our understanding of their clinical elements.² CIED infections result in substantial morbidity and mortality that can be reduced if optimally treated.^{3,4}
- Patient and procedural factors and physician experience combine to optimize care of CIED infections, but coordinated systematic approaches are lacking. Patients and physicians play a role in CIED infection care, and communication between these stakeholders is critical.
- Health care burdens related to CIED infection are substantial,⁵ thus health systems could provide higher-value care by addressing this problem.

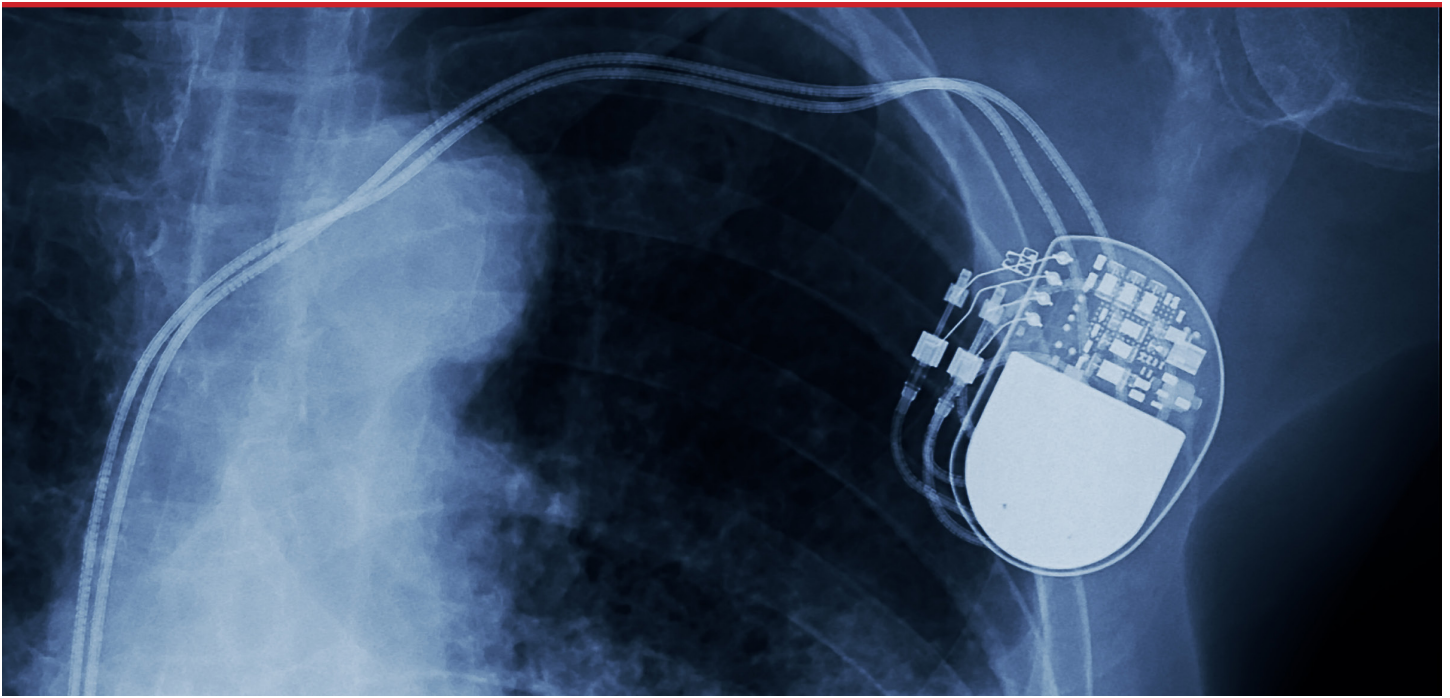
ACTIONABLE SOLUTIONS

- Convene interdisciplinary medical professionals to learn about optimal CIED infection care.
- Create and disseminate tailored education to multidisciplinary teams of health care professionals, administrators and patients.
- Focus on optimal care where all eligible patients are engaged, well-informed, and referred for treatment.

The CIED Infection Initiative has two phases:

- **Phase 1:** Convene key opinion leaders, stakeholders, medical societies, patient groups and other system-of-care participants for a national summit aimed at identifying barriers, opportunities and recommendations to improve awareness and detection of CIED infections.
- **Phase 2:** Build understanding of the gap in guideline-recommended care to improve CIED patient care by creating educational resources for professionals, with a series of resources released through June 2023. Insights and best practices identified at the summit inform educational activities to be promoted and disseminated across the AHA's extensive network. In addition, the AHA has well-established relationships with key collaborators who can play a vital role in future phases of the CIED Infection Initiative.





BACKGROUND

Millions of people have reaped the benefits of cardiac implantable electronic devices for many years, and these devices continue to save and extend lives. However, a small but significant percentage of these patients experience a CIED-related infection. Because so many people have CIEDs, these infections are not rare events, and the risk increases the longer a device has been implanted. One study found 6.2% of patients will have experienced an infection by 15 years of having an implanted device, and 11.7% by 25 years.⁶ And the infection burden is increasing: One study found a significant increase in the annual rate of CIED infection from 1.53% in 1993 to 2.41% in 2008.¹

Device infections contribute significantly to mortality: One trial that followed nearly 2,500 patients who had received implantable cardioverter-defibrillator (ICD)/cardiac resynchronization therapy-defibrillator (CRT-D) devices found that 2.6% experienced a device-related infection in the first

three years after implantation, and those patients were more than twice as likely to die in the year following the infection, compared to patients who did not have CIED infections.⁷ Awareness and diagnosis are critical, and timely, guideline-directed treatment is lifesaving. Multiple studies have demonstrated that delays in treatment increase mortality.⁸

Clinical Features of CIED Infections

CIED infections can be localized to the CIED pocket, such as generator erosion or pocket infection, or as systemic, such as bacteremia or lead-associated endocarditis, an inflammation of the heart lining associated with the leads, or wires, that connect the device to the heart. Local infections can lead to systemic infections if not identified and treated promptly according to established guidelines. A small majority of local pocket infections — about 55% — occur in the first year after implantation.

But others can occur years later, even more than 15 years after the initial procedure.⁹

The clinical presentation of lead associated endocarditis is influenced by the time from the most recent CIED procedure. Among patients with lead-associated endocarditis, those who presented less than six months after their most recent CIED procedure were more likely to also have local pocket infections. Conversely, those who presented six months or more after their most recent procedure were more likely to have a systemic infection—suggesting that lead-associated endocarditis should be suspected in any CIED patient who presents with a systemic infection.¹⁰

The Direct, Indirect and Intangible Costs of CIED Infections

Patients and their families bear the greatest cost when CIED infections reduce the quality and length of the patients' lives. Patients with infections also require additional procedures, and if best-practice management guidelines are not followed, they may experience morbidity and/or mortality as a result.



Some costs are direct: Average annual medical costs were 2.4 times higher for CIED patients with an infection, compared to those without an infection.¹¹ An analysis of claims through commercial insurers and Medicare supplement insurance estimated that infections increase the per-patient cost of care from \$62,256 to \$110,141 for initial implants and from \$64,810 to \$110,332 for replacement implants.⁵ Indirect costs include lost productivity for the patient and family caregivers, and intangibles such as pain, disruption and lost time due to illness, disability and treatment.

Patient, Procedural and Physician Factors

The number of CIED implantations is increasing. One study found that the incidence of CIED implantation increased by 96% from 1993 to 2008.¹ At the same time, the devices being implanted have become more complex: Between 1998 and 2008, the number of permanent pacemakers and implantable cardioverter-defibrillators (ICDs) being inserted decreased, while the number of cardiac resynchronization therapy devices (CRTs) increased.¹² In addition, the age of patients receiving implants has been increasing, and the patients have more cardiovascular and other co-morbidities such as diabetes and chronic kidney disease.¹

The risk of infection increases with age, co-morbidities and complexity of the devices.¹³ Younger patients, including those with certain forms of inherited arrhythmia syndromes, are receiving these devices and can expect to undergo several pulse generator replacements over their lifetime. Device recipients are living longer, so they are more likely to undergo a generator replacement or upgrade as well — and these are associated with increased infection risk. A 2013 study found that although infection rates

after first implantation for ICDs and pacemakers decreased to less than 1% from 1997 to 2010, among patients who had undergone five CIED procedures, the infection rate rose to almost 9% for ICDs and 14% for pacemakers.¹³

A significant risk factor is the presence of abandoned leads. These wires, which connect the device to the patient's heart, are sometimes not removed when the patient receives new leads. Infections are more likely when leads are not properly extracted.¹⁴ Sometimes, leads are not extracted because physicians and patients think that extraction is riskier than leaving the leads in. But abandoned leads increase the infection rate, and removing previously abandoned leads from a patient with an infection may carry increased risk. In that situation, patients are more likely to experience a procedural complication when the abandoned leads are extracted.¹⁵

THE SOLUTION

Close the Gaps Between Guidelines and Treatment

The Heart Rhythm Society's (HRS) revised 2017 guidelines and 2020 European Heart Rhythm Association's (EHRA) international consensus document are clear about what to do:

1. Patients presenting with a definite CIED infection, endocarditis (regardless of device involvement), or unexplained or persistent bacteremia or fungemia, should be referred to an expert in the treatment of CIED infection.
2. The Heart Rhythm Society's guidelines also call for antibiotics to be initiated after two sets of positive blood cultures are obtained.

3. However, antibiotic treatment alone is not enough; the device and its components should be removed promptly and completely. Other major professional organizations recommending complete removal in patients with a definite CIED infection include the AHA, British Heart Rhythm Society, and European Society of Cardiology.

Despite these guidelines, as recently as 2018, 36% of patients with CIED infection did not undergo complete system removal.¹⁶

The consequences of not removing the device completely can be severe. Patients with CIED infection whose devices were removed were 18.3% more likely to be alive one year later, compared to those whose devices were not removed, one 2012 study found.¹⁷ Infection relapse occurs in 50% to 100% of cases with partial removal or antibiotic treatment alone, compared to relapse of 0% to 4.2% with complete removal.¹⁸⁻²² Timely guideline-directed treatment is critical to effectively managing CIED infections. A 2021 study found that among patients who underwent transvenous lead removal, those whose procedures were delayed had a higher overall rate of complications, including a doubled risk of death.²³

At the CIED Infection Summit in March 2022, participants identified barriers to closing these gaps. One barrier is the false perception that removing an infected device and its leads is risky, more risk than dying from the infection. The overall risk is relatively low and can be significantly reduced when the extraction is performed by an experienced operator at a high-volume extraction center.

Another barrier is overconfidence in antibiotics. Research, reflected in the guidelines for CIED infection treatment, shows that relying on antibiotics alone rather than removing the device is associated with far worse outcomes, including significantly higher mortality.¹⁸⁻²²

A third barrier is that some health care systems operate in silos and without adequate coordination. For example, the clinician who first sees a patient with infection symptoms may not recognize the CIED. Even if they do, they may not know treatment guidelines or may be reluctant, sometimes for economic reasons, to refer the patient to another health care professional.

Infections are a lifelong risk for patients with CIEDs, but prompt, expert, guideline-directed treatment can reduce the impact of infections on patients' lives. Safe and effective treatments exist. Quality improvement initiatives and care redesign programs can enhance the care that patients with CIEDs receive within health systems. These initiatives should address greater awareness among patients, caregivers and health care professionals of the risk of infection and the best ways to manage it; earlier detection and diagnosis of infection; guideline-directed treatment and management; and measurement and feedback on care performance.





Challenges in the Patient Journey

Understanding the impact of detection, diagnosis, treatment and management from the patient's perspective

CASE REPORT: MICHAEL PERRY

Michael Perry received an implantable cardioverter-defibrillator (ICD) in his late 30s to manage ventricular tachycardia, and it served him without incident for 13 years, including three generator changes. But in August 2020, at age 51, something went wrong: The device was protruding from his skin. He sought medical attention and was treated with antibiotics and a pocket relocation for the infection. The device leads were not extracted.

Seven months later, in March 2021, Mr. Perry arrived at The Heart Institute at Palmetto General Hospital

in Hialeah, Florida, with an abscess of his pectoralis muscle. Blood cultures found a staphylococcus infection. Dr. Roger Carrillo and his team debrided the pectoralis muscle, drained the abscesses, removed the device and used laser catheters to safely remove the leads. A few days later he received a new device, recovered uneventfully and a year later had no recurrence of the infection.

“The recovery was tough, and difficult, but I’m glad to be here,” Mr. Perry told participants at the summit. He said he would advise other patients to inform themselves, to be aware of the risk of device-related infection, and if they do have an infection to make sure the treating clinician (or physician) removes the entire system.

“I wish I had been repeatedly informed about the possibility of infection throughout this journey,” he said. “I feel that repetition can break through the denial.”

Dr. Carrillo said he had a clear message for patients: “Your implanted cardiac device improves the quality of your life. However, if you develop a device infection, which is often deadly, there is a lifesaving solution: Prompt, complete extraction.”

SURVEY REPORT: ARRHYTHMIA ALLIANCE

Trudie Lobban, founder and board member of Arrhythmia Alliance, addressed the summit about challenges in the patient journey, including obtaining a diagnosis, understanding the need for an implantable device, and what to do if an infection occurs.

Arrhythmia Alliance conducted a survey in 2017 of people from their community with a CIED who had experienced difficulties. The results highlight implications for patients following implantation. Of the 129 people who responded, 15% reported a device-related infection and all reported being prescribed antibiotics; of these, 38% were admitted

to the hospital. A few (5.4%) had their device removed and implanted in another position, and 28.5% had an infection after replacement of their original device.²⁴

In 2021 Arrhythmia Alliance conducted another survey in partnership with Mended Hearts, illustrating significant gaps in patients’ understanding of device infections and how they should be managed.

Ms. Lobban urged health care professionals to engage with patients and caregivers about the risk, signs and symptoms of infection, and to make sure patients and their families know when and how to seek medical attention if they suspect a CIED infection. Professionals, patients and caregivers need to know where to find more information and support from organizations such as Arrhythmia Alliance and Mended Hearts; these organizations, together with AHA, can support clinicians, patients and caregivers.





Avenues for Action

During the March 2022 summit, participants heard from speakers on the three main categories of actions to be taken:

- Driving Detection and Diagnosis
- Improving Treatment and Management of CIED Infections
- Raising Awareness and Advancing Education

Three groups then met separately to discuss each category in detail and identify action items that were then reported back in plenary.



Driving Detection and Diagnosis

Identifying the most critical problems across clinical settings, connecting the dots for clinicians, including the role of informatics

Timely detection and diagnosis of a CIED infection is essential for providing best-practice care. The revised 2017 guidelines from the Heart Rhythm Society (HRS) are clear: Patients with a documented CIED infection should be promptly referred to an electrophysiologist or other experienced extractor. But health care systems are missing signs of infection in too many patients who need prompt extraction of their devices to reduce the risk of adverse outcomes. The first delay, which is often unavoidable, occurs between blood collection and culture. The second delay occurs between a positive blood culture and

a consultation with an electrophysiologist; this took between two and five days at Cooper from 2015 to 2018. One reason for the second delay may be that neither the patients, their families nor the first professional they see, whether a primary care doctor or urgent care or emergency department clinician, may suspect the infection is CIED-related.

The critical problem is that there is no quick, standard method to detect device-related bacteremia and pocket infection early. A solution piloted successfully at Cooper University Health Care in New Jersey (and at several other hospitals) is to leverage the electronic medical record (EMR) system to identify patients who have both positive blood cultures and implanted devices.

At Cooper University Health Care, a team set up a rule in the electronic medical record system to identify patients with both a CIED and a positive blood culture. This triggered a best-practice advisory that sent messages to physicians in the electrophysiology and infectious disease departments, as well as to the patients' physicians. The notifications also went to a "coordinator" for follow-up. The results of the effort have not yet been published.

Preventing CIED Infections

As with other medical problems, the best way to deal with infections is to prevent them. Cynthia M. Dougherty, ARNP, Ph.D., a nurse practitioner in cardiology at the University of Washington, advised an evaluation before the procedure to identify patients who may be at higher risk for infection. It would also frame what characteristics may affect the patient's recovery — such as housing, employment, nutrition, transportation, and other social and economic determinants — and whether the patient can get follow-up care. High-risk factors for infection include patient

selection factors, number of leads to be implanted, co-morbidities, use of anti-coagulation, operating room set up and environment, type of skin preparation, use of prophylactic antibiotics, staff training, and minimum volume ICD implants. Besides receiving guideline-based post-procedure clinical care, patients should receive verbal and written instructions, including signs and symptoms of an infection or other complications, and instructions on daily examination, cleansing and dressing of the wound. Patients should also be provided a 24/7 callback number for questions and concerns.

Improving Treatment and Management of CIED Infection

Recommendations to enhancing systems of care

Experts agree on the best, evidence-based strategies for treating and managing CIED infections, and the guidelines reflect that consensus. Of course, what's best isn't necessarily what's delivered to the people who need it.

A review of implementation science research conducted by the ACC/AHA Joint Committee on Clinical Practice Guidelines examined four kinds of implementation strategies: reminders; educational outreach visits; audit and feedback; and provider incentives. The joint committee also noted that multifaceted interventions were more effective than a single intervention strategy.

While gaps between guidelines and care exist throughout the U.S. health care system, examples of successful implementation of proven interventions include flu shots, mammograms, colonoscopies, aspirin for acute myocardial infarction and more recently, vaccines for COVID-19.

The American Heart Association’s Mission: Lifeline® initiative is another successful example. The program’s goals are to bring stakeholders together in a collaborative manner and to reduce mortality and morbidity while improving overall quality of care and patient outcomes. Through a team of quality and systems improvement experts across the U.S., Mission: Lifeline is focused on supporting hospitals, EMS agencies, regions and communities while forming and enhancing collaborative, efficient and effective systems of care.

Duke Clinical Research Institute has initiated a demonstration project at three centers in the U.S. to improve care of CIED infection by leveraging lessons from previous implementation research. The intervention will test a model to identify, diagnose, refer and treat people with CIED infections by aligning administrators, clinicians and patients. At each center, a multidisciplinary team will be established to develop patient care pathways.

Duke representatives will conduct outreach visits to these three selected centers in order to support the team in defining gaps in care, monitoring data, identifying barriers to guideline-directed care, and developing and implementing a multifaceted intervention to address the barriers. The team will

represent multiple medical specialties — including electrophysiologists, cardiologists, hospitalists and infectious disease physicians — as well as hospital administrators, a nursing educator, a patient navigator/educator, device clinic staff, a quality specialist and patients. Specific interventions and tools will include EMR alert implementation, device check forms, targeted education, surveys, care pathways, dedicated time in the operating rooms for extractions and dedicated surgical back-up, and formal bimonthly data review.

While the safety and effectiveness of lead extraction has been demonstrated, the procedure can be associated with rare catastrophic complications. This has led to misperception of the risk and reluctance for referral. In addition to education about the actual risk, driving down complications and improving outcomes will help reduce referral reluctance. These goals can be achieved by sharing best practices, defining centers of excellence and partnering with industry to develop safer tools used in the procedure. As with all procedures, improvements can be better achieved if outcomes are measured and analyzed, so an extraction registry will be important. Lastly, economic factors can drive change and improvement; therefore, linking outcomes to payments should be considered.

Awareness and Education

Examples of consumer and health care professional initiatives in other diseases

In managing CIED infections — as with many other conditions — the problem is not lack of technical knowledge. The guidelines are clear on how best to diagnose and treat these infections, but in many cases, the guidelines are not followed. To change that, patients, caregivers and clinicians need



to better understand the problems and solutions. The good news is that experience from other diseases offers a road map to improving awareness and education on CIED infections.

The [Hypertrophic Cardiomyopathy Association](#) (HCMA) is the preeminent organization improving the lives of those with hypertrophic cardiomyopathy (HCM), preventing untimely deaths and advancing understanding. A recent collaboration between the AHA and the HCMA illustrates some of the best practices in designing an education, awareness and engagement initiative.

The Building Blocks

Three Pillars of an Effective Campaign to Expand Knowledge and Understanding

PILLAR 1: EDUCATION

Knowledge is necessary to change behavior, but is often not sufficient.. In the hypertrophic cardiomyopathy campaign, health care professionals and diagnosed patients were given specifically tailored information.

Email, newsletters and organic and paid social media content drove recipients to the [AHA](#) and [HCMA](#) websites to learn more about the condition. In addition, paid programmatic display ads, such as banner ads on premium health sites, targeted those most likely to engage.

PILLAR 2: AWARENESS

The campaign built awareness to improve detection and diagnosis by targeting at-risk patients and health care professionals, informing them about how to recognize risk factors and symptoms.

Channels included the organizations' social media and email streams, such as the HCMA's Facebook page and the [@AHAScience](#) Twitter feed. Paid media included digital display ads on targeted websites and ads on Facebook. LinkedIn posts alerted health care professionals to webinars and podcasts.

PILLAR 3: DRIVING ENGAGEMENT

The third pillar — engaging patients and professionals — builds on what's worked: consistent, ongoing education and relevant, accessible and easy-to-understand content. For undiagnosed and at-risk patients, that means tools for identifying and tracking symptoms. Materials for diagnosed patients and their caregivers focus on living with the condition, including symptoms and disease progression. And health care professionals are being offered education on patient tools and resources, guidelines for care of hypertrophic cardiomyopathy and AHA Lifelong Learning as an education source.

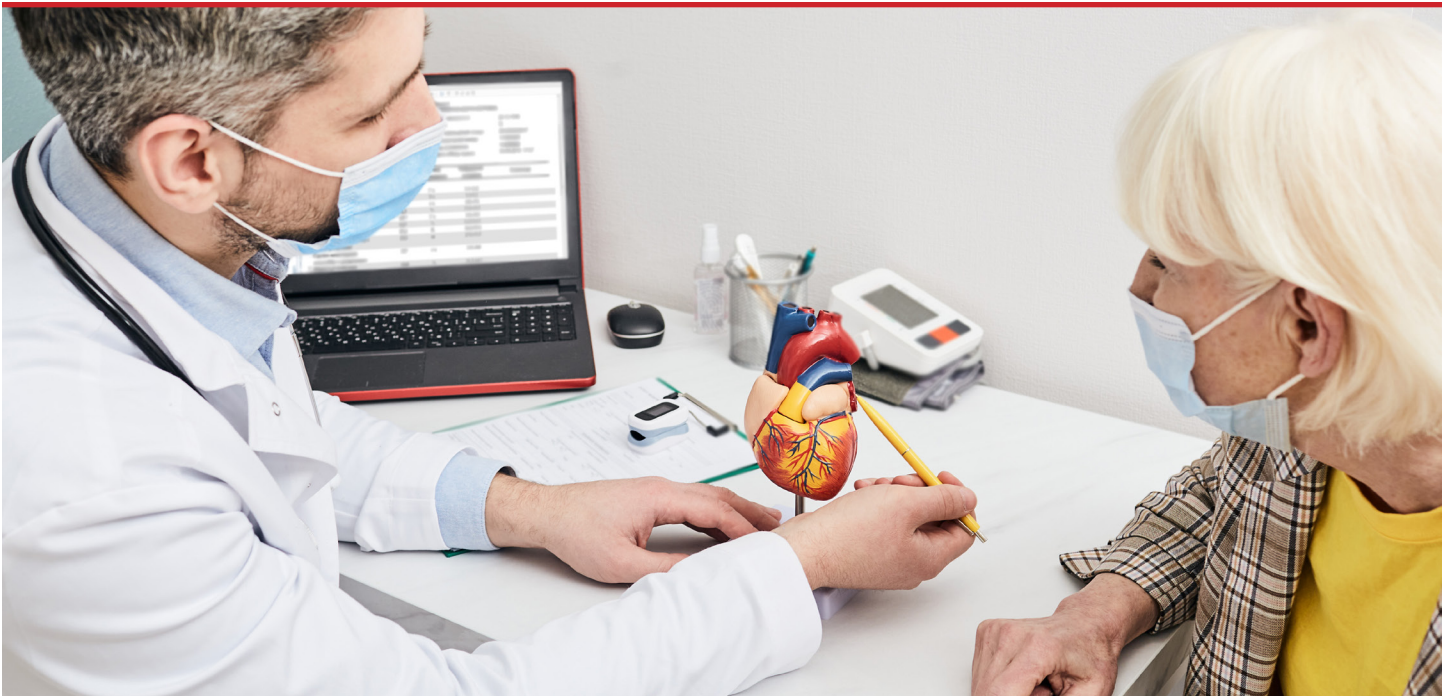
The HCMA also provides a community for patients and their families, with personalized support and education. When they join, patients and caregivers are offered a 15-minute intake consultation in which they can ask questions about a new diagnosis and discuss medication or surgery. Every year, members also get a 45-minute navigation call; more than 600 navigation calls occurred in 2021.



Key Summit Takeaways

The use of cardiac implantable electronic devices is rising, but so is the incidence of related infections.

- Undertreatment of cardiac device infection is a significant public health crisis, with a significant number of patients not being treated according to guidelines, a situation that leads to significant mortality and economic burden.
- A multi-disciplinary and multi-society approach is needed to improve the identification and treatment of CIED infection patients.
- Proposed solutions to the issues raised include:
 - Develop patient and referring physician tools to drive earlier diagnosis: e.g, symptom tracker, both offline and digital tools; intake forms; explore integration with EMRs.
 - Create care pathways and structures to support safe extraction.
 - Establish a device infection registry, with measurement and feedback function to be used for regular review at hospital center level.
 - Develop transfer infrastructure for referred patients who present to the emergency department or other clinical settings.
 - Develop multidisciplinary approach to identifying and addressing barriers at individual center level.
 - Develop quality measures, credential requirements and center-of-excellence criteria.
 - Launch patient awareness and education campaign.
 - Target those at risk and caregivers.
 - Engage collaborators to spread the message.



Call to Action

The insights and data presented at the CIED Infection Summit highlighted a clear but complex problem to address. As a result, the call to action is multi-layered and relies on improving healthcare professional evaluation of how patients are being treated, driving adherence to guidelines, and

increasing awareness about existing gaps in care. To reinforce these elements, patients are called upon to be advocates for their own health. Key thought leaders have identified an initial road map to drive change, which is outlined in the following tables of Action Items.

ACTION ITEMS: Driving Detection and Diagnosis

	Short Term	Long Term
Proposed solution(s)	<p>Patient tools to track symptoms including photography and device identification</p> <p>Early detection of CIED infection using triggers by EMR; improvement of device identification on intake forms</p>	<p>Long-term distribution and marketing strategy for a digital patient self-management solution</p> <p>Intake forms developed and implemented</p>

Key stakeholders	Patients, implant centers, device clinics	
	Hospital systems, multidisciplinary specialties	
Resources needed	Digital app, patient education materials	Synchronization with remote monitoring cycles
	Institutional buy-in, EMR compatibility and bandwidth	Infrastructure to support EMR compatibility
Proposed measures of success	Compliance rates regarding data submission by patients	Quality improvement incentive-like model
	Quality metrics including time from presentation to actual delivery of care	Capture of device in history (device clinic as a central check point)



ACTION ITEMS: Treatment and Management of CIED Infection

	Short Term	Long Term
Proposed solution(s)	<p>Establish criteria for center of excellence for CIED infections</p> <p>Care pathway development – including patient transfer infrastructure for non-extracting centers</p> <p>Improve extraction safety</p>	<p>Make center of excellence model the standard of care</p> <p>Identify CIED infection management quality measure</p> <p>Work with CMS to make it a quality measure to align performance with payment</p> <p>Measure the care pathway</p> <p>Secure credential requirements</p> <p>Create device infection registry</p> <p>Measure outcomes in randomized study for center of excellence</p>
Key stakeholders	<p>Multidisciplinary core team including:</p> <ul style="list-style-type: none"> ● Core group: Champion electrophysiologist, infectious disease specialist, administrator, dedicated center coordinator, and wound care ● Cardiology, infectious disease specialist, nurse practitioner, nurse, wound service, hospitalist, other health care professionals, EMS services ● Hospital administration, dedicated nurse coordinator, physician lead, project manager ● Payors ● Industry 	
Resources needed	<p>Care pathways</p> <p>Measurement tools/ registry</p> <p>Dedicated time in the lab from cardiac surgery</p>	<p>Steps on how to set up a center of excellence</p>

Proposed measures of success	<p>Establish metrics for CIED infection interventions</p> <p>Determine benchmarks for economic impact</p>	<p>Increase rates of early extraction to appropriately treat CIED infections</p>
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ACTION ITEMS: Raising Awareness and Advancing Education for Patients

	Short Term	Long Term
Proposed solution(s)	<p>Develop patient education toolkit to target people living with a device and their caregivers:</p> <ul style="list-style-type: none"> ● Develop a standard, simple protocol or checklist for device checks, with templates for patients and providers, including capture of infection photographs ● Device makers to include information on risks in instructions for use. Collaborate with Association for Advancement of Medical Instrumentation (AAMI) to update information ● Include infection in the shared-decision document during informed consent process (leverage existing AHA and HRS materials) ● Identify opportunities for patients to inform clinicians that they have a device ● Key messages: Combat misperceptions of risks of extractions and convey futility of antibiotic therapy 	<p>Broaden patient target to those at risk; embed resources in health care system infrastructure:</p> <ul style="list-style-type: none"> ● Embed checklist in technology platforms: mobile health apps for patients, remote monitoring, EMRs ● Develop a consensus statement to drive adoption of a singular approach to checklist protocol ● CIED extraction specialist finder for patients ● Prevention of infections

Key stakeholders	Patients, caregivers, health care professionals (across specialties), industry, professional societies, patient advocacy groups, Association for Advancement of Medical Instrumentation (AAMI), Association for Professionals in Infection Control (APIC)	Patients, caregivers, health care professionals (across specialties), industry, professional societies, patient advocacy groups, policymakers, payors
Resources needed	Expertise: marketing and communication, science	Expertise: marketing and communication, science, policy, funding for paid marketing
Proposed measures of success	Reach and engagement of target audiences	Measured behavior change





Collaborators

The following collaborators participated in the March 2022 CIED Infection Summit and contributed to the development of the CIED Infection Summit Proceedings Report. Special recognition to the Planning Group members who shaped the Summit agenda and content to drive the conversation. Organizational and individual participants provided thought leadership and contributed to the overall proceedings report.

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Collaborating Organizations

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- American College of Cardiology
- American Heart Association
- Arrhythmia Alliance
- Black Nurses Rock
- Heart Rhythm Society
- Hypertrophic Cardiomyopathy Association
- Joint Commission
- Mended Hearts
- National Association of Hispanic Nurses
- National Black Nurses Association
- National Quality Forum

NOTE: Organizational participation does not indicate endorsement.

* Reported a relevant Relationship With Industry

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Sponsor

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