Exploring the latest advancements in cardiology tech

Cardiovascular disease kills approximately 17.9 million people annually, making it the leading cause of death worldwide (Medical Device Network, 2023). However, medical technology advancements are working to decrease that number. Growth in the cardiology tech field is rapid as the global burden of cardiovascular disease and the desire for minimally invasive treatment options increase. Heart Rhythm Society's 2023 meeting recently showcased some of the latest cardiology medical devices and how they are transforming cardiac care.

AI use in the cardiology field

A recent FDA-published list of AI-approved devices in 2022 found that 57% fell in the cardiology field.

- **Cedars-Sinai** has developed an AI-enabled tool that scans images for signs and patterns associated with heart disease and plaque accumulation in the arteries. Combined, these images are helping clinicians to better identify a patient's risk of a heart attack (Medical Device Network, 2023).

- **Philips** presented another example of AI in cardiology to help predict life-threatening ventricular arrhythmias using a single lead ambulatory ECG. Their model predicted V-tach occurrences correctly in 88% of users wearing Holter monitors (Whooley, 2023a).

Remote heart failure monitoring by Abbott

CardioMEMS, Abbott's remote heart failure monitoring system, has provided data showing it has reduced heart failure hospitalizations in patients and improved their quality of life. The device, which the FDA originally approved in 2014 as a wireless version, has continued to gather data and evolve since then. It is now a paperclip-sized sensor that clinicians can surgically implant into the pulmonary artery. Here, it monitors pulmonary artery pressure, sending notifications of changes in the patient's condition that could indicate worsening heart failure. The changes it recognizes are seen before physiological markers change, meaning it catches changes sooner, and clinicians can initiate treatments proactively. Further, patients using Abbott's CardioMEMS scored higher on the Kansas City Cardiomyopathy Questionnaire (KCCQ) than their peers in the control group. The KCCQ measures health status from a patient perspective (Taylor, 2023).

Positive findings from Boston Scientific

Boston Scientific has many cardiology devices showing positive data for treating various cardiac conditions, including the Farapulse system and EMBLEM MRI S-ICD device. The Farapulse system is a pulsed-field ablation (PFA) system used to treat AFib and atrial tachycardia. Highlights of the Farapulse system include the following:

- Pulsed-field ablation uses non-thermal electric fields to selectively ablate heart tissue without disturbing any surrounding critical areas.
- Boston Scientific reports a success rate of 74% from patient recurrence of Afib and atrial tachycardia when using their Farapulse system (Kirsh, 2023).

Boston Scientific's EMBLEM MRI S-ICD device is the only implantable subcutaneous defibrillator, protecting against sudden cardiac death and the risks and complications of transvenous leads. Below are some focal points of the EMBLEM MRI S-ICD:

- This device provides defibrillator therapy for patients with life-threatening ventricular tachyarrhythmias.
- Studies comparing tricuspid regurgitation severity in patients at the six-month mark with the EMBLEM MRI S-ICD versus a transvenous implantable cardioverter-defibrillator (TV-ICD) found that patients in the TV-ICD group were seven times more likely to present with worsening tricuspid regurgitation, and 6.9% of those patients developed moderate or severe symptoms. Alternatively, only 2.3% of Boston Scientific's S-ICD group patients showed symptoms (Kirsh, 2023).

FDA approval for Abbott's Assert-IQ

The U.S. Food and Drug Administration recently approved its Assert-IQ insertable cardiac monitor, which detects irregular heartbeats. Here are some of the highlights of the Assert-IQ:

- Assert-IQ connects via Bluetooth technology, allowing clinicians to monitor heart rhythms in real-time.
- The real-time data allows clinicians to make more informed, accurate, and timely treatment decisions.
- The device has two options for a battery life of three or six years, the longest battery life for an insertable cardiac monitor on the market today (Lokuwithana, 2023).

Abbott's Aveir dual-chamber leadless pacemaker shows positive data

Data presented at Heart Rhythm Society's 44th annual meeting showed that Abbott's dual-chamber (DR) i2i leadless pacemaker showed positive results and could benefit those with slower-than-normal heart rhythms (Whooley, 2023b). This device offers the following benefits:

- The device delivers impulses directly to the heart muscle to restore the normal heart rhythm.
- The leadless device goes directly into the heart via a catheter-based procedure, eliminating the need for cardiac leads and an under-the-skin pulse generator.

- The Aveir DR system allows the two devices to communicate and sense and pace the appropriate chamber of the heart, unlike other pacemakers limited to single-chamber ventricular devices.

Abbott reports that over 97% of people present atrioventricular synchrony with their devices.

The future of the cardiology device market

The cardiovascular medical technology landscape is evolving rapidly as companies research, modify, and regularly introduce new technologies and devices to help deliver more quality care to patients. Cardiology device companies are constantly studying patients, outcomes, and interventions to understand the benefits and risks of introducing new devices to the market. Some of the top cardiology medical device companies introducing new technologies include the following:

- Biotronik
- Cardinal Health
- Abbott Laboratories
- Biosensors International Group Ltd
- Medtronic Inc.
- Boston Scientific
- Cook Medical Inc.
- Terumo Medical Corporation

Not only is the cardiology device market evolving, but how the data is recorded and acted upon is also changing. A study out of France found that using a third-party, universal remote monitoring system led to lower mortality and fewer hospitalizations for patients than conventional monitoring systems or devices with no monitoring (Swain, 2023). These universal systems would collect data from all devices and manufacturers, and use medical algorithms to help triage data for relevant vs. non-relevant data, ultimately leading to less time clinicians need to spend analyzing the data. These solutions are on the market, and implementation could mean greater billing and reimbursement and more practical use of resources and time for health care professionals.

Rapid technological advancements are paving the way for improved cardiac care with more accurate data collection and analysis, leading to increasingly effective, life-saving clinician interventions. All of the above-discussed devices and technologies are helping clinicians work more efficiently and effectively in caring for their patients, lessening the burden put on them by increasing the demands of chronically ill patients.

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