The beat goes on

How implantable defibrillators save lives

BY LINDA CHILDERS

It's a small device—about the size of a pager—but it's been proven to save lives and provide cardiac patients with continued peace of mind.

The device, an implantable cardioverter defibrillator, or ICD, detects and corrects abnormal heart rhythms called arrhythmias that can lead to cardiac arrest. ICDs are surgically placed under a patient's collarbone, with wires that run through the veins and into the heart, typically through the right ventricle. Today, about 300,000 ICDs are implanted in patients each year.

"ICDs have proven to be effective in patients who have had cardiac arrest and are at a high risk for occurrence, as well as patients who are at a high risk of the deadliest forms of arrhythmias—ventricular tachycardia and ventricular fibrillation," says Bradley Knight, M.D., medical director of cardiac electrophysiology and the medical director of electrocardiography at Northwestern Memorial Hospital in Chicago, Ill. "The procedure entails a minor surgery and complications are rare."

The device acts as a lifesaver for patients whose hearts beat out of rhythm—either too fast or too slow. The ICD detects these abnormal beats and resets the heart with a strong jolt of electricity. It differs from a pacemaker, both in size and function. While a pacemaker keeps hearts beating at the proper rate, an ICD is larger in size and works to prevent deaths from cardiac arrest. There's also a dual-chamber ICD for patients who require both a defibrillator and a pacemaker.

Knight says that before an ICD is implanted, cardiologists evaluate the patient to see if he or she would benefit from the procedure. Things to be considered include prior cardiac arrest, ventricular tachycardia, which is an episode of rapid heartbeat starting from the lower chambers of the heart, ventricular fibrillation, characterized by a heartbeat that is too rapid and is irregular or chaotic and ejection fractions of less than 35 percent. An ejection fraction (EF) is the proportion, fraction or percentage of blood pumped by the heart with each beat. A normal heart pumps out

a little more than half the heart's volume of blood with each beat, making a normal EF 55 percent or higher.

Patients who have spontaneous coronary artery dissection (SCAD) and congestive heart failure (see HEART INSIGHT'S May 2012 cover story, "Heart of the Matter") are more prone to certain heart arrhythmias that put them at risk for sudden cardiac death. ICDs are implanted in these patients to prevent such arrhythmias from occurring. A 2004 study conducted by the National Heart, Lung and Blood Institute showed that ICDs greatly reduce deaths in patients with heart failure.

After having an ICD implanted, patients undergo routine check-ups and monitoring to ensure their device is operating properly.

"An ICD will usually last for 4 to 8 years before it needs to be replaced," Knight says. "Patients do need to have the battery of their device checked every 3 months, and this is usually done remotely through a telephone call."

Knight says patients are typically unaware of the ICD in their body, unless they feel the electrical pulse or shock. The devices also carry few limitations, allowing patients to continue living active lives.

Knight says ICDs have improved over the years and continue to evolve. He is currently involved in several multicenter clinical trials, including one for a totally subcutaneous implantable defibrillator.

"This device would be placed under the skin, as opposed to running a lead within the heart," Knight says. "By offering a safe and minimally invasive alternative, these new devices might also simplify surgery and reduce the chance of infection." HI