

# Largest study to date finds benefits of ICDs in children

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More and more children with congenital heart disease are receiving implantable cardioverter-defibrillators (ICDs) to maintain proper heart rhythm. ICDs were first introduced for adults in the 1980s, but little is known about how well they work in children, who account for less than 1 percent of recipients.

A report in the April 29 *Journal of the American College of Cardiology* summarizes the largest pediatric experience to date. It finds the devices to be life-saving, but also suggests that they tend to deliver more inappropriate shocks to children than to adults, making it important to watch children with ICDs closely.

The researchers, led by Charles Berul, MD, a cardiac electrophysiologist at Children's Hospital Boston, analyzed data from 443 patients who received implants between 1992 and 2004 at one of four pediatric centers. The study included both pediatric heart patients and adults with congenital heart disease. The median age was 16 years (range, 0 to 54).

Among the 409 patients for whom shock data was available, 26 percent had received appropriate shocks from their ICD, averaging four per patient. However, 21 percent had received inappropriate shocks – an average of six per patient. When broken down by age, 24 percent of children under 18 had received inappropriate shocks, versus 14 percent of adult patients. While such shocks aren't life-threatening, they are very unpleasant – “like being kicked in the chest,” says Berul.

One reason for the inappropriate shocks was that children often have spikes in heart rate that aren't normally seen in adults. “Children are more active and get their heart rates up faster,” Berul says. “The devices sometimes have trouble differentiating normal increases in heart rate from abnormal rhythms.”

In addition, 14 percent of inappropriate shocks were due to failure of the ICD wires (leads). This was a particular problem in children, who live much longer with their ICDs than adults do, and whose leads can stretch due to activity and growth. Lead failure also requires periodic surgery to replace the wires.

Berul's team is working with device manufacturers to change ICD programming to minimize unnecessary shocks in children and to provide more durable, longer-lasting leads. “Children are not an important market for device makers, but they are an important subgroup,” Berul says.

Overall, the study shows a benefit of ICDs, but suggests that physicians should give more attention to determining which children with congenital heart disease really need the devices, since not all are at risk for life-threatening arrhythmias. For example, patients who had experienced a prior cardiac event had a higher likelihood of appropriate shocks than those receiving the devices preventively (32 vs. 18 percent), improving the overall cost-benefit ratio.

Berul notes that the current study is by far the largest to date involving the newer generation of ICDs. It confirms the findings of earlier studies, which have looked at older-generation pacemakers and devices implanted only after children were resuscitated from cardiac arrest.

Source: Children's Hospital Boston

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