

# Shock from heart device often triggers further health care needs

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A shock from an implantable cardioverter defibrillator (ICD) may trigger an increase in health care needs for many people, regardless whether the shock was medically necessary, according to a new study published in *Circulation: Cardiovascular Quality and Outcomes*, an American Heart Association journal.

ICDs save people from sudden cardiac death by delivering a shock to restore a normal rhythm when the lower chambers of their heart, or ventricles, beat erratically. Inappropriate shocks occur with ICDs, most often when the device mistakes a different heart rhythm problem for ventricular arrhythmia—abnormal heart rhythms that originate in the lower chambers of the heart.

"ICDs cannot assess patients the way a doctor can," said lead study author Mintu Turakhia, M.D., M.A.S., cardiac electrophysiologist and senior director of research and innovation at the Center for Digital Health at Stanford University in California. "The device doesn't know, for instance, if the patient is unconscious or has a pulse. We wanted to see what happens after a shock, in terms of care and cost, to help define the potential benefit of smarter ways to program these devices."

The authors analyzed the experience of 10,266 patients implanted with an ICD in the U.S. between 2008 and 2010 by linking data transmitted to the device manufacturer with the patients' healthcare records. During that time, 963 patients, average age 61, experienced 1,885 shocks. Thirty-eight percent of those shocks were determined to be inappropriate.

Researchers also found:

- Nearly half of all patients (46 percent) who experienced a shock received [health care](#) related to the shock.
- One in three patients received emergency room or outpatient care only.
- One in seven patients was admitted to the hospital.
- Invasive cardiovascular procedures, including electrophysiology studies, cardiac catheterization and cardiac ablation, were commonly performed following both appropriate and inappropriate shock.
- The average cost of health care following a shock was \$5,592 for an appropriate shock and \$4,470 for an inappropriate shock.

"Obviously, shocks that save people's lives are a good thing, but they are also very painful, can be traumatic and often lead to more health care procedures and expenses," Turakhia said. "This is why strategies to make these ICDs more selective so that they deliver fewer inappropriate shocks is especially important. Fortunately, the industry has made many advancements in this area."

Turakhia added that newer programming strategies reduce the number of inappropriate shocks, even among older-generation ICDs. The devices can be programmed by clinicians to deliver fewer inappropriate shocks by waiting briefly to see if the ventricular arrhythmia resolves itself and by cautiously avoiding triggering shocks for heart rhythms with moderately fast rates.

"The quality of care is no longer just an issue of whether an ICD was implanted in appropriate patients but also whether it was programmed in the best way possible," he said. "We have the technology to do that today."

The findings may be limited as all [patients](#) had an ICD from the same manufacturer (Medtronic) and information about factors that may have biased results, including patient behavior and health status, was not available.

"From this study, we cannot tell whether any patient received appropriate or inappropriate care—only whether they received an appropriate shock or not," Turakhia said. "We can say, however, that the costs associated with both kinds of shock are substantial and that optimal device programming that reduce [shock](#) events are likely to decrease healthcare costs and improve patient health."

**More information:** *Circulation: Cardiovascular Quality and Outcomes*, DOI: [10.1161/CIRCOUTCOMES.115.002210](https://doi.org/10.1161/CIRCOUTCOMES.115.002210)

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