Should implantable cardioverter-defibrillators and permanent pacemakers in patients with terminal illness be deactivated?

Deactivating Implantable Cardioverter-Defibrillators and Permanent Pacemakers in Patients With Terminal Illness

An Ethical Distinction

G. Neal Kay, MD; Gregory T. Bittner, JD

The recently published 2008 Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities include a discussion of ethical issues surrounding the deactivation of pacemakers, implanted cardioverter-defibrillator (ICDs), and CRT devices in patients who are terminally ill. The authors rightly note that most clinicians make an ethical distinction between deactivating an ICD and deactivating a permanent pacemaker. Programming an ICD so that it will not provide antitachycardia therapy in the event of ventricular tachycardia or ventricular fibrillation in a terminally ill patient who requests this action seems to be widely accepted as morally permissible. Many patients and physicians find the deactivation of an ICD in this situation as morally equivalent to a “do not resuscitate” order. Deactivation of an ICD in a patient who is dying of a terminal illness, whether cardiac or another condition, prevents the delivery of painful ICD shocks and allows the patient to die of the natural progression of their underlying disease. As such, this action seems a humane withdrawal of a futile medical treatment.

Response by Zellner et al on p 339

In contrast to deactivating an ICD in a dying patient, there is more controversy regarding whether a pacemaker can be deactivated at the request of a terminally ill patient, especially if the patient is pacemaker dependent. Although some authors have suggested that it may be morally permissible to discontinue pacing therapy in patients who are hopelessly ill and request this action, we believe that there can be a fundamental difference between discontinuation of antitachycardia and antibradycardia therapies in some patients, depending on their degree of pacemaker dependency. For example, consider a patient with complete heart block who has long had a permanent pacemaker implanted. Pacing by itself does not prevent the patient from following the natural course of their disease and does not impede the natural dying process. However, in the absence of an escape rhythm, programming the pacemaker to a nonpacing mode probably would result in the nearly instantaneous death of the patient. Even if such a patient has terminal congestive heart failure or cancer, many clinicians would find this action equivalent to killing the patient. For those who are opposed to euthanasia as morally unacceptable, it seems that many physicians would consider deactivation of a pacemaker in such a patient as crossing a line separating the withdrawal of a medically futile treatment from killing.
Although the irreversible cessation of brain function has been widely accepted as an ethically valid and clinically useful measure of death, the irreversible cessation of cardiac function has long been a way that people have determined life to have ended. Thus, the discontinuation of cardiovascular devices that sustain cardiac function—and life—may be particularly relevant to the ethical considerations regarding the discontinuation of a therapy that supports the very organ that has been used to determine the presence or absence of life. Despite this apparent ethical difference between deactivation of an ICD and deactivation of pacing in a pacemaker-dependent patient, the question arises, “what principle explains this ethical distinction?” In both situations, the patient is allowed to die of their underlying illness by withdrawing the functions of an implantable device. And yet, many patients and physicians readily perceive that there is an ethical difference that makes one action morally acceptable and the other unacceptable. However, if this distinction is based on a real ethical difference in these therapies, clinicians should be able to articulate the basis for such a distinction.

There are several factors that one might consider when analyzing the distinction between deactivating an ICD and deactivating a pacemaker. These factors seem to be congruent with the instincts of patients and physicians, but are they ethically decisive? First, one might consider the fact that ICD shocks are physically painful and emotionally distressing, whereas pacing stimuli cannot be perceived by the patient. As such, because of their inherently noxious nature, ICD shocks may be considered to be more inhumane than pacing stimuli. However, bursts of antitachycardia pacing stimuli (as opposed to shocks) from an ICD are not painful and are often imperceptible by the patient. In addition, patients with impaired consciousness may not perceive shocks as painful. Although clinicians could disable shocks while leaving antitachycardia pacing active (at least in the ventricular tachycardia [VT] zones), in most situations both forms of response to VT or ventricular fibrillation [VF] are deactivated when a patient requests that they be allowed to die without the interference of their ICD. Indeed, leaving antitachycardia pacing active without ICD shocks might theoretically accelerate ventricular tachycardia and the patient’s death. The goal of discontinuing antitachycardia therapies is to allow the patient to live out the end of their life in comfort without the interference of their ICD. Therefore, because ICD therapy is not always painful, the painfulness of ICD shocks seems to be a clinically relevant but not a decisive moral consideration.

A second factor that one might consider is that deactivating an ICD is unlikely to result in the instantaneous death of a patient at risk for ventricular arrhythmias, whereas termination of pacing in a pacemaker-dependent patient may result in the death of the patient within seconds. Thus, the rapidity of onset of the clinical effects of device deactivation would appear to be a relevant clinical distinction between these two therapies. Despite this clinical difference, one can readily imagine patients near the end of their lives who have very frequent VT or VF episodes. Disabling the ICD in these patients may well result in their very rapid death. In addition, the medical community has considered withdrawal of ventilator support as morally licit for hopelessly ill ventilator-dependent patients in many situations. In these patients, withdrawal of a medical therapy (ventilator support) may result in the very rapid death of such a patient. Therefore it would appear that the rapidity that the clinical effects of therapy withdrawal become manifest is also not a morally decisive factor.

A third factor that one might consider is that the antitachycardia therapies of an ICD are fundamentally reactive in nature rather than a continuously active treatment. As such, the ICD reacts to the occurrence of a life-threatening medical condition (VT or VF) rather than continuously replacing a disordered physiological function (complete heart block). Episodes of VT or VF may occur very rarely or not at all in patients who have an ICD implanted for a primary or secondary prophylaxis indication. In such patients, deactivation of antitachycardia therapies may not contribute in any way to the death of a terminally ill patient who may be just as likely to die of respiratory failure as cardiac arrest. Thus, an ICD can be considered as a clinical strategy for risk reduction rather than a therapy that replaces a lost physiological function.

In contrast, ventricular pacing in a patient with complete heart block cannot be considered as a risk-reducing clinical strategy but an ongoing treatment in which every pacing stimulus provides a (potentially) life-saving medical effect. In view of this difference between antitachycardia and antibradyarrhythmia therapies, it might seem that withdrawal of pacing in a patient who is pacemaker dependent is much more akin to killing the patient than withdrawing a reactive response to a condition that may or may not occur. However, consider withdrawal of ventilator support, a treatment that is continuously active but may be ethically acceptable to withdraw in certain circumstances when a patient is terminally ill. Thus, the distinction between a therapy that reacts to an episodic need and a therapy that is continuously active does not appear to be, by itself, a decisive moral principle.

If none of these factors represent a decisive difference between an ICD intermittently responding to the occurrence of VT or VF and the continuous delivery of life-sustaining pacing therapy, is there a fundamental principle that would allow clinicians to make a sound ethical distinction between these treatments? In general, there is agreement that the conditions that justify withholding a therapy are the same as those that justify withdrawing a therapy. For example, if a patient with ventricular tachycardia has a widely metastatic malignancy with little prospect for survival, it seems justifiable for the patient and their physician to conclude that implantation of an ICD may not be in the patient’s best interest. Therefore, if a widely metastatic malignancy develops in a similar patient with a previously implanted ICD, it...
would seem permissible to withdraw ICD therapies, should the patient request this action. Would not this logic allow one to conclude that if complete heart block develops in a patient with a terminal malignancy, they would be justified in refusing to have a pacemaker implanted? It seems so. If a patient who is terminally ill can refuse to have a pacemaker implanted, what about the patient with complete heart block and a previously implanted pacemaker who then has the same terminal malignancy? Is this patient not justified in asking to withdraw the function of the pacemaker? On the surface, the answer to these questions would seem to be “yes.” However, there is an important clinical distinction that may cause this apparent logic to fall apart: When a patient who has a terminal illness and has requested not to be resuscitated has complete heart block, the implantation of a pacemaker should be considered as a form of resuscitation. In this case it may be morally acceptable to forego pacemaker implantation just as it would be to withhold cardiopulmonary resuscitation. However, if a patient who has a previously implanted pacemaker for complete heart block later has a malignancy, pacing is not a resuscitation procedure but sustains life, perhaps in a manner similar to providing food or water. What may be considered extraordinary therapy in the first case becomes ordinary care in the second.

Sulmasy has suggested that we might consider using the term “replacement therapy” to indicate a technological intervention that participates in the organic unity of the patient. A replacement therapy is one that functions as part of a patient’s restored physiology; it provides a function that has been pathologically lost in a manner similar to which the patient was able to function when healthy. As an example, a heart transplant or a renal transplant would seem to qualify as a replacement therapy. Few, if any, patients or physicians would consider it morally acceptable to “turn off” the function of a transplanted heart at the request of a patient by an intravenous potassium injection. This would represent a deliberate act of killing by interrupting a replacement therapy. In contrast to a replacement therapy, a “substitutive therapy” is one that substitutes for a pathologically disordered bodily function but is not integrated into the patient. As an example, a ventilator substitutes for normal respiratory function just as hemodialysis substitutes for renal function. It may be morally acceptable to withhold or withdraw these therapies in patients who request this action. However, the more that a therapy is a replacement and the less it is substitutive, the less it seems appropriate to withdraw that therapy.

Sulmasy has suggested additional factors that could be used to suggest that a therapy is a replacement rather than a substitution. A permanent pacemaker is responsive to changes in the patient and his environment, being capable of tracking the function of the sinus node or a rate-adaptive sensor such as minute ventilation. Pacemakers function for many years independent of an external energy supply and are capable of self-adjusting stimulation amplitude and sensitivity. These devices are immunologically compatible and are well integrated into the patient’s body.

We suggest that permanent pacemakers function as a replacement therapy for the normal conduction system in patients who are pacemaker dependent. As such, it seems ethically unacceptable to withdraw pacing from patients who will die without pacing support. Such an action is very much like killing the patient and is not acceptable to those who oppose euthanasia. In contrast, an ICD functions as a substitutive therapy, and it may be morally acceptable to withdraw this therapy for patients who are dying and request deactivation of the antitachycardia functions of their device. In this situation, deactivating an ICD allows the patient to die of the natural progression of their disease. The ethical distinction between withdrawing a risk-reducing substitutive therapy and a life-sustaining replacement therapy is very much in keeping with the instincts of both patients and physicians as they consider how to humanely program ICDs and pacemakers at the end of life.

We believe this analysis to be useful, but it is likely that not all patients and physicians will share our conclusions. Several questions remain to be considered. Can a pacemaker be ethically deactivated in a patient who is not pacemaker dependent? In such a situation, the ethical analysis may be quite different than when the patient is pacemaker dependent. Can cardiac resynchronization therapy be programmed “off” in a patient who has responded to this form of pacing to hasten their death from congestive heart failure? This issue seems to be more problematic and will require further investigation. Despite these open questions, the principle of replacement versus substitutive therapies may provide a framework for evaluating the ethics of withdrawing new medical technologies as they are developed.

**Disclosures**

Dr Kay has received research and fellowship support from Medtronic, Boston Scientific, St Jude Medical, and BioSense Webster.

**References**


KEY WORDS: ICDs / permanent pacemakers / terminal illness / ethics

Response to Kay and Bittner

Richard A. Zellner, JD, Mark P. Aulisio, PhD, William R. Lewis, MD

We disagree with Kay and Bittner when they argue that withdrawing pacing therapy is fundamentally different from removing other life-sustaining treatments and is therefore unethical. They correctly observe that withdrawal of this therapy in a pacemaker-dependent patient is uncomfortable for physicians. To identify a cause of this discomfort, the authors rely primarily on an article by Sulmasy, who divides medical interventions into 2 categories: “replacements,” which should not be withdrawn, and “substitutive” interventions, which can be withdrawn. Kay and Bittner argue that pacemaker therapy is a “replacement” intervention similar to a heart or kidney transplant. However, a “replacement” must be capable of growth and self-repair and must be independent from external energy sources and expertise. Pacemakers are not capable of growth or self-repair. They rely on batteries that deplete. Pacemakers are subject to malfunction, often need expert intervention, and are subject to recall. Thus, pacemakers are not “replacements.” More importantly, defining a device as a “replacement” risks losing focus on the main issue: that patient autonomy is paramount. Kay and Bittner argue that a pacemaker “sustains life...similar to providing food and water.” However, even withdrawal of life-sustaining interventions (such as ventilators) is a daily occurrence, and competent informed patients can refuse medically assisted nutrition and hydration. Finally, compassionately fulfilling a patient’s request for deactivation is not euthanasia. Indeed, the 2008 Guidelines themselves describe such requests as an “integral part of patient-centered care” and state that honoring them is neither euthanasia nor assisted suicide.
Should implantable cardioverter-defibrillators and permanent pacemakers in patients with terminal illness be deactivated?: An Ethical Distinction

G. Neal Kay and Gregory T. Bittner