



## Ironic technology: Old age and the implantable cardioverter defibrillator in US health care

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### ABSTRACT

We take the example of cardiac devices, specifically the implantable cardioverter defibrillator, or ICD, to explore the complex cultural role of technology in medicine today. We focus on persons age 80 and above, for whom ICD use is growing in the U.S. We highlight an ironic feature of this device. While it postpones death and 'saves' life by thwarting a lethal heart rhythm, it also prolongs living in a state of dying from heart failure. In that regard the ICD is simultaneously a technology of life extension and dying. We explore that irony among the oldest age group – those whose considerations of medical interventions are framed by changing societal assumptions of what constitutes premature death, the appropriate time for death and medicine's goals in an aging society. Background to the rapidly growing use of this device among the elderly is the 'technological imperative' in medicine, bolstered today by the value given to evidence-based studies. We show how evidence contributes to standards of care and to the expansion of Medicare reimbursement criteria. Together, those factors shape the ethical necessity of physicians offering and patients accepting the ICD in late life. Two ethnographic examples document the ways in which those factors are *lived* in treatment discussions and in expectations about death and longevity.

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"I have an ICD and a pacemaker. It's prolonged my life a little bit. But the longer it prolongs my life, the more things happen to me that it can't correct. So the question is, do you want to have those effects, or do you want to end it all?"

---86 year old man.

### Introduction

This article takes the example of cardiac devices, specifically the automatic implantable cardioverter defibrillator (ICD or AICD), to explore the complex cultural role of technology in American medicine today. It specifically addresses the use of the ICD for elderly persons age 80 and above and its impacts on the end of life. We pay particular attention to the ironic feature of this device. While it postpones death and 'saves' life by thwarting a lethal heart rhythm, by firing a precise dose of electricity into the right ventricle, it also, then, alters the dying trajectory among the elderly from an unpredictable, but swift death to that of a progressive,

symptomatic dying of heart failure. It prevents sudden death from a potentially fatal arrhythmia, the kind of death many claim to want in late life, yet, in doing so, it contributes to prolonged dying (Goldstein & Lynn, 2006). In that regard the ICD is *simultaneously a technology of life extension and dying*. This article explores that irony among the oldest age group – those who must now consider *what they want* in terms of medical intervention in older age, and whose considerations are framed by changing societal assumptions about premature death, the appropriate time for death, and medicine's goals about thwarting death in later life.

As background to our exploration, we draw on the work of Latour and Venn (Latour & Venn, 2002), who point out the ways in which technologies of all kinds are not merely means to specific ends, and that 'ends' are not static and already known. Rather, they describe how we change the ends as new means emerge and develop – and the ICD (as well as other medical technologies) illustrates this phenomenon. Technologies, they argue, are never merely instruments, utensils fulfilling a pre-determined function. Rather, they are active agents and a form of mediation – between intention and the discovery of multiple functions not foreseen, between original plans and their inevitable mutations. Thus while specific tools may in fact fulfill one intended purpose, they

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also, and perhaps more importantly, incite new ways of thinking about the kinds of ends we may desire.

The mechanical ventilator provides perhaps the most well known example of the way in which the use of a technique modifies the original intention. It was developed over a 50-year period in response to the demands of surgeons who needed to maintain patients' respiratory function while they operated on hearts, lungs and other organs. The mechanical ventilator became standard equipment in American hospital intensive care units by the mid-1970s. Within a few years, it was indicated for a long list of diseases and problems beyond its original intention. Recovery from life-threatening pneumonia or chronic obstructive lung disease became possible. Because that technology keeps the organs of the dead oxygenated, it opened up the realm of organ transplant beyond anything previously imaginable. It quickly came to be used, also, to keep people 'alive' who are in a vegetative state, leading to a new world of dilemmas about familial, medical and legal responsibility, and new questions about personhood, life and death (Kaufman, 2000).

Latour and Venn state, "If we fail to recognize how much the use of a technique, however simple, has displaced, translated, modified, or inflected the initial intention, it is simply because we have *changed the end in changing the means*, and because, through a slipping of the will, we have begun to wish something quite else from what we at first desired" (Latour & Venn, 2002:252).

Today's implantable cardiac devices, which may include pacing, defibrillating and heart chamber coordination functions (the latter is called cardiac resynchronization therapy or CRT), are examples of this constant re-invention (Jeffrey, 2001). Most recently, the ICD function often is included with cardiac resynchronization therapy, which helps the two chambers of the heart beat in a synchronized or balanced way, thus relieving the debilitating symptoms of heart failure. (Cleveland Clinic, 2010; "Pacemakers: the new generation. Today's implantable units do far more than previous models," 2006).

These multi-function devices can improve cardiac function, reduce debilitating symptoms and treat and prevent lethal rhythms. The development of these 'all in one' devices makes it easy for physicians to suggest to patients that they should consider adding the ICD function when they are offered or advised to get a pacemaker and a resynchronization device. The important point here is that the ICD, invented and then first used to prevent people from dying prematurely, while still young, is now implanted primarily in older patients, often as part of a multi-function device, mostly with no plans for its impacts on end of life care or for its eventual deactivation in the elderly near death. The expanded means of the ICD, coupled with its expanded use, have contributed to an altered end – a socio-medical emphasis on diminishing the risks of death, regardless of advanced age or disease state. The pursuit of that end precludes or complicates individual physician and patient choice, as we will see below. The goal of avoiding death in ever older, sicker patients fosters, also, new pathways to death and new qualms for patients and families facing the responsibility of choosing one form of dying over another.

The ironic dual identity of the ICD as a technology of life extension *and* the dying transition, coupled with its contemporary end of managing the risk of nearness to death, present a useful example for exploring the ways in which choices about life extension, the timing of death and forms of dying, the management of risk in late life and the pursuit of technological innovation are shaping health care delivery in an aging society. The trend of averting death among the ever older and ever-sicker has policy implications for the rising economic and social costs of health care in a society in which there are few economic constraints on technology use and multiple incentives for that use.

We begin with a brief background of the expansion of ICD use among the elderly in the U.S. We then turn to our study and our on the ground ethnographic examples of doctor-patient dialogue and patient and family deliberation about use of the device. The two case studies we present highlight the kinds of conversations that occur about ICD use and consequences, especially how the device is presented to patients and how they consider its ramifications. Next, we broaden the frame of our discussion to focus on first, a description of the mediating effects of ICD technology, and second, the structural-cultural context of ICD use in the US. We show how evidence-based studies – through their reliance on and support of technological innovation and technology use – contribute to standards of care and to the expansion of Medicare reimbursement criteria. Together all those factors bolster the ethical necessity of offering and accepting the ICD in late life. That structural-cultural framework is essential for understanding the parameters of choice for older persons and the ways in which risk is perceived by professionals and patients. Our ethnographic examples document the ways in which those factors are *lived* in treatment discussions and in expectations about death and longevity. They reveal as well the inadequacy of bioethical discussions focused narrowly on enhancing choice.

### The ICD and the elderly

The implantable cardioverter defibrillator (ICD) is a small electronic device (like a pacemaker) that monitors heart rate and rhythm and recognizes the onset of life-threatening arrhythmias. When it detects an abnormal rhythm, it delivers timed electrical discharges or shocks to the heart muscle, thereby disrupting and ending a life-threatening rhythm. It is commonly referred to as an "emergency room in the chest" and functions like the defibrillator paddles used in emergency room resuscitation (Pollock, 2008). A normal rhythm then can resume, either through the pacing function of the device which corrects the rhythm or via the heart's own return to a normal beating pattern (Jeffrey, 2001; Kamphuis et al., 2004; Jeffrey, 2001). There is no question of the unequivocal 'good' of this device for preventing people from dying young. Yet today, most persons with ICDs are older and sicker with underlying cardiac disease, and shocks from ICDs "might not significantly extend the patient's life or improve quality of life" (Jeffrey, 2001:258).

Initially approved by the US Food and Drug Administration (FDA) in 1985, the device was conceptually framed by Medicare (the US government program that pays for acute medical treatment for persons aged 65 and over) at that time as "a treatment of last resort..." for patients who had documented episodes of life-threatening arrhythmias or cardiac arrest (de Lissovoy, 2007). In the ensuing decades, the device has become smaller and lighter, battery life has increased and implantation has grown simpler. Still, the ICD was used sparingly up to 2002 or 2003 for those at high risk of life-threatening cardiac events. Following a series of clinical trials between 2002 and 2004, in which results showed survival benefits for increasingly lower-risk populations (but not for the elderly specifically), the ICD has come to be considered more broadly as a means of primary prevention of sudden cardiac death (Gillick, 2004; Hlatky, 2004). That is, it has come to be seen as appropriate for a substantially larger population of lower-risk patients who have never suffered a cardiac event. As Latour and Venn (2002) note, its meaning shifted so that, in a very few years, the ICD has become a tool to reduce the risk of death from a *potentially* lethal cardiac event for those with underlying heart disease, even for persons who have never had an arrhythmia. Similar to other technologies, it has been subject to 'indication creep,' the inevitable extension of its use to more and more persons,

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