

## Biomedicalization of Cardiac Risk

Alan Sachnowski  
*New College of Florida*

According to the Administration on Aging, a division of the federal Department of Health and Human Services in the United States, “The 85+ population is projected to increase from 5.5 million in 2010 and then to 6.6 million in 2020 (19%) for that decade” (Administration on Aging). The source does not qualify this statistic with the means of achieving such a dramatic 85+ population, but rather, silently celebrates the possibility of prolonging life and postponing death. The population growth implies a dynamic network of macro and micro processes that construct what it means to be “old” both materially and socially. Moreover, it redefines the value of life by “medicalizing” certain types of death. An extension of this medicalization is the treatment of “risk” rather than symptoms.

Historically, the health of aging individuals has been framed by the way in which an individual lives his or her life, including decisions and habits that affect the individual later in life. The medicalization of aging involved a comprehensive evaluation of personal activities that regulated the health of the individual, making alterations to the lifestyle as a form of preventative treatment for aging. In this framework, the declining health of the elderly represented both a natural process and a risk to be prevented. Advances in medical science and technology have transformed the way in which aging is perceived and treated, more accurately defining risk. While cardiac problems have been treated medically for much of the twentieth century, the notion of cardiac risk has become *biomedicalized* as a technologically treatable phenomenon fairly recently.

Every human body within a population is at risk to a certain extent at all times; however, the elderly are most at risk of death and physical ailments. In particular, older individuals are more likely to have a stroke, which means their *risk* of having a stroke is also higher. Cardiac risk treatment entails the same invasive procedures as emergency treatment, which relies on “ironic technology” to intervene with biological processes to prolong life (Kaufman, 2011, 7). By preventing the risk of sudden death, devices such as the implantable cardioverter defibrillator (ICD) prolong the total process of dying (2011). Thus, biomedical technologies that detect cardiac risk dovetail with their biomedical counterparts in treatment. These technologies have been readily used for the past three

decades, and in recent years, they have become primary treatment for aging bodies. The diagnosis and treatment of these cardiac problems has simultaneously shaped and been shaped by the emergent paradigm and structure of biomedicalization. Therefore it is crucial to deconstruct biomedicalization in order to understand its implications as an emergent medical paradigm for aging.

For the 85+ population, biomedicalization of cardiac risk involves negotiating the value of a longer life at the expense of a particular identity. When patients elect to implant an ICD, the biomedical device becomes a form of self-surveillance but goes further than structuring healthy behavior by physically regulating a biological process. An international biomedical corporation, Biotronik, has developed an ICD that is remotely monitored. This innovation is celebrated because of the ways in which cardiac risk has been biomedicalized, and it is worth examining because of its implications for the 6.6 million people that will be over the age of 85 in 2020.

### Context

In *Biomedicalization: Technoscientific Transformations of Health, Illness, and U.S. Biomedicine*, biomedicalization is defined as “the increasingly complex, multisited, multidirectional processes of medicalization that today are being both extended and reconstituted through emergent social forms and practices of a highly and increasingly technoscientific biomedicine” (Clarke, 2003, 162). The authors trace the process with five focuses, which I will utilize as the structural framework in which cardiac risk is biomedicalized. The political and economic “reconstitution” of biomedicine, health and risk, the role of science and technology in biomedicine, biomedical knowledge production and distribution, and technoscientific identities (163). The focuses build upon medicalization theory to describe new forms of medical jurisdiction. The treatment of cardiac risk represents an almost sublime medical jurisdiction, technologically regulating internal biological processes as well as regulating external relations with the world. The Biotronik remote ICD represents a new form of interaction between the elderly and the medical community, globalizing the biomedical jurisdiction of cardiac risk.

Different forms of risk associated with “life extension” interact with the biomedicalization process in order to transform elderly bodies and populations. “Risk, Life Extension and the Pursuit of Medical Possibility” examines the concept of risk in relation to aging bodies, and how the technological possibilities of extending life have altered what it means to be “old.” The authors write, “Risk acts to discipline bodies in progressively more thorough ways. Constructions of 'risk factors', techniques of medical surveillance and the cultural linkages among health maintenance, individual choice and familial and social obligations today constitute taken-for-granted features of daily life” (Shim, 2006, 480).

Cardiac risk for the elderly is high, and the biomedical treatment of that risk with ICDs justifies invasive and dangerous biomedical interventions.

For the elderly themselves, the decision to get an ICD entails negotiating between a longer life of heart problems or a shorter life with the possibility of sudden death. The option of technologically extending life is a biomedical innovation to treat cardiac risk, but with individuals over the age of 80, the ICD can have devastating consequences for an individual's quality of life. "Ironic Technology: Old Age and the ICD in US Health Care" describes the biomedical role of ICDs as technology for the elderly:

The ironic and 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 (Kaufman, 2011, 7).

In the US health care system, the standardization of ICD implantation and the expansion of eligible patients has effectively increased the average age of the ICD recipient, which further conflates cardiac risk from old age with the cardiac risk of ICD implantation. The Biotronik remote ICD adds another dimension of surveillance that remotely manages risk while also regulating the timing of death and its forms.

"Biomedical Technoservice Complex Inc."

One of the structures that facilitates the process of biomedicalization is formed through the interactions of different people and institutions that wield social authority: international technology corporations, federal agencies, and doctors. The fictional title adequately describes the complexity of the health-care industry, and relays the commercial relationship between technology and medicine. As an international biomedical corporation, Biotronik has a particular function in the complex.

As a private corporate entity, Biotronik makes a profit from the demand for its technology. This demand is dependent on the cooperation of other actors in the "complex". The complex is held together "because the notion of medical progress is tied to technological innovation (especially drugs and devices), because clinical medicine is financed and organized around the delivery of discrete procedures, and because the profit-driven drug and device industries contribute so centrally to rapidly transforming standards of care in U.S. Medicine" (Kaufman, 2011, 10). For the aging population, advances in ICD technology could extend lives or prolong the transition to death. Within the "complex," doctors are integral to the sale of the devices (Shim, 2006, 486).

In a global market, the drug and device industries that develop biomedical technology centralize their management in order to be able to

coordinate production and consumption worldwide. Through the Internet, telephones, and other telecommunications, companies do not have to be physically represented around the world; they can “capture more markets and arenas of health for profit” by using “meso-level computer and information science practices and programs that automatically monitor highly dispersed developments for centralized management operations” (Clarke, 2003, 170).

In fact, Biotronik worked with T-Mobile and IBM to develop the remote ICD implant, which sends data to a centralized location to automatically monitor the heart. In this model of cardiac risk treatment, the doctor-patient relationship is mediated virtually and in real time because the doctor has access to the transmitted data through the Internet. This development justifies biomedical intervention for both doctors and patients because of the efficiency of the technology and the relationship it forms.

Advances in biomedical intervention technology transform what it means to be elderly for both doctors and patients. The structure of the complex encourages technological progress and advancement, having dynamic effects on intra-personal relationships. “Patients—whether undergoing angioplasty, stent or bypass surgery—themselves come to understand the experience of advanced age as reversible through biomedical intervention, and to share physicians' perceptions of old age as being pushed ever later in a technologically-prolonged life” (Shim, 2006, 486). The “irony” of the ICD is that for older individuals, the multiplicity of risks and ethical considerations have become structural features of the Biomedical Technoservice Complex Inc.

### Health, Risk, Surveillance

The concepts of health and risk are operationalized in biomedicine, mediated by technological innovation and intervention. Through biomedicalization, health becomes “a social and moral responsibility,” which encourages cooperation between patients and the “complex” to agree on an ideal value for health and by extension ideal treatments to achieve health (Clarke, 2003, 172). A socially negotiated meaning of health depends on value systems related to risk in order to self-regulate.

The biomedical treatment of cardiac risk involves the moral responsibility of extending life through technology. It reinforces ideal conceptions of healthy hearts and bodies, consequently segmenting populations depending on their relation to the ideal. Elderly people are further from the ideal conception of health, which translates their life extension into a moral social responsibility. Through biomedicalization, new technologies have enabled an extension of health management to include the potential deviation from ideal health. This potential deviation from ideal health is related to patients and consumers as “risk”.

Cardiac risk represents a measure of potential deviation from ideal

heart functions, and its biomedical treatment signifies and legitimizes the risk materially. “In part, what makes it possible for late-life cardiac procedures to become routine is the legitimation of the presense of *risk* itself, rather than disease or symptom, as grounds for treatment” (Shim, 2006, 487). Biomedical technologies are therefore mechanisms that manage and treat risk as a disease or symptom in the “pursuit of health and ‘quality of life’” (487). In old age, cardiac risk and risk of death are closely associated, and the technological solutions to diminish the risks “may simply prolong living in a state of dying from heart failure” (Kaufman, 2011, 11).

Kaufman claims that the risk of “dying in late life” has become an important cornerstone in biomedical treatments, forming a particular style of management that equates reduced cardiac risk with reduced risk of death (12). The authors of *Risk* describe the ways that cardiac and mortal risks are biomedically managed and treated in old age. In particular, the goal of “diminishing risk” in the pursuit of ideal heart functions is achieved through biomedical innovation and practice (Shim, 2006, 482).

Technological innovation diminishes the mortal and cardiac risk of the implantation procedure itself, which effectively normalizes invasive biomedical interventions. The smaller sizes, alternative constructions, and new procedures of ICDs reduce the risks of the surgical intervention for the patient, and provide a safer means of becoming healthy (483). In addition to the diminishing the risk of implantation, the Biomedical Technoservice Complex Inc. encourages patients to undergo biomedical intervention by quantifying and establishing new risks to be treated. Technological progress yields new ways of perceiving and evaluating health, simultaneously reinforcing and revitalizing risks. For instance, the Biotronik remote ICD perceives and idealizes the healthy heart as one that is ready for the potential of heart failure, but through its “remote” function, creates another risk contingent on the presence and gaze of the physician. The security of the “remote” function relies on the risk that the physician could not normally respond or supervise the treatment without it.

The notions of medical gaze and presence reflect forms of surveillance, by one's self and by the other, that are biomedically regulated to manage health and risks. Once again, the social and personal obligation for a “healthy” body becomes an ethical engagement, and the means of measuring and calculating health are dynamically linked with the way that risks are perceived and treated. “Risks are calculated and assessed in order to rationalize surveillance, and through surveillance risks are conceptualized into ever more precise calculations and algorithms” (Clarke, 2003, 172). The implications of this process for the elderly involve innovative technologies to justify and manage their quantified cardiac risks.

The concept of “technological incrementalism” combines diagnostic

technology to assess risk with the biomedical intervention technology to treat the risk (Shim, 2006, 491). The concept represents the biomedical marriage of diminishing procedural risks and increased perception of biomedical risks. Technological incrementalism reinforces forms of self-surveillance and medical surveillance by pairing diagnostic possibilities with procedural obligations, which requires acute attention to risk by both doctor and patient. Within the realm of cardiac treatment, individuals who require catheterisation, angioplasty, or stenting must consent to diagnosing other risks, which entail “a spectrum of interventions, not only for the original diagnostic catheterisation” (491). In the event that the patient has a high risk in a particular diagnosis, the forms of biomedical surveillance converge on the body to constitute reasons for further intervention.

The Biotronik remote ICD introduces another form of surveillance as well. The entire commercial premise of the technology is that the patient is constantly under the watchful gaze of both the company and the physician. It extends the virtual panopticon of medical surveillance, allowing for biomedical presence within and beyond the corporeal limits of the body. It has a place in “technological incrementalism” as the intervention justified by the *risk* of cardiac failure or problems.

#### “Technoscientization”

Technological innovations not only affect diagnostic and procedural aspects of biomedicine, but they impact the very structure that fosters this form of progress. The digitization of medical information represents another virtual jurisdiction of biomedicine: the patient's history. Furthermore, biomedical information gathered through evidence-based research is compiled digitally, which becomes problematic when individual needs of patients are overlooked in treatment. Another aspect of biomedical technology is its ability to transform the body “from the inside out”, which is focused on changing the body to treat the risk of certain ailments in a preventative way (Clarke, 2003, 176). Finally, the Internet is gaining increasing relevance in biomedicine, providing a real-time technological solution to the traditional spaces and temporalities that occupy the doctor-patient relationship. The innovations “are increasingly likely to be hybrid ones that are generated simultaneously through sciences *and* technologies *and* new social forms,” having a significant impact on the way in which the elderly are biomedically treated (173).

An essential part of biomedicine is the computerization of information, which synchronizes technological databanking and scientific data gathering. Digitalization quantifies and qualifies the patient's medical history, biomedicalizing individual illness narratives within a new representational framework. In terms of risk, the digital history of a patient is another way in which risk can be determined (in conjunction with treatment options and diagnoses). Moreover, the data helps to scientifically justify the course of biomedical treatment. Cardiac risk is



determined by the patient's medical history and the availability of treatment. For older patients, the digitalization indicates higher risks for cardiac problems while offering a multitude of treatment options quantitatively proven to reduce the risks. "The dominance of clinical trial data in assessing the benefits of expanded ICD use and the outcomes of those trials have enable the US medical community (as well as others) to think in a new way about cardiac risk and prevention" (Kaufman, 2011,12). The regular ICD is concerned with the preventative biomedical treatment of cardiac risk, but the Biotronik remote ICD capitalizes on the union of digital and biological in order to simultaneously treat and document the medical history of the patient. It represents a biomedical synthesis of science and technology, documenting the present as medical history in order to determine future preventative interventions.

A less important, but still significant, advent of biomedicine is the "molecularization and geneticization" of the body. The scientific imperative to deconstruct biological processes into their material constituents has developed the trajectory and styles of treatment that are offered by biomedicine. The quantified and digitized forms of this scientific data "enables the further tailoring and customization of bodies" (Clarke, 2003, 175). For the elderly, this philosophy translates into the possibility of life extension. That is, the elderly body is able to be tailored and customized using biomedicine from the inside out, ensuring a longer life and a longer transition to death. The problem with understanding the body as a malleable and customizable object is that the standardized forms of treatment do not take into account subjective differences between patients, grouping all exhibitors of a certain type of risk with the respective treatments. The elderly, more susceptible to cardiac conditions, become automatically grouped into a high-risk category and thus their form of treatment involves a biomedical customization of the heart. Regardless of age, ICDs are implanted in living bodies, tailoring them and customizing them in order to increase the time of lived life. However, above the age of 85, ICDs can become as life-threatening as cardiac failure in the event of irregular heart functions.

The historical development of the ICD traces the technoscientization of medical interventions and how biomedical processes and structures transform the utility of technology as it develops. The narrative describes that the ICD was initially approved by the FDA in 1985 "for patients who had documented episodes of life-threatening arrhythmias or cardiac arrest", which reflects the historical roots of biomedical treatment. In this phase, the technoscientization of treatment was more concerned with the illness itself as manifest in the patient, not the potential risk of the illness. "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"

(Kaufman, 2011, 7). According to the tenets of biomedicalization as previously identified, the customization of bodies came into play in this historical medical development. The means of extending life and preventing premature death converged as the technology was utilized for the elderly population to treat the new ethos of *risk* in medicine. Kaufman writes that the ICD “first used to prevent people from dying prematurely, while still young, is now implanted in primarily older patients” because of its utility for treating the *risk* of sudden death (7). Furthermore, the risks of implantation have diminished through technological progress, grounding a justified theory of life extension by negotiating procedural and mortal risks in biomedicine.

Finally, the Biotronik remote ICD uses digital signals that are transmitted to and from the Internet in order to triangulate a particular doctor-patient relationship. The remote function in this instance serves to be another layer of customization within the standard treatment of cardiac risk with biotechnology. With this *custom* feature, patients are always within the biomedical jurisdiction of both the industry at large and the individual's physician because of the Internet. This particular use of the internet and digital technology differs from the traditional ways that data is managed. It offers more dynamic access to digital information by the patient (the patient can log in to view real-time updates of the ICD), simultaneously recording and developing the medical history and evidence needed to justify other biomedical interventions in real time (Biotronik).

These themes of science and technology are crucial in understanding biomedicalization because they produce the quantifiable data that justify cardiac interventions, translating cardiac risk into a scientific and technological reality.

### Information and Knowledge

The digitalized data mentioned in the previous section is a form of information and knowledge, integrated with biomedicine through technological networks, dominance within a framework of competing knowledges, and science-based techniques of legitimation. “The production and transmission of health and medical knowledges are key sites of biomedicalization in terms of both the transformation of their sources and distribution channels and the reformulation of who is responsible for grasping and applying such knowledges” (Clarke, 2003, 177). The elderly occupy a particular place within the hierarchies of information and knowledge, situated as the producers and consumers of biomedical data. Information and knowledge about cardiac risk has been constructed around the possibilities of life extension and technological progress, in dialogue with risk and the treatment of risk. The ICD has become a standard biomedical intervention for the elderly because of evidence from clinical trials, the approval of government agencies, and the greater access to the elderly by means of insurance policy. The Biotronik



remote ICD is an upgrade to the standard cardiac intervention, using different forms of knowledge production to justify its use.

First and foremost, the production and access to information about cardiac risk is regulated by the Biomedical Technoservice Complex Inc., but is materialized by a “heterogeneous” variety of outlets (177). The historical progression of medicalization to biomedicalization is marked by technological advances in measuring and understanding medical knowledge. Likewise, technological advances demarcate differences in the *production* and *distribution* of medical knowledge. With the advent of the Internet, the production of medical knowledge has become “democratized” but allows more fluid boundaries between the authorities of different biomedical assemblages. For instance, websites such as WebMD.com “blend award-winning expertise in medicine, journalism, health communication and content creation to bring you the best health information possible,” mediating and transforming the traditional doctor-patient relationship (WebMD). Furthermore, international biomedical corporations have utilized mediums such as the radio, television, and most importantly, the Internet, to directly reach consumers and potential patients, informing them about risks and advertising their proposed treatments (Clarke, 2003, 177). “One recent survey found that thirty percent of Americans surveyed who viewed direct-to-consumer advertising said they talked to their doctor about a specific medication they saw advertised, and forty four percent of those report that their doctors provided them with the prescription medicine they asked about” (Clarke, 178 & Kaiser Family Foundation, 2001, 18-20). Consumers and patients are thus the most susceptible to the demands of the biomedical industry, constituting the receiving end of biomedical knowledge production and distribution. Subsequently, doctors have a large role in translating the biomedical knowledge produced by large corporations and clinical studies to the patient.

The elderly constitute a population of consumers that are less likely to self-educate themselves through advertising mediums; however, these mediums facilitate a dialogue between the doctor and patient. In a study about direct-to-consumer advertising from 2004, researchers in the Drug Information Journal concluded that “78% of respondents would discuss the drug identified in the ad with their doctor, if they thought it would help them” (Marinac, 2004, 311). In the case of ICD implantation, doctors translate biomedical knowledge about cardiac risk to the patient during the clinical encounter. In an ethnography of ICD deliberation, Kaufman studies two clinical encounters that produce and translate biomedical knowledge about cardiac risk to elderly patients. The first patient, named “Mr. Albert”, takes part in a dialogue with a cardiologist who educates him and his wife about the ICD. The physician's comments reveal the doctor's role in producing biomedical knowledge about cardiac risk through discussion of treatment:

I want to talk to you about a defibrillator and a pacemaker. The question is whether you might benefit from an ICD with or without pacing of the heart all the time. The defibrillator is a special pacemaker that has the ability to shock the heart in a rhythm that would lead to death. It can be thought of as an insurance policy to prevent that kind of arrhythmia. Do we want to insure the cost – for something we may not need? It's a balance that needs to be thought of in that way, because it's hard to predict which individuals will actually benefit from the device (2011, 8).

Later, the doctor describes the patient as “eligible” for this treatment and concludes by saying, “considering your risk, it would be appropriate to buy the insurance”. In the quotations, the cardiologist uses his biomedical authority to inform Mr. Albert about cardiac risk, using the metaphor of insurance against cardiac risk interchangeably with discussion about *actual* insurance coverage for the treatment. Although he ambiguously implies that the results of the intervention are uncertain, the cardiologist effectively sells the ICD to Mr. Albert. “The ironic feature of the device is not yet apparent to Mr. Albert because the topic of prolonged advanced heart failure is not mentioned” (8). Kaufman importantly notes that the “ironic feature” is omitted in the knowledge production of the ICD, which indicates a problematic aspect of biomedical production that increases the marginalization and suffering of the elderly population above 85. The “ironic feature” can be seen as another type of risk that is overlooked during the distribution of cardiac risk knowledge from doctor to patient.

In an interview with an electrophysiologist, the authors of *Risk* engage in a discourse about biomedical treatment of cardiac risk. During the interview the doctor acknowledges the ironic prolonging of suffering of the ICD for the 85+ population as well as for those who do not have a history of heart conditions:

It's just sort of a vague judgment that this person's 88, and they seem mentally alert, but you just got a sense, boy they've been through so much...I've found my way into an area of medicine that I, on the one hand, believe in, but on the other hand, it doesn't leave me feeling great about what I'm doing in terms of utilisation of technology. I'm glad the technology's there, but it seems I'm asked to use it at times when I'm not perfectly comfortable (Shim, 2006, 489).

This quotation contrasted with that of the interaction of the doctor with Mr. Albert reveals a dichotomy between professional awareness and communication of different cardiac risks for the elderly above 85. In both studies the authors agreed that “the *absence* of any memorable conversation about procedural risks may have contributed to-however subtly or unintentionally- the impression that these interventions were routine and safe” (484). The quotations also compliment one another in the sense of moral obligation to proceed with ICD intervention simply because it is available. One can conclude from these quotations that the production and distribution of cardiac risk knowledge is framed in social and individual obligations to *live* healthy.

These clinical interactions provide the foundation on which it is possible to speculate the implications of Biotronik's remote ICD technology. The standardization of ICD procedure and the availability of the technology already sway the consumer/patient to consider their moral obligation to healthy life through the device, but the “irony” of the devices for the 85+ population can dissuade the consumer when negotiating different forms of risk. The remote function therefore serves as an additional means of democratizing the access to biomedical information, but also aims to reduce the risk of prolonged suffering through real-time monitoring. In the construction of biomedical knowledge and information, this device functions to both produce and distribute knowledge of cardiac risk between patients, doctors, and biomedical corporations through real-time communication.

Finally, the biomedicalization of cardiac risk could not take place without the coordination of knowledge by federal agencies and insurance companies with biomedical corporations, doctors, and patients. Revisiting the history of the ICD, the FDA first approved the device in 1985, which was couched within the context of changing biomedical practices and structures. As these structures shifted, Medicare began to cover more and more of the cost and manipulated the criteria for implantation to include older populations with a lower history of cardiac problems. The history of how Medicare transformed cardiac risk information can help identify structural factors of the Biomedical Technoservice Complex Inc. that allow for the “ironic” feature of the ICD to be overlooked during knowledge production and distribution.

The studies that occurred between 2002 and 2004 transformed the criteria for ICD implantation and had direct consequences on their insurance coverage for different populations. “Before 2003, the criterion for defibrillator implantation—and importantly, for Medicare reimbursement for the procedure—was, at minimum, one incident of cardiac arrest or of documented arrhythmia” (Shim, 2006, 488). In 2003, this was expanded to anyone who met “measures of declining heart function” and now research suggests that the technology would extend the life of patients with “weakened hearts, *regardless of any previous cardiac event*” (489). The elderly population is thus grouped into this category, and the elderly above the age of 85 become candidates for the biomedical implantation of an ICD. The problematic aspect of this research-policy process is that “few clinical trials for the ICD include persons over the age of 70,” which makes it difficult to determine the effectiveness of the technology in reducing cardiac risk (Kaufman, 2011, 12). Likewise, this oversight in ICD research reveals another gap in the production and distribution of cardiac risk knowledge. Once again, the biomedical establishment omits the “ironic feature” of the ICD for elderly patients above 85 and for those who have no cardiac conditions.

Medicare is a structure responsible for both the production and

distribution of cardiac risk knowledge, and each subdivision within the organization carries out a part of the mediation between other assemblages of the Biomedical Technoservice Complex Inc.. Kaufman describes the chain of knowledge and authority within Medicare, revealing the mechanisms that standardize ICD procedures and develop the language of risk on their own terms:

Committees working through the Centers for Medicare and Medicaid Services..constantly review and assess clinical studies and evidence about what constitutes the therapeutic. Their reviews are the basis for reimbursement and coverage decisions. Those coverage decisions strongly influence the 'need' for certain treatments, the organization of specific options that physicians employ, which therapies become standard, and the effects of those options on the patients' and families' lives (12).

Now the relationship between the patient, the doctor, and the biomedical industry is regulated through insurance agencies, which develop the scientific basis and legitimize cardiac risk. They construct the empirical basis for the biomedical industry's technological imperative, establishing the limits of what constitutes proven knowledge about cardiac risk and ICD implantation. This structure is partly responsible for the omission of the “ironic feature” because it does not scientifically validate the adverse effects of ICDs on the elderly over 85. If the Biotronik remote ICD were to become standard treatment, it would have to undergo clinical trials before being accessible to patients. Given the basis for allowing ICDs to become standard, the value of insuring life outweighs the “ironic feature” of the ICD in determining whether it will be covered by Medicare or other insurance agencies.

#### Implications for Elderly Bodies

The implications of the Biomedical Technoservice Complex Inc., the surveillance brought about by treatments of risk, the technoscientization of biomedicine, and the production/distribution of knowledge on the elderly body are great. “Significantly, biomedicalization processes are appropriating both the definition of and management of bodily differences as within the proper jurisdiction of biomedical scientific research and technologies” (Clarke, 2003, 181). The elderly body has already been transformed and appropriated both socially and materially. The way in which cardiac risk has been socially constructed through biomedicalization has transformed concepts of the elderly body based on age into concepts of the elderly based on performativity (Shim, 2006, 486). At the same time, the way in which cardiac risk has been technologically constructed (through ICDs, pacemakers, etc.) has in turn transformed the material reality for the new “elderly”.

In this new reality, “there seems to be a growing consensus among physicians in the cardiac specialties that “‘old age’ shouldn't be defined by a number,” which implies the standard treatment of biomedical

intervention to extend life. The growing population of individuals over the age of 85 also indicates the standardized practice of life extension and the treatment of cardiac risk. Furthermore, the ICD treatment of cardiac risk helps the new elderly to develop a “technoscientific identity” (Clarke 2003, 182). With an ICD, the elderly can feel younger because of the increased range of activities that can now be performed. For patients over 85, this technoscientific identity is more fragile because the population is more vulnerable to heart failure than younger recipients. Levels of risk are also embedded in the technoscientific identity. For the elderly, cardiac risk is high and even higher for those who are over 85. For those who are over the age of 85 and elect to have an ICD implant, their technoscientific identity is negotiated between the self-awareness of being a high-risk patient and the perceived identity that the ICD will make the individual younger. The Biotronik remote ICD attempts to layer this technoscientific identity with a sense of community. The centralization of data and information, in addition to the regulated flow of cardiac risk information, allow patients, doctors, and the biomedical industry to be virtually linked in a community of information.

In conclusion, I would like to stress the importance of researching the effects of ICD implantation on the elderly over 85, because the process of biomedicalization has created a complex system of risks and their treatments and structurally omitted the 85+ population's existence. Through facilitating cooperation between doctors, insurance companies, and biomedical corporations, perhaps the “ironic features” of the ICD can be elucidated to reduce the overall suffering of the extremely elderly.

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