

Cognitive and Behavioral Treatments for Anxiety and Depression in a Patient with an Implantable Cardioverter Defibrillator (ICD): A Case Report and Clinical Discussion

Adam T. Hirsh · Samuel F. Sears Jr. ·
Jamie B. Conti

Published online: 30 April 2009
© Springer Science+Business Media, LLC 2009

Abstract Implantable cardioverter-defibrillators (ICDs) are the treatment of choice for patients at risk for potentially life threatening arrhythmias. The associated stress of living with an implanted device and receiving ICD shock therapy has been noted to exert a psychological toll on the individual patient and family. Anxious and depressive symptomatology is frequently reported by these patients, thus creating a demand for tailored psychological interventions for this population. The current case report describes the components, delivery, and effectiveness of a targeted treatment approach for anxiety and depression in an individual with an ICD. Test results and interview data revealed significant improvements in multiple domains of cognitive, emotional, and behavioral functioning. Improvements in marital relations were also achieved. These treatment effects were maintained at follow-up and in the context of acute, medical stressors. Future clinical and research directions are also discussed.

Keywords Implantable cardioverter-defibrillator (ICD) · Anxiety · Depression · Cognitive and behavioral treatment

Background

The effectiveness of implantable cardioverter-defibrillators (ICDs) in preventing sudden cardiac arrest is well-established (AVID Investigators, 1997; Bardy et al., 2005; Moss et al., 1996). In high-risk patients with cardiac disease, ICD implantation has decreased mortality 30–54% (Moss et al., 2004; Greenberg, Case, & Moss, 2004). For this reason, ICDs have become an increasingly common treatment option for many patients with cardiac disease. ICD placement is typically indicated for individuals with one or more of the following characteristics: (1) previous cardiac arrest; (2) ventricular tachycardias that result in significant decrease in blood supplied by the heart and/or are not adequately managed with medications; (3) significant heart muscle damage from prior myocardial infarction (MI); and (4) high risk for sudden death from cardiac arrest.

The ICD is a small electronic device (the unit can be as small as 30 cm² for single-lead systems) that is implanted in the subclavicular region and consists of a defibrillator unit and one or more leads (wires) that transmit electrical signals between the device and the heart. Rather than preventing the occurrence of life-threatening arrhythmias, these leads allow the ICD to monitor the heart's rhythm and provide corrective therapy via electrical shock when needed. In the event of an abnormal rhythm that exceeds the programmed threshold of the device, the ICD can respond in several ways. When ventricular tachycardia is detected, the ICD can deliver a series of weak electrical impulses and/or low energy shocks to return the heart to normal rhythm. These signals are often not detectable by the individual, and when they are, they typically are experienced as relatively minor impacts to the chest. However, in the context of a potentially lethal heart rhythm known as ventricular fibrillation, the ICD is designed to

A. T. Hirsh (✉)
Department of Rehabilitation Medicine, University of
Washington, Box 356490, Seattle, WA 206-221-5688, USA
e-mail: ahirsh@u.washington.edu

S. F. Sears Jr.
Department of Psychology, East Carolina University, Greenville,
NC, USA

J. B. Conti
Division of Cardiovascular Medicine, University of Florida,
Gainesville, FL, USA

deliver one or more powerful electrical shocks that rapidly terminate the arrhythmia and restore sinus rhythm.

The psychosocial implications of this technology have been the subject of growing clinical and empirical attention. ICD-related fear and anxiety have emerged as the most common psychological symptoms experienced by ICD recipients, with clinically significant symptomatology occurring in between 13% and 38% of patients (Sears, Todaro, Saia-Lewis, Sotile, & Conti, 1999). Concerns about the shock experience, device malfunction, and/or death are often reported by patients. Risk factors for such adjustment difficulties include younger age (<50 years), lack of social support, reduced physical functioning, more frequent ICD shocks, and poor understanding of the underlying condition and ICD itself (Lüderitz, Jung, Deister, & Manz, 1994; Keren, Aarons, & Veltri, 1991; Jenkins, Dunbar, & Hawthorne, 1996; Sneed & Finch, 1992; Vitale & Funk, 1995).

Cognitive-behavioral therapy (CBT) and stress management frameworks are particularly well-suited for ICD-related adjustment issues. A recent meta-analysis indicated that a variety of intervention strategies spanning education approaches, CBT, and exercise had produced a wide ranging set of effect sizes but that the interventions were generally consistently better than control groups (Pedersen, Van Den Broek, & Sears, 2007). However, only our recent study utilizing a CBT approach focused solely on shocked ICD patients and demonstrated a significant reduction in self-reported anxiety and salivary cortisol concentration (Sears et al., 2007). Nonetheless, previous research using broad approaches have been positive (Fitchet et al., 2003; Kohn, Petrucci, Baessler, Soto, & Movsowitz, 2000; Urizar, Sears, Handberg, & Conti, 2004). These potentially important theoretical and clinical contributions notwithstanding, psychological interventions aimed at this specific patient population remain under-developed, and large-scale clinical trials have not been conducted to date. The following case report is presented as an illustration of the components, delivery, and effectiveness of the targeted treatment approach we employ in our medical center with ICD recipients with device-related adjustment difficulties.

Case Report

Demographic and Medical Background

Mr. S is a mid 50s-year-old, married male of mixed racial/ethnic background. He is retired for medical reasons. His medical history is significant for ischemic cardiomyopathy with an ejection fraction of 15–20% (normal range is 55–75%), chronic atrial fibrillation, diabetes, dyslipidemia, morbid obesity, and gout. Ischemic cardiomyopathy is a common cause of congestive heart failure. Common

symptoms, all of which were reported by Mr. S, include angina, palpitations, shortness of breath (baseline and exertional), peripheral edema, and fatigue. He underwent an ICD placement approximately 4 years ago, which was upgraded to a biventricular device (leads are attached to both the right and left chambers of the heart) 2 years later. His surgical history is also significant for a three-vessel coronary artery bypass graft (CABG), multiple percutaneous coronary interventions (also known as angioplasty), and rotator cuff repair. Following several unremarkable months post-upgrade, Mr. S received multiple ICD shocks for ventricular tachycardia. He was started on amiodarone, a medication used to suppress ventricular arrhythmias, and did well for approximately one year. He then experienced frequent, medication-refractory ICD shocks over a two-month period and was subsequently admitted to a tertiary care center. His medication list upon admission included mexiletine HCl, potassium chloride, glimepiride, carvedilol phosphate, hydralazine, isosorbide mononitrate, furosemide, warfarin, lansoprazole, folic acid, enalapril, niacin, simvastatin, digoxin, allopurinol, amiodarone, and a multivitamin.

Psychological Presentation and Presenting Problems

Shortly following Mr. S's admission, the attending cardiologist referred him for a psychological consultation due to perceived distress and adjustment difficulties regarding recent medical events. Mr. S's presentation was consistent with extreme psychological distress, with clinically significant anxious and depressive symptomatology (see below) present on the majority of days over approximately the past three weeks. His affect was full in range, and he became tearful at times when discussing recent events, particularly those related to ICD shocks. Behavioral manifestations of his psychological symptoms were seen in his shaky hands and trembling voice. Mr. S described his mood as anxious and depressed, and reported sleep disruption, increased irritability, increased tearfulness, emotional lability, social withdrawal, and anhedonia. He denied current and past suicidal ideation. Mr. S reported that anxiety—both generalized and shock-specific—was his most troubling overall psychological symptom. He reported an intense fear of death; indeed, imminent mortality was his foremost, specific fear. He initially expressed measured confidence in his ICD, but later acknowledged significant concerns about its functional reliability. He reported intrusive cognitions, ruminations, catastrophizing, and occasional nightmares, all related to ICD shocks.

His attempts at cognitive and emotional avoidance were variably successful. Mr. S stated that over the preceding several months he had been searching for a consistent pattern of behaviors that precede shock. Consequently, he had withdrawn from most activities (e.g., exercise,

recreation, sex) out of fear, which represented a significant change from baseline for this previously very active individual. Mr. S also reported hypervigilance to somatic sensations in order to determine his likelihood of getting shocked. Mr. S denied a prior history of psychological disorders and/or treatment. Mr. S's wife was present throughout the consultation, per his request. Although not formally evaluated, she, too, presented with significant anxious symptomatology. She made numerous statements that indicated she shared her husband's cognitive and emotional framework surrounding recent medical events.

To supplement the interview, Mr. S completed several objective, self-report measures of mood and ICD-related adjustment. His score on the Beck Depression Inventory (BDI; Beck & Steer, 1993) was suggestive of mild-moderate symptoms of depression. His responses to items on the State-Trait Anxiety Inventory (STAI; Spielberger, 1977) were consistent with extremely high levels of both situational and dispositional anxiety. The Florida Patient Acceptance Survey (FPAS; Burns, Serber, Keim, & Sears, 2005)—a measure of patient acceptance of an implanted ICD—suggested diminished acceptance. Finally, the Florida Shock Anxiety Scale (FSAS; Kuhl, Dixit, Walker, Conti, & Sears, 2006) was administered to characterize Mr. S's level of shock-related anxiety. His responses indicated high levels of shock-related anxiety and regular avoidance of activities due to fear of shock. Table 1 presents a summary of these scores. Data derived from the clinical interview and objective measures were consistent with DSM-IV diagnoses of Adjustment Disorder with Anxiety (DSM-IV: 309.24) and Major Depressive Disorder (DSM-IV: 296.22). Mr. S was subsequently referred for ICD-related psychological treatment.

Psychological Intervention

A cognitive behavior stress management approach, specifically tailored to patients with ICD-related adjustment difficulties, was employed. This approach was adapted from a treatment manual for medical providers treating ICD recipients (Sotile & Sears, 1999), as well as traditional cognitive-behavior therapy for anxious and depressive disorders. The treatment approach with Mr. S consisted of psychoeducation, stress management, and family interventions. The initial five treatment sessions were conducted on an inpatient (for medical reasons) basis by a clinical health psychologist. The remaining five sessions occurred in the outpatient setting. Follow-up sessions occurred at one and three months, respectively. As requested by Mr. S and consonant with our approach, Mrs. S was present throughout treatment. Inclusion of a significant other may reduce the burden that is common among caregivers of the medically ill. It also allows the provider to address both adaptive and maladaptive relational characteristics (e.g., communication patterns) that influence the experience of and reaction to significant medical stressors.

Sessions 1 and 2 focused on psychoeducation. Topics included basic anatomy and physiology of Mr. S's cardiac disease; the ICD device; and the psychological reaction to ICD implantation. Mr. and Mrs. S responded particularly well to corrective information about shocks and their precipitating factors. Information about psychological responses to chronic illness and the ICD provided assurance to Mr. S that he was not "going crazy" but, rather, was having common reactions to uncommon stressors. This component of treatment assisted Mr. S in gaining a sense of mastery over his disease and its management.

Table 1 Self-report measures of patient distress and functioning across time

Measure	Baseline		Mid treatment (3 weeks)		Conclusion (6 weeks)		Follow-up (14 weeks)	
	Score	Percentile	Score	Percentile	Score	Percentile	Score	Percentile
BDI ^a	18	88	8	35	0	3	1	3
STAI ^a								
State	72	>99	51	89	24	12	23	11
Trait	62	>99	41	77	22	8	24	12
FPAS ^b	57	95	57	95	73	72	88	34
FSAS ^c	30	97	18	63	14	42	12	33

BDI Beck Depression Inventory, *STAI* State-Trait Anxiety Inventory, *FPAS* Florida Patient Acceptance Survey, *FSAS* Florida Shock Anxiety Scale

^a Higher BDI and STAI scores indicate greater depression and anxiety, respectively. Normative data derived from Sears et al. (1999)

^b Higher FPAS scores indicate greater acceptance of ICD. FPAS normative data derived from Sowell, Sears, Walker, Kuhl, and Conti (2007)

^c Higher FSAS scores indicate greater shock-related anxiety. FSAS Normative data derived from Kuhl et al. (2006)

Table 2 Shock management plan

Shock management plan “Standard operating procedures”		
I. Preparing for shock	II. Post-shock coping	III. Follow-up coping
Important phone numbers	I will physically relax by:	Debriefing thoughts:
Primary Cardiologist	Deep breathing exercises	Review pre-shock actions
Family Physician	Autogenic relaxation	Discuss meaning (or lack of)
Neighbor’s House		Avoid “analysis paralysis”
If I get a shock and feel fine, I will:	I will tell myself:	Re-Entry Behavior Plan:
Call my cardiologist to talk about the event and plan for the next step	That was scary but I’m a veteran who has coped with past shocks and will cope with this one too	Stepwise plan to build confidence
		Affirmative action
If I get a shock and don’t feel fine, I will:	I am going to:	I know I’m alive and well when...
Seek medical attention immediately	Sit down, say a prayer, and talk with my wife and family	I am laughing and joking like usual

Note: Individual patient plans will vary and should be developed with the patient’s medical team

Sessions 3–8 focused on stress management. Physical, cognitive, and behavioral functioning were delineated and individually targeted. Relaxation strategies (e.g., Progressive Muscle Relaxation) were taught to address physical manifestations of anxiety and depression, and an automated relaxation CD was provided for daily practice. Mr. and Mrs. S were encouraged to engage in joint relaxation, which reduced their overall distress and heightened their intimacy, a neglected aspect of their relationship due to medical events. The cognitive component of treatment taught Mr. S how to identify automatic negative thoughts (cognitive distortions) and challenge/replace them with adaptive and accurate ones. A daily thought record assisted in the regular use of these cognitive skills.

Cognitive therapy also assisted Mr. S in shifting his conceptual framework about self from “victim” to “veteran.” Whereas he previously saw himself as weak in the face of his disease, he came to see himself as a hardy and adaptive survivor. He was also encouraged to conceptualize his device as a foundation of safety from which he can venture into life, rather than a source of threat that constrains his engagement in valued activities.

Finally, the behavioral component of treatment oriented Mr. S away from maladaptive behavioral attempts at anxiety and depression management and towards adaptive ones. For example, Mr. S’s food-based coping resulted in morbid obesity and limited his candidacy for heart transplantation. He was assisted in achieving his goal of replacing this strategy with exercise. By the end of treatment, he was engaging in multiple bouts of exercise per day. This change led to improved mood management, weight loss, and increased social contact.

Sessions 9 and 10 focused on family concerns. Communication skills, joint stress management, and adaptive dyadic behavior patterns were emphasized. The familial effects of Mr. S’s health condition were explored. They

stated that being assisted in honest discussions about the negative, as well as positive, effects was very helpful. Basic communication strategies (e.g., active and empathic listening) were taught and modeled. Spouse and family self-care strategies were also emphasized. Mrs. S’s resistance to self-care was addressed by framing these activities as vital to her caregiving efficacy. A family-oriented shock plan of “Standard Operating Procedures” for the future was also developed (Table 2). This plan reportedly assuaged much of their anxiety and increased their comfort in life engagement. Mrs. S commented, “Since we’ll already know what to do if a shock happens, we don’t have to worry about it.” Post-shock coping and relapse prevention strategies were also reviewed.

Treatment Outcome and Follow-Up

At treatment conclusion, Mr. and Mrs. S evinced markedly increased understanding of his medical condition and ICD. Mr. S reported significant reductions in anxious and depressive symptoms and a return to premorbid psychological functioning. He also demonstrated increased physical functioning and behavioral engagement. The couple further noted improvements in communication, and Mrs. S reported considerable reductions in her psychological symptoms as well.

Objective measures of depression, anxiety, and ICD-specific acceptance and anxiety indicated significant improvements in each of these domains from baseline to treatment conclusion; all scores at conclusion were within normal limits (Table 1; Fig. 1). Perhaps most striking was the change in Mr. S’s scores on the STAI (STAI-State: baseline = 72 and conclusion = 24, Trait: baseline = 62 and conclusion = 22), which indicated extreme levels of state and trait anxiety at baseline.

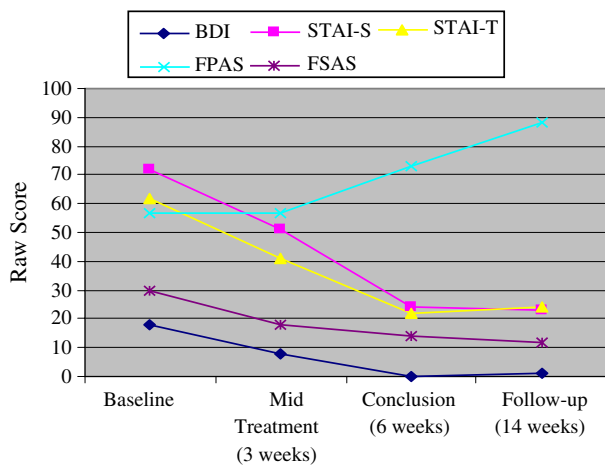


Fig. 1 Changes in self-report measures across time. *Note:* Higher BDI and STAI scores indicate greater depression and anxiety, respectively. Higher FPAS scores indicate greater acceptance of ICD. Higher FSAS scores indicate greater shock-related anxiety

At one month follow-up, Mr. and Mrs. S reported maintenance of treatment gains, which was consistent with objective measures completed at that time (Table 1; Fig. 1). They continued to utilize stress management skills previously taught, and described their life as immeasurably enriched as a consequence of their lasting confidence. Mr. S's presentation was notable for his sense of overall ease; he seemed to relish his adopted identity as a "veteran." Another striking indicator of progress was his medically appropriate 40 lbs weight loss since the initial consultation.

Mr. S was re-admitted two months later following multiple successive shocks. Psychology was consulted to assess his adjustment and determine his need for re-initiation of treatment. Mr. S's presentation was consistent with mild, context-appropriate symptoms of anxiety and depression. His overall outlook was positive, and he was "taking things in stride." Perhaps most illustrative was his continued behavioral engagement. Upon admission, he immediately resumed his practice of walking laps around the unit and socializing with staff and patients. Mr. S denied the need for psychological services, stating, "Hey, doc, I'm a veteran now, remember?" His demeanor at discharge (per medical staff report) a few days later was one of comfort and confidence. His psychological prognosis is good.

Discussion

The current case study is presented to illustrate the implementation and effectiveness of a cognitive behavior stress management treatment for an individual with

clinically significant anxiety and depression related to ICD implantation and therapy. Subjective and objective post-treatment results indicated clinically significant reductions in symptoms of anxiety, depression, and ICD-specific maladjustment. Significant improvements in multiple indices of quality of life were also demonstrated, and these improvements were maintained at follow-up.

Declines in psychosocial functioning and quality of life are relatively common occurrences following ICD shock (Irvine et al., 2002; Sears & Conti, 2003). Classical conditioning has been identified as a particularly important operating factor in the development and maintenance of such distress (Godemann et al., 2004; Pauli, Wiedemann, Dengler, Blaumann-Benninghoff, & Kühlkamp 1999; Sears et al., 1999). Even in patients who do not experience shock, adjustment difficulties may arise from the fear of being shocked, which can produce increased anxiety, behavioral withdrawal, and negative perceptions of self-efficacy (Sears & Conti, 2003). Catastrophic thinking patterns are likely to precipitate, amplify, and maintain such symptoms (Sears & Conti, 2002). Given this, the development and delivery of psychological services specifically tailored to the needs of this population appears critical.

Mr. S cited the educational component of treatment as particularly helpful. It was his experience that the ICD was not sufficiently explained to him prior to or after implantation. As with many medical patients (Cohen & Lazarus, 1979, 1983; Suls & Wan, 1989), information deficits can be a primary source of psychological symptoms in these patients and contribute to a sense of helplessness. Our treatment approach begins with a psychoeducational module for this purpose. In fact, significant reductions in anxiety, depression, and other symptoms are frequently achieved following this module, before introduction of specific stress management strategies. Such was certainly the case with Mr. S. It is, thus, reasonable to assume that a more extensive "standard" educational component both prior to and immediately following ICD implantation may "protect" against the development of significant ICD-related adjustment difficulties that require more extensive treatment. Similar inoculatory effects have been reported in other clinical populations (Meichenbaum & Deffenbacher, 1988; Ross & Berger, 1996; Schneider & Nevid, 1993; Timmons, Oehlert, Sumerall, & Timmons, 1997). While ICD education at our facility has typically been accomplished via clinical health psychologists and graduate trainees, this treatment component could certainly be delivered by any number of non-mental health providers (e.g., nurses, physician assistants).

Mr. S also noted the benefit derived from the relaxation skills component of treatment. The regular use of these strategies—aided by an automated CD—provided

assistance in the management of acute anxious and depressive symptoms associated with his ICD and hospitalization, as well as the general stress of everyday life. These strategies were also used to increase marital intimacy. ICD recipients often withdraw from intimate activities for numerous physical and psychological reasons (Leosdottir et al., 2006; Shea, 2004; Sotile & Sears, 1999). Joint relaxation practice can increase marital intimacy and is well-suited to the decidedly non-intimate hospital environment. Spousal inclusion in some or all of therapy can be beneficial in other ways. The stress of caregiving for the medically ill is widely recognized (Hebert & Schulz, 2006; Schulz & Beach, 1999); thus, spouses of ICD recipients may also benefit from many of our intervention strategies. Reductions in spousal stress can then “feed back” onto the patient and further maximize his/her progress. Such a process certainly occurred in the presented case, as Mr. and Mrs. S’s shared and expressed anxieties created a cycle of escalating symptoms that was disrupted only through individual improvements in each partner.

A particularly remarkable outcome of the current case was the profound conceptual shift that occurred in Mr. S’s self-identity. His initial presentation was one of helplessness and victimization, which is not uncommon in these patients (Sotile & Sears, 1999). Through targeted cognitive therapeutic strategies, he was assisted in developing an alternative framework within which to see himself, one that was rooted in his “veteran” status. In addition, cognitive therapy assisted Mr. S in the reinterpretation of the nature of his device from one of threat to one of safety. His reengagement in valued life activities was largely predicated on this change.

As rates of ICD implantation continue to rise, the psychological effects of this technology have only recently begun to be characterized. The current case study provides some clinical direction for providers faced with ICD recipients manifesting symptoms of sub-optimal adjustment. We believe that attention to the psychological experience of ICD recipients is a critical (but all-too-often neglected) component of the biopsychosocial approach to treatment in this growing patient population. Despite advances in clinical health psychology and related fields, inpatient and outpatient medical settings remain foreign environments for the majority of mental health providers. Nevertheless, our experience and this particular case example highlight the role of psychologists in such non-traditional settings. Clinical practice in these settings certainly challenges the psychologist to expand his/her knowledge base, skill set, and interdisciplinary effectiveness. However, as the once distinct lines delineating fields of physical and mental health continue to blur, such challenges will only grow in the years ahead.

Dialogue Between Drs. Hirsh (Psychology Fellow), Sears (Psychologist), and Conti (Cardiologist) Regarding the Case

Dr. HIRSH: Dr. Conti, how common is it that your patients with ICDs experience similar psychological symptoms as Mr. S? Is he representative of your typical patient?

Dr. CONTI: As a cardiologist specializing in cardiac arrhythmias, I routinely manage patients with a significant risk of cardiac arrest. Not surprisingly, patients and family members often present with anxiety surrounding death, shock, the reliability of their ICD, or even end of life concerns. Interestingly, patients spend a fair amount of time trying to predict their death, based on their symptoms. For example, if a patient receives a shock, they assume that means they are “sicker” and that death is more imminent than it was before the shock. Most cardiac patients are not very accurate at predicting their eventual death; they routinely forecast it due to situational variables that we are often able to manage. However, the disease progression usually continues with or without their distress. In this sense, Mr. S is quite similar to many of my patients. However, what sets him apart from the “typical” ICD patient is the intensity and pervasiveness of his symptoms. Mr. and Mrs. S presented with symptoms that could not be addressed by his primary medical team, because we are not trained nor do we have the time to treat such psychological problems. In these instances, we rely heavily on our psychological colleagues so that the patient may fully benefit from the life saving therapies we offer.

Dr. CONTI: Why did you select cognitive behavioral therapy and the other psychological therapies for this patient?

Dr. SEARS: We have been active in attempting to provide empirical evidence for CBT in ICD patients. Our own research engaged shocked ICD patients in a stress and shock management program (SSMP) that included CBT, education, relaxation/stress management training, and group social support. Results showed a significant reduction in self-reported anxiety and improved device acceptance, as well as in salivary cortisol concentration. A recent meta-analysis (Pedersen et al., 2007) established that psychosocial interventions for ICD patients have demonstrated wide ranging effect sizes but that they were particularly helpful in addressing anxiety by combining elements of education, relaxation, CBT, support, and/or exercise.

Dr. HIRSH: In addition to the research cited above by Dr. Sears highlighting the effectiveness of CBT-based interventions in this population, a cognitive-behavioral framework seemed to be particularly well-suited to Mr. S.

We conceptualized Mr. S's psychological presentation as a constellation of symptoms—manifested in reaction to severe cardiac disease and ICD placement and subsequent therapy—that fell into the domains of physical, psychological, behavioral, and social functioning. A broadly construed CBT framework provided a theoretically coherent and efficient way to address these diverse symptoms, and it also fit nicely with Mr. S's rather practical and problem-focused personality style. For example, his anxiety manifested in several physical symptoms such as increased heart rate and rapid and shallow breathing in excess of what would be expected from his cardiac disease. Progressive muscle relaxation was introduced to address these symptoms. In the psychological domain, Mr. S articulated a diverse array of faulty cognitions that were predictably and automatically activated in certain situations. Cognitive therapeutic techniques such as labeling and challenging these thoughts were used to provide more balance and realism to his thought processes. Many of this patient's behavioral symptoms were also maladaptive, in particular his use of food as a primary coping strategy and absence of behavioral engagement in an attempt to “prevent” ICD shocks. Not only did this further compromise his cardiac status, but it also limited his life experiences and resulted in a highly isolated existence for this previously very engaged gentleman. By slowly incorporating exercise into his daily routine, we were able to assist Mr. S in adopting a more healthy and satisfying lifestyle. Lastly, the relational patterns between Mr. and Mrs. S, while positive and supportive in many instances, proved to be problematic in other respects. For example, their mutual reinforcement of the other's irrational anxieties only heightened their fears and further contributed to their maladaptive patterns. By addressing these issues in treatment, the couple learned to communicate in a clearer and more adaptive manner.

Dr. CONTI: This all makes sense since I know just treating anxiety and depression symptoms alone was not effective. A more comprehensive psychological approach was needed.

Dr. SEARS: As a follow-up point, I'd like to stress that although we conceptualized Mr. S's symptoms as physical, psychological, behavioral, or social, these are somewhat arbitrary and artificial distinctions. These domains are highly intertwined and influence each other, as illustrated by the increased social engagement Mr. S experienced when he replaced food with exercise as a more adaptive behavioral coping strategy. It is also important to remember that Mr. S did not present with a previous history of psychological or psychiatric problems. His current issues were related to the unique stressors of living with a significant cardiac condition

that required a unique type of treatment, the ICD. In fact, some of his current maladaptive symptoms may have actually been adaptive in the initial stages. For example, anxiety about a medical condition can serve as a powerful motivator to seek appropriate healthcare and take better care of oneself. It is only when such symptoms start to interfere with functioning do they become problematic and in need of clinical attention, as, for example, when Mr. S's anxiety increased to such a degree that it proved to be a “paralyzing” rather than motivating force in his life.

Dr. CONTI: You were also recently conducting a randomized trial aimed at reducing psychological and physiological markers of distress in ICD patients. How did the conduct of this trial affect your care planning with Mr. S? Did Mr. S get the same treatment you used in your research protocol?

Dr. SEARS: We definitely wanted to offer state of the art care to this patient, even as we were working to establish that with science. The key components of the ICD Shock and Stress Management Program were:

- (a) *ICD-Specific education:* To help patients understand their condition and their device and reduce any misperceptions
- (b) *Relaxation/Stress Management training:* To assist patients in reducing their hypervigilance to shock
- (c) *Cognitive techniques:* To help patients identify their attitudes and beliefs about their life with arrhythmias and the ICD and determining to what extent the ICD provides a feeling of safety
- (d) *Group discussion and Peer Social support:* To allow for the experience and exposure of the virtually universal experience of shock and living with arrhythmias.

The trial helped reassure us that these components were our best effort at providing empirically validated therapy.

Dr. HIRSH: I am curious why you did not give Mr. S psychotropic medicines for anxiety and depression prior to our consultation.

Dr. CONTI: I value both medication and non-medication approaches to these issues. Many of my patients are on a psychotropic medication alone or in combination with psychological treatment. In this instance, I did not feel that Mr. S's symptoms would be best addressed—in the short or long-term—with medication alone; psychological interventions seemed particularly important given his cognitive, affective, and behavioral symptoms. Moreover, his list of medications was already quite extensive and complex, and adding additional medications could increase the risk of problematic drug interactions. Thus, I wanted to see if his symptoms

could be managed without the use of additional medicines, and was pleased to see that the psychological treatments did just that.

Dr. HIRSH: Psychological providers are generally not trained or licensed to prescribe psychotropic medications, though in some states, there are prescribing psychologists; this responsibility typically falls on physicians. In the broader sense, these medications are frequently used in concert with psychological treatment, and there is evidence that such combination is superior to either medication or therapy alone. Thus, it is reasonable to consider medications for anxiety and depression in patients with ICDs. Nevertheless, the use of psychotropic medications in these patients may be complicated given their unique medical conditions that typically require a host of other pharmacologic agents. Careful monitoring of medication response and side effects is critical, which the psychological provider can also assist in.

Dr. CONTI: Mr. S had significant anxiety and depression, and this seems to be the usual problems I see in my ICD patients. Are there others in your experience Dr. Hirsh?

Dr. HIRSH: These patients can and do present with a variety of psychological problems that are present in the general population. Anxiety and depression are seen most often, but there are other psychological conditions that are likely to be prominent in this patient population that healthcare providers should be aware of. For example, symptoms consistent with Obsessive-Compulsive Disorder (OCD) may emerge due to the unique aspect of living with an ICD. An ICD patient who spends considerable time trying to “prevent” shocks may develop an intricate and debilitating set of rituals towards this end. These behaviors are negatively reinforced each time the patient does not receive a shock after engaging in the ritual. Patients may also develop Posttraumatic Stress Disorder (PTSD) following an ICD storm, or even a single shock. Intrusive thoughts related to the shock, physiological reactivity, and persistent avoidance of thoughts and/or activities are hallmark signs of a clinically significant condition. In addition, these patients may be at increased risk of contemplating and/or attempting suicide. We know that living with a chronic illness increases ones risk of suicide, and this applies to patients with cardiac disease that requires an ICD. Such stress is often compounded by other psychosocial factors related to employment, family, etc. The risk of suicide is further increased for patients who are male, older, and with a history of psychological problems including previous suicidal ideation/attempt.

Dr. CONTI: Mr. S has some unique psychological problems related to the ICD, but in many respects he is like other cardiology patients.

Dr. SEARS: I agree. In general, ICD patients are simply a subset of cardiac patients with an identified risk of life-threatening arrhythmias. They are a heterogeneous group of patients with an electrical (e.g., atrial fibrillation) or life-threatening (e.g., ventricular fibrillation) problem. So, ICD patients present with the common challenge of living life with the limitations and responsibilities that the disease may give them with the added protection of the ICD. ICD shock and other pacing therapies provide benefit of improved survival. My hope is that appropriate psychological care will increase the chances that patients will truly accept and understand the ICD as a device that protects vs. a device that shocks and causes discomfort.

Dr. HIRSH: Dr. Conti, are referrals to psychologists for these types of concerns becoming more common?

Dr. CONTI: At our medical center, we are fortunate to have psychological providers who are not only available to consult on these matters, but who are specialized in the care of patients with ICDs. As such, referral to psychologists is a regular aspect of the inter-disciplinary care we provide. Unfortunately, our medical center is unique in this respect in that few of my colleagues in other settings have access to similar services.

Dr. SEARS: The current case highlights many of the features that attracted me to concentrate my clinical and research efforts on ICD patients in the mid 1990s. As a psychologist, I was and continue to be impressed by the rational and irrational anxieties that ICD patients have to sort through. No previous generation of patients has ever lived with cardiac disease to this extent; we simply did not have the technology of today to protect patients. We are now working to refine our psychological services to keep pace with these technological advances. We are also challenged with educating our physician colleagues about the psychological sequelae of technologies like ICDs, so that they are more aware of these factors and can make the appropriate referrals. Progress has been made but more work is needed.

Dr. SEARS: How are these psychological issues handled in most medical centers other than your own?

Dr. CONTI: These issues do not get dealt with because of the clinical demands on cardiac providers. Well-trained, inter-disciplinary care teams in cardiac electrophysiology including psychologists are extremely rare. Cardiologists, together with consulting psychiatrists, might rely on psychotropic medications and non-specific psychotherapies.

Dr. SEARS: Dr Conti, could you comment more about your experience of the integration of psychology and medicine?

Dr. CONTI: As cardiologists, we recognize that there is much more going on with our patients in terms of adjustment to illness and therapy, but we are not trained

to handle the psychological manifestations of our interventions. We rely on our psychological colleagues who complement our skill sets well; our patients benefit from the broader range of attention to their needs.

Dr. CONTI: Do either of you have thoughts about possibly assessing and treating these patients before they have an ICD implanted (preemptive psychological treatment)?

Dr. HIRSH: This is an interesting topic and one that is likely to elicit strong feelings from various providers. I think most would agree that a benefit of this approach would be the identification of patients who are in need of mental health care and subsequent provision of such services. However, there is likely to be significant disagreement among providers regarding using psychological evaluations as a part of the overall screening process. Certainly, this is frequently done in other areas of medicine, perhaps most notably in the field of organ transplantation. Without wading into these waters too deep, it would seem to me that some patients, particularly those with clinical mental health conditions, might have better post-implantation outcomes if they had some level of education and/or psychologic care provided before device implantation. Research could test this assumption and perhaps clarify the relevant practical considerations, such as intervention timing, dose, and context. A pre-implantation psychoeducation module could perhaps serve as a starting point.

Dr. SEARS: The purpose of psychological care is to help ICD patients feel *safer* because of their ICD and aid them in returning to living life with confidence. Psychosocial patient education is an efficient and valuable process to affirm this message, and this could be done prior to ICD placement. Nonetheless, many barriers exist to successfully executing this nationally including financial, provider, and system limitations. Ideally, well-conducted research will ultimately provide the impetus for wide scale implementation in the care of ICD patients to ensure that they receive full quality of life benefit from this life-saving technology.

Acknowledgments Preparation of this manuscript was supported in part by grants from the National Institutes of Health, National Institute of Neurological Disorders and Stroke (F31 NS049675) and National Institute of Child Health and Human Development, National Center for Rehabilitation Research (T32 HD007424).

References

Antiarrhythmics Versus Implantable Defibrillators (AVID) Investigators. (1997). A comparison of antiarrhythmic drug therapy with implantable defibrillators in patients resuscitated from near-fatal ventricular arrhythmias. *New England Journal of Medicine*, 337, 1576–1583. doi:10.1056/NEJM199711273372202.

- Bardy, G. H., Lee, K. L., Mark, D. B., Poole, J. E., Packer, D. L., Boineau, R., et al. (2005). Amiodarone or an implantable cardioverter-defibrillator for congestive heart failure. *The New England Journal of Medicine*, 352, 225–237. doi:10.1056/NEJMoa043399.
- Beck, A. T., & Steer, R. A. (1993). *Beck Depression Inventory*. San Antonio, TX: Psychological Corporation.
- Burns, J. L., Serber, E. R., Keim, S., & Sears, S. F. (2005). Measuring patient acceptance of implantable cardiac device therapy: Initial psychometric investigation of the Florida Patient Acceptance Survey. *Journal of Cardiovascular Electrophysiology*, 16, 384–390.
- Cohen, R., & Lazarus, R. S. (1979). Coping with the stresses of illness. In G. C. Stone, F. Cohen, & N. E. Adler (Eds.), *Health psychology, a handbook: Theories, applications and challenges of a psychological approach to the health care system* (pp. 217–254). San Francisco: Jossey-Bass.
- Cohen, R., & Lazarus, R. S. (1983). Coping and adaptation in health and illness. In D. Mechanic (Ed.), *Handbook of health, health care and the health professions* (pp. 608–635). New York: The Free Press.
- Fitchet, A., Doherty, P. J., Bundy, C., Bell, W., Fitzpatrick, A. P., & Garratt, C. J. (2003). Comprehensive cardiac rehabilitation programme for implantable cardioverter defibrillator patients: A randomized controlled trial. *Heart (British Cardiac Society)*, 89, 155–160. doi:10.1136/heart.89.2.155.
- Godemann, F., Butter, C., Lampe, F., Linden, M., Werner, S., & Behrens, S. (2004). Determinants of the quality of life (QoL) in patients with an implantable cardioverter/defibrillator (ICD). *Quality of Life Research*, 13, 411–416. doi:10.1023/B:QURE.0000018493.32844.56.
- Greenberg, H., Case, R. B., & Moss, A. J. (2004). Analysis of mortality events in the Multicenter Automatic Defibrillator Implantation Trial (MADIT II). *Journal of the American College of Cardiology*, 43, 1459–1465. doi:10.1016/j.jacc.2003.11.038.
- Hebert, R. S., & Schulz, R. (2006). Caregiving at the end of life. *Journal of Palliative Medicine*, 9, 1174–1187. doi:10.1089/jpm.2006.9.1174.
- Irvine, J., Dorian, P., Baker, B., O'Brien, B. J., Roberts, R., Gent, M., et al. (2002). Quality of life in the Canadian Implantable Defibrillator Study. *American Heart Journal*, 144, 282–289.
- Jenkins, L. S., Dunbar, S. B., & Hawthorne, M. H. (1996). ICD patient concerns across the first nine months of recovery. *Circulation*, 93, 1–134. abstract.
- Keren, R., Aarons, D., & Veltri, E. P. (1991). Anxiety and depression in patients with life-threatening ventricular arrhythmias: Impact of the implantable-cardioverter-defibrillator. *Pacing and Clinical Electrophysiology*, 14, 181–187. doi:10.1111/j.1540-8159.1991.tb05088.x.
- Kohn, C. S., Petrucci, R. J., Baessler, C., Soto, D. M., & Movsowitz, C. (2000). The effect of psychological intervention on patients' long-term adjustment to the ICD: A prospective study. *Pacing and Clinical Electrophysiology*, 23, 450–456. doi:10.1111/j.1540-8159.2000.tb00826.x.
- Kuhl, E. A., Dixit, N. K., Walker, R. L., Conti, J. B., & Sears, S. F. (2006). Measurement of patient fears about implantable cardioverter defibrillator shock: An initial evaluation of the Florida Shock Anxiety Scale. *Pacing and Clinical Electrophysiology*, 29, 614–618. doi:10.1111/j.1540-8159.2006.00408.x.
- Leosdottir, M., Sigurdsson, E., Reimarsdottir, G., Gottskalksson, G., Torfason, B., Vigfusdottir, M., et al. (2006). Health-related quality of life of patients with implantable cardioverter defibrillators compared with that of pacemaker recipients. *Europace*, 8, 168–174. doi:10.1093/europace/euj052.
- Lüderitz, B., Jung, W., Deister, A., & Manz, M. (1994). Patient acceptance of implantable cardioverter defibrillator devices:

- Changing attitudes. *American Heart Journal*, 127, 1179–1184. doi:10.1016/0002-8703(94)90107-4.
- Meichenbaum, D. H., & Deffenbacher, J. L. (1988). Stress inoculation training. *Counseling Psychologist*, 16, 69–90. doi:10.1177/0011000088161005.
- Moss, A. J., Greenberg, H., Case, R. B., et al. (2004). Long-term clinical course of patients after termination of ventricular tachyarrhythmia by an implanted defibrillator. *Circulation*, 110, 3760–3765. doi:10.1161/01.CIR.0000150390.04704.B7.
- Moss, A. J., Hall, W. J., Cannon, D. S., Daubert, J. P., Higgins, S. L., Klein, H., et al. (1996). Improved survival with an implanted defibrillator in patients with coronary disease at high risk for ventricular arrhythmia. *New England Journal of Medicine*, 335, 1933–1940. doi:10.1056/NEJM199612263352601.
- Pauli, P., Wiedemann, G., Dengler, W., Blaumann-Benninghoff, G., & Kühlkamp, V. (1999). Anxiety in patients with an automatic implantable cardioverter defibrillator: What differentiates them from panic patients? *Psychosomatic Medicine*, 61, 69–76.
- Pedersen, S. S., van den Broek, K. C., & Sears, S. F. (2007). Psychological intervention following implantation of an implantable defibrillator: A review and future recommendations. *Pacing and Clinical Electrophysiology*, 30, 1546–1554.
- Ross, M. J., & Berger, R. S. (1996). Effects of stress inoculation training on athletes' postsurgical pain and rehabilitation after orthopedic injury. *Journal of Consulting and Clinical Psychology*, 64, 406–410. doi:10.1037/0022-006X.64.2.406.
- Schneider, W. J., & Nevid, J. S. (1993). Overcoming math anxiety: A comparison of stress inoculation training and systematic desensitization. *Journal of College Student Development*, 34, 283–288.
- Schulz, R., & Beach, S. R. (1999). Caregiving as a risk factor for mortality: The Caregiver Health Effects Study. *Journal of the American Medical Association*, 282, 2215–2219. doi:10.1001/jama.282.23.2215.
- Sears, S. F., & Conti, J. B. (2002). Current views on the quality of life and psychological functioning of implantable cardioverter defibrillator patients. *Heart (British Cardiac Society)*, 87, 488–493. doi:10.1136/heart.87.5.488.
- Sears, S. F., & Conti, J. B. (2003). Understanding implantable cardioverter defibrillator shocks and storms: Medical and psychosocial considerations for research and clinical care. *Clinical Cardiology*, 26, 107–111. doi:10.1002/clc.4960260303.
- Sears, S. F., Sowell, L. D., Kuhl, E. A., Kovacs, A. H., Serber, E. R., Handberg, E., et al. (2007). The ICD shock and stress management program: A randomized trial of psychosocial treatments to optimize quality of life in ICD patients. *Pacing and Clinical Electrophysiology*, 30, 858–864. doi:10.1111/j.1540-8159.2007.00773.x.
- Sears, S. F., Jr., Todaro, J. F., Saia-Lewis, T., Sotile, W., & Conti, J. B. (1999). Examining the psychosocial impact of implantable cardioverter defibrillators: A literature review. *Clinical Cardiology*, 22, 481–489. doi:10.1002/clc.4960220709.
- Shea, J. B. (2004). Quality of life issues in patients with implantable cardioverter defibrillators: Driving, occupation, and recreation. *AACN Clinical Issues*, 15, 478–489. doi:10.1097/00044067-200407000-00013.
- Sneed, N. V., & Finch, N. (1992). Experiences of patients and significant others with automatic implantable cardioverter defibrillators after discharge from the hospital. *Progress in Cardiovascular Nursing*, 7, 20–24.
- Sotile, W. M., & Sears, S. F. (1999). *You can make a difference: Brief psychosocial interventions for ICD patients and their families*. Minneapolis: Medtronic.
- Sowell, L. V., Sears, S. F., Walker, R. L., Kuhl, E. A., & Conti, J. B. (2007). Anxiety and marital adjustment in patients with implantable cardioverter defibrillator and their spouses. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 27, 46–49.
- Spielberger, C. D. (1977). *The State-Trait Anxiety Inventory (Self-Evaluation Questionnaire: Form Y)*. Palo Alto, CA: Consulting Psychologists Press.
- Suls, J., & Wan, C. K. (1989). Effects of sensory and procedural information on coping with stressful medical procedures and pain: A meta-analysis. *Journal of Consulting and Clinical Psychology*, 57, 372–379. doi:10.1037/0022-006X.57.3.372.
- Timmons, P. L., Oehlert, M. E., Sumerall, S. W., & Timmons, C. W. (1997). Stress inoculation training for maladaptive anger: Comparison of group counseling versus computer guidance. *Computers in Human Behavior*, 13, 51–64. doi:10.1016/S0747-5632(96)00029-5.
- Urizar, G. G., Sears, S. F., Handberg, E., & Conti, J. B. (2004). Psychosocial intervention for a geriatric patient to address fears related to implantable cardioverter defibrillator discharges. *Psychosomatics*, 45, 140–144. doi:10.1176/appi.psy.45.2.140.
- Vitale, M. B., & Funk, M. (1995). Quality of life in younger persons with an implantable cardioverter defibrillator. *Dimensions of Critical Care Nursing*, 14, 100–111. doi:10.1097/00003465-199503000-00009.