

Electrophysiology, Pacing, and Arrhythmia

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Examining the Psychosocial Impact of Implantable Cardioverter Defibrillators: A Literature Review

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Summary

Background: The implantable cardioverter defibrillator (ICD) has proven to be superior to medications in treating potentially life-threatening ventricular arrhythmias, resulting in reduced mortality rates. Despite the number of patients receiving this therapy, its psychosocial impact is not well understood.

Hypothesis: The purposes of this paper are (1) to review the available literature documenting the psychosocial impact of the ICD on patients, (2) to hypothesize possible mechanisms for this psychosocial impact, and (3) to suggest clinical risk profiles and indications for psychological consultation.

Methods: Electronic and library searches (e.g., MEDLINE, PsychLit) were used to gather studies examining the psychosocial impact of the ICD. Only studies investigating psychosocial outcomes (e.g., psychological distress, quality of life, social and role functioning), either prospectively or cross-sectionally, were admitted into the review. No literature reviews or secondary sources were included.

Results and Conclusions: Current research suggests that ICD-specific fears and symptoms of anxiety (e.g., excessive worry, physiological arousal) are the most common psychological symptoms experienced by ICD recipients, with approximately 13–38% of recipients experiencing diagnosable levels of anxiety. Depressive symptoms are reported at rates that are generally consistent with other cardiac populations. Although the incidence of psychological disorders appears to be similar to that found in general cardiac populations, specific ICD-related concerns such as fear of shock, fear of device malfunction, fear of death, and fear of embarrassment have been identified. Selected psychological theories such as classical conditioning, learned helplessness, and a cognitive appraisal model help to explain the occurrence of psychological symptoms post implantation. Psychosocial adjustment risk profiles indicate that young ICD recipients and those with high discharge rates may experience the most adjustment difficulties.

Key words: implantable cardioverter defibrillator, psychosocial, quality of life, adjustment, anxiety, depression, risk factors

Introduction

The implantable cardioverter defibrillator (ICD) is an effective and life-saving therapy for potentially lethal ventricular arrhythmias. Two recent trials underscored the efficacy of ICDs in reducing mortality. The AVID trial (Antiarrhythmics Versus Implantable Defibrillators) randomized patients with electrocardiographically documented ventricular fibrillation (VF) or ventricular tachycardia (VT) to an ICD or best medical therapy.¹ The AVID trial was terminated early due to increased mortality rates in the drug-treated group compared with the ICD-treated group. These results indicated that ICD therapy appears to be the treatment of choice to reduce mortality for potentially life-threatening ventricular arrhythmias.

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Similarly, MADIT (Multicenter Automatic Defibrillator Implantation Trial)² reported a 54% lower risk of dying in patients treated with an ICD compared with conventional medical treatment. Again, the trial was stopped earlier than planned due to a significantly superior survival rate in the ICD patient group. The MADIT required prophylactic implantation of the ICD in patients with inducible VT but no spontaneous event. The results of this trial led to the first FDA-approved prophylactic indication for ICD implantation.

With the ICD, we have achieved the goal of prolonging life. To achieve maximal health outcomes, however, perhaps we should be considering a broader perspective, including psychosocial and quality of life aspects of ICD implantation. First posited by Engel in 1977,³ the current definitions and conceptualizations of health care reflect a biopsychosocial emphasis on quality of life outcomes for medical procedures.⁴ Psychological and social factors often impinge on the broad health outcome of cardiac patients, with as many as 20–50% of cardiac patients experiencing significant psychological distress.⁵ Therefore, the impact of the ICD should be considered in the broader context of a serious medical illness, which is understood to affect not only the physical, but also the emotional, behavioral, and social functioning of the patient. In this paper we review both prospective and cross-sectional studies examining the complex psychosocial impact of ICD implantation, attempt to provide cohesive psychological explanations of our patients' behavior, and suggest some warning signs that indicate that a psychological intervention may be necessary.

Methods

Electronic and library searches (e.g., MEDLINE, PsychLit) were used to gather studies examining the psychosocial impact of the ICD. Only studies investigating psychosocial outcomes (e.g., psychological distress, quality of life, social and role functioning), either prospectively or cross-sectionally, were admitted into the review. No literature reviews or secondary sources were included.

Results

Prospective Investigations

Since its approval for patient use in 1985, researchers and clinicians have speculated about the possible negative psychological impacts of the ICD, including adjustment difficulties with anxiety and depression.⁶ To date, the ICD literature is limited to a few prospective investigations (Table I) examining the longitudinal impact of ICD implantation. In the earliest study, Pycha *et al.*⁷ reported that ICD recipients experienced fear and anxiety prior to and after implantation. Although no specific prevalence rates of negative emotions were provided by early researchers in this area, this work stimulated increased interest in the psychological impact of the ICD. Subsequent studies reported that ICD recipients experienced high

levels of anxiety that appear to be more severe in younger patients and those recipients experiencing a greater number of ICD discharges.^{8,9} In further support of this finding, a recent investigation of the psychosocial adjustment of 95 ICD recipients, conducted by Luderitz *et al.*¹⁰ reported that younger patients (<50 years of age) and patients who experienced more than five discharges developed significantly higher anxiety than other ICD recipients.

While research indicates that the period immediately following implantation is the most psychologically challenging for ICD recipients, there is some discrepancy as to how long that period of adjustment persists. Based on an evaluation of a small sample, Vlay *et al.*⁸ reported that ICD recipients adjusted to the presence of the device in approximately 3 months. More recently, however, some investigators have suggested that psychological distress associated with the ICD decreases within the first 6 months,¹⁰ while others have reported increases in psychological distress at 6 months post implantation with returns to preimplantation levels approximately 1 year following surgery.¹¹ Collectively, these data suggest that acceptance of the ICD and its mode of therapy is initially difficult for most recipients but that adjustment to the device generally occurs for most recipients within the first year following ICD implantation.

Cross-Sectional Investigations

Several investigators have examined the psychosocial adjustment of ICD recipients by assessing patients periodically in order to understand the impact of ICD implantation. Although cross-sectional methodologies are limited in that they ignore preimplantation functioning, they provide health care professionals with information regarding the prevalence of psychological distress in the ICD recipients. Empirical research examining the prevalence of negative emotions (Table II) have reported that 24 to 87.5% of ICD recipients experience increased symptoms of anxiety.^{12,13} These patients report a variety of worries and fears including fear of shock, fear of device malfunction, fear of embarrassment, and fear of death.^{14,15} Furthermore, investigators have also found that 12.7 to 38% of ICD recipients report clinically diagnostic levels of anxiety.^{9,14}

In addition to anxiety, studies have indicated that depressive symptomatology is common and is experienced by 24 to 33% of ICD recipients after implantation.^{12,16} Of greater concern, researchers have reported that 9.6 to 15% of all ICD recipients will experience clinically diagnostic levels of depression at some time following implantation.^{9,17}

In contrast, other research has supported the positive psychosocial benefits from ICD therapy. In one study, the majority of ICD recipients (75%) reported that they would recommend the ICD again for themselves and to others.¹² In another, the majority of ICD recipients (88%) indicated that the ICD was very important to their life and well-being.¹⁸ In general, recipients appear to believe that ICD implantation will provide them with a longer life expectancy and relatively good quality of life.^{12,19} Researchers have also reported favorable employment and return to work rates, with 62% of recipients return-

TABLE I Pre and post assessment of psychosocial adjustment in recipients of implantable cardioverter defibrillators (ICD)

First author (Reference No.)	No. of patients	Measures	Time of assessment		Summary of results
			Pre-implant	Post-implant	
Pycha <i>et al.</i> (7)	18	Psychiatric interviews, subset of patients completed Minnesota Multiphasic Personality Inventory (MMPI) or California Personality Inventory (CPI)	✓	Not specified	In this descriptive study, patients reported experiencing fear and anxiety prior to implantation. No specific percentages of psychological distress in this population were provided. Patients immediately discharged reported pain, discomfort, anxiety, and depression that appeared to decrease over time.
Vlay <i>et al.</i> (8)	8	State Trait Anxiety Inventory (STAI), Symptom Checklist 90 (SCL-90)	✓	Average of 30 months	Pre- to postimplantation assessments indicated that high levels of trait anxiety remained stable (pre = 82nd percentile, post = 76th percentile). Authors noted that most patients reported acceptance of the ICD at a mean of 3.6 months.
Luderitz <i>et al.</i> (10)	95	State Trait Anxiety Inventory (STAI), Complaint List, self-designed measure of patient ICD acceptance	✓	12 Months	Patients < 50 years of age had significant increases in state anxiety at follow-up compared with older patients. Patients experiencing > 5 discharges reported significantly higher levels of state anxiety postimplantation than those experiencing fewer discharges. At follow-up, adaptation to the device was high (93%). However, although there was a trend for improvement over time, some patients still reported awareness of the ICD (20%), fear of ICD discharge (26%), and physical discomfort related to the device at 12-month follow-up.
Vitale and Funk (26)	9	Nottingham Health Profile, Index of Subjective Concerns for People with ICD, Heart Rhythm	✓	Between 3 and 6 months	In this study of young ICD patients, follow-up patient reports revealed that sleep difficulties were most problematic (89%), followed by increased social isolation (44%), and limited physical activity (33%). Patients also noted fear of shock and concerns regarding death.
May <i>et al.</i> (11)	21	Sickness Impact Profile (SIP)	✓	6 and 12 Months	Significant decreases in quality of life and psychosocial functioning at 6-month follow-up, including transient problems in areas of emotional behavior, alertness, and social interaction. At 1-year follow-up, scores returned to preimplantation levels.

ing to work in one study.²⁰ Although these findings are preliminary, they do suggest that most patients look favorably upon ICD implantation and that ICD therapy often has a significant beneficial impact on overall quality of life.

Proposed Mechanisms of Implantable Cardioverter Defibrillator Therapy Impact on Psychosocial Functioning

Applicable psychological theories can provide working hypotheses regarding how ICD therapy can produce adverse

psychosocial impacts, as well as provide theoretical and empirical bases for assessment and treatment of affective and behavioral disorders. The first theory, *Classical Conditioning*,²¹ refers to the process discovered by the Russian physiologist Ivan Pavlov by which repeated presentations of an unconditioned stimulus with a neutral stimulus produced conditioned physiological or behavioral responses. The classical conditioning paradigm has been used to explain the learning of phobia and fear responses for aversive events.²² In relation to the ICD, recipients may experience similar conditioning when

TABLE II Postimplantation assessments of psychosocial adjustment in recipients of implantable cardioverter defibrillators (ICD)

First author (Reference No.)	No. of patients	Measures	Time of assessment post ICD implantation
Cooper <i>et al.</i> (18)	17	Retrospective interview	Not specified
Kalbfleisch <i>et al.</i> (20)	101	Employment rates	Not specified
Pycha <i>et al.</i> (34)	42	Beck Depression Inventory (BDI), Self-Assessment Anxiety Scale, self-designed ICD Psychosocial Inventory	Average of 18 months
Keren <i>et al.</i> (24)	18	BDI, STAI, measure of ICD discharges	Average of 18 months
Kuiper <i>et al.</i> (35)	20	Jalowiec Coping Scale, semi-structured interviews	Average of 8.75 months
Morris <i>et al.</i> (17)	20	Psychiatric diagnostic interview, mini mental status exam, social support questionnaire	Average of 7.5 months
Sneed (15)	15	Calculated frequency of concerns in ICD recipient focus groups	Between 1 month and 3 years
Dunbar <i>et al.</i> (13)	22	ICD activation event record	1, 3, and 6 Months
Arteaga (19)	104	Quality of Life Index, Sickness Impact Profile (SIP), Brief Symptom Index	Average of 10 months for ICD group Average of 27 months for medication group
Dougherty (25)	15	Profile of Mood States questionnaire (POMS), STAI, distancing scale (WCCL-R)	Immediately following hospital discharge, 6 and 12 months
Konstam <i>et al.</i> (12)	33	AICD questionnaire	Average of 1.6 years
Dubin <i>et al.</i> (27)	16	SF-36 Health Survey	Average of 3.3 years
Craney <i>et al.</i> (36)	80	Duke Activity Status Index (DASI), Psychosocial Adjustment to Illness Scale (PAIS), Ways of Coping Checklist (WCCL)	Average of 4.5 years
Hegel <i>et al.</i> (16)	38	STAI, Anxiety Sensitivity Index (ASI), BDI	Average of 4.2 years Two consecutive yearly assessments were reported
Herrmann <i>et al.</i> (9)	63	Hospital Anxiety and Depression Scale (HADS), Quality of Life Profile for the Chronically Ill	Average of 1.4 years
Burgess <i>et al.</i> (28)	25	SCL-90-R, ICD discharge history	Not specified
Schuster <i>et al.</i> (14)	39	STAI, Physical Abilities Self-Efficacy Questionnaire, ICD Psychosocial Index	Majority (61%) of ICD patients were assessed within the first 2 years
Heller <i>et al.</i> (29)	58	Self-designed biopsychosocial questionnaire	Average of 20 months

Summary of results

88 % considered ICD very important to their life and well-being; 83% receiving discharges expressed anticipatory fear of discharges; 63% observed a decrease in exercise related to fear of discharges.

At follow-up, 62% of sample had resumed employment. Those who returned to work were more educated and less likely to have a history of myocardial infarction. No significant differences between those who returned to work and those who did not on measures of age, sex, race, functional class, ejection fraction, extent of CAD, reason for ICD, or concomitant surgery.

ICD was perceived as a "life extender" and a "source of security" by 75% of the patients. Despite high acceptance of the device, anxiety and fear were present, and 42.5% reported concerns about sexual activity triggering ICD discharges, with many patients reporting abstinence. Additional concerns were the unpredictable nature of ICD discharges, pain, and the possibility of device malfunction. Furthermore, 94% indicated increased preoccupation with cardiac condition since implantation.

Study compared three groups: ICD without discharges, ICD with discharges, and medications alone. Results indicated no differences between groups on measures of anxiety or depression. Descriptive analyses indicated 42% reported being more anxious as a result of their ICD.

Coping measures indicated that ICD patients engaged in both emotion-focused and problem-focused coping. Optimistic coping was the most frequent emotion-focused strategy yielding better outcomes. Patients reported stressors and concerns related to exercise and recreation, uncertainty of discharge, and significant social support.

50% manifested psychological disorders: adj. disorder ($n = 6$), major depression ($n = 3$), panic disorder ($n = 1$). Trend that ICD discharges were related to psychiatric maladjustment and morbidity.

In this qualitative analysis, major physical concerns were related to being shocked, medications, and trouble sleeping. Major psychosocial concerns were fear of death, mental changes, lifestyle changes, and driving a car.

At 6-month follow-up assessment, 8 of 22 patients reported ICD discharges, with the most common symptom experienced being nervousness (87.5%). Mean shock intensity was a "5" on a 10 point scale. ICD discharges were associated with specific activities, such as exercise or walking.

Study compared three groups: medication ($n = 30$), ICD ($n = 45$), and reference group ($n = 29$). Psychological distress was associated with lower quality of life for all groups. No significant differences were observed on measures of quality of life and psychological distress between treated groups. Younger patients and patients with greater cardiac dysfunction reported reduced quality of life.

Study compared two groups: ICD without discharges ($n = 10$) and ICD with discharges ($n = 5$). Anxiety levels were significantly higher in patients who experienced ICD discharges at 12-month follow-up. Denial was common and stable among ICD recipients.

ICD patients reported increases in symptoms of anxiety (24%), depression (24%), and anger (18%); however, a majority of patients noted decreased levels of anxiety and depression following implantation.

This study examined the quality of life in young ICD patients (≤ 40 years old). Patient complaints were somewhat different from those reported by older patient populations; particular areas of concern for younger ICD patients included device appearance, physical activity limitations, sexual relations, social interactions, and driving restrictions.

This study examined the physical and psychosocial adaptation of patients who had had the ICD for at least 2 years. Younger recipients, male sex, and emotion-focused coping strategies were associated with poorer physical functioning ($R^2 = 25\%$). For psychosocial functioning, only emotion-focused coping was associated with worse psychosocial functioning ($R^2 = 12\%$).

33% of ICD patients reported significant anxiety and depression. Of these, 40–63% continued to experience psychosocial difficulties over the course of 1 year. Anxiety about ICD discharges was associated with increased incidence of depression. In addition, anxiety and depression were significantly related to less perceived control.

Significant levels of anxiety (12.7%) and depression (9.6%) were reported by ICD recipients. More than 50% of patients who had received > 10 ICD discharges reported elevated anxiety or depression and reduced quality of life. No significant differences on measures of quality of life and depression between ICD patients and CAD reference group. Of interest, ICD patients reported significantly lower levels of anxiety than noted in CAD reference group. 55% desired psychosocial support and 35% were interested in contacting other ICD patients to discuss ICD-related issues.

Overall psychosocial distress was related to number of ICD discharges classified as inappropriate by the patient ($r = 0.53$) and diminished physical activity ($r = 0.63$). After controlling for age, psychiatric history, and number of comorbid diagnoses, inappropriate ICD discharges and diminished physical activity significantly predicted overall psychosocial distress ($R^2 = 0.41$, $p < 0.01$). Appropriate discharges were related to diminished family responsibilities ($r = 0.48$), but not overall psychosocial distress. Authors concluded that patient beliefs about ICD discharges are an important influence, and noted that improvements in patient education would be helpful in reducing patient risk of psychological distress.

38% of ICD patients reported clinically significant anxiety. Most common concerns were trouble sleeping (56%), memory problems (64%), depression (54%), overprotective family members (50%), fear of shock (46%), fear of device malfunction (41%), fear of death (38%), sense of loss of control (31%), and sex difficulties (33%). Patients receiving discharges reported significantly higher levels of state anxiety than those who did not. Frequency of discharge was not significantly associated with increased symptoms of anxiety.

Experiencing one or more discharges was strongly associated with anxiety, diminished activities, depression, and health concerns. Experiencing five or more discharges was strongly associated with health concerns, depression, fatigue, and anxiety. Of the total sample; 20–58% of the patients reported symptoms of depression, 1/3 expressed fear of ICD shock, and 45% reported reduced sexual frequency. However, despite levels of patient-reported distress, positive attitudes toward the ICD were reported by 75% of the sample.

the event of painful discharge (unconditioned stimulus) yields fear and anxiety (unconditioned response). Neutral stimuli (e.g., environment, behavioral activities) repeatedly paired with multiple discharges of the ICD may become associated with stimuli that lead to the conditioned responses, such as fear, anxiety, and behavioral avoidance. The conditioning paradigm, therefore, explains the heightened fear and anxiety that ICD recipients present to their attending physicians.

A second theory, *Learned Helplessness*,²³ was hypothesized following the results of a series of laboratory experiments with dogs who were repeatedly subjected to aversive stimulation (i.e., electric shock) over which they had no control and were unable to avoid pain. These "no control" animals were compared with animals who were able to control an identical aversive condition. Animals who had no control over a series of learning trials became physically exhausted and generally ceased to struggle for survival, despite later being given the opportunity to escape the aversive stimulation. The researchers concluded that the animals had acquired a state of *learned helplessness* and hypothesized that similar situations with humans in uncontrollable stressful situations may explain the behavioral manifestations of depression. In ICD recipients, depressive symptoms may be produced from the perceived lack of control over the necessary defibrillation discharges, which lead to increased feelings of hopelessness and negative beliefs about their current and future health status.

A third theory, which we will term *Cognitive Appraisal of ICD Activity*, is hypothesized as an attempt by some ICD recipients to seek greater perceived cognitive control by interpreting the activity or inactivity of the ICD as an indicator of current cardiac functioning. Clinical experience with ICD patients suggest that they tend to "keep score" of the recent actions of the device, either inactivity or high activity, and infer health status information from this "score sheet." We suggest that self-monitoring of ICD activity can be misinterpreted, such that an ICD discharge is believed by the patient to be a "sickness scoreboard" that provides objective information about how they are doing. Psychological benefit is gained from an attempt to transform a virtually unpredictable, random arrhythmic event into an event that can be predicted. Obviously, the validity of these patient predictions can be erroneous and a source of personal distress, as well as a conflict between the health care provider and the patient.

The empirical literature to date has not specifically tested the validity of these theories or their applicability to ICD recipients. Classical conditioning and learned helplessness have been implicated in a recent set of case studies in which problematic anxiety and depressive symptoms emerged following high rates of ICD discharges and a self-reported perceived loss of control (Sears *et al.*, *PACE*, in press). Only larger, more representative studies will adequately test their utility for explaining distress in ICD patients. These psychological theories appear to be relevant in understanding the etiology of psychological distress associated with ICD implantation. Further research is needed to determine if ICD implantation contributes uniquely to the onset of such distress above that which is typically experienced by patients with serious cardiac illness.

Psychological Distress in Implantable Cardioverter Defibrillator Recipients versus General Cardiac Samples

The presented data beg the question, "Is the psychosocial functioning of ICD recipients significantly different from that of patients with other serious cardiac illnesses?" Some studies have found that the degree to which ICD recipients experience psychological distress or declines in quality of life is not significantly different or greater than that found in other cardiac patient populations.^{9,24} Furthermore, although one study has indicated that patients with arrhythmia do experience more distress and quality of life declines than a comparative cardiac patient population, the researchers also noted that the two arrhythmia patient groups (ICD therapy vs. antiarrhythmic medication therapy) were not significantly different from each other. Given the unique characteristics of ICD therapy, including the drama of unexpected discharges and invasive monitoring systems, it seems plausible that ICD patients would be more susceptible to symptoms of psychological distress. For example, Hegel *et al.*¹⁶ found that ICD patients who experienced more discharges (i.e., more than five discharges) were significantly more anxious and depressed than the group not experiencing discharges. Dougherty²⁵ reported that ICD recipients experiencing discharges were significantly more anxious at 1 year post implantation than those ICD recipients who had not experienced discharges. The current evidence suggests that ICD recipients may be comparable with cardiac patients in terms of psychological distress, but are susceptible to increased anxiety and depression as ICD discharges increase in frequency. This research underlines the possibility that there may be more precise risk factors for ICD-related adjustment difficulties than simply the ICD device.

Risk Factors for Psychosocial Adjustment Difficulties after Implantable Cardioverter Defibrillator Implantation

To predict which recipients are at risk for psychological maladjustment following implantation, it is necessary to derive hypotheses from both the current ICD and general cardiac disease adjustment literature. The current literature has yielded two groups of risk factors: (1) ICD-specific risk factors, and (2) general heart disease risk factors often common to ICD recipients.

Supported by both empirical research and clinical cases, the two most agreed upon ICD-specific risk factors for psychological maladjustment are younger age and high frequency of defibrillator discharges.^{9, 10, 26} We believe that the unexpected physical and social limitations, behavioral accommodations, and severity of illness experienced by younger ICD recipients may render these patients more vulnerable to psychological distress. Younger recipients, defined in some studies as < 50 years of age, also make greater demands on the ICD because of their more active life styles.^{10,27} Researchers have suggested that greater discharge rates were associated with psychological maladjustment and diminished quality of life. Specifically, in a number of recent investigations, ICD discharges were reported to be significantly associated with psychological dis-

tress and diminished physical activity.^{9,28,29} Therefore, we hypothesize that both high cumulative discharge rates over time, as well as multiple discharges in a short period of time, sometimes referred to as an "ICD storm," can produce adverse psychosocial outcomes. Conscious awareness or second-hand account (due to patient syncope) about the frightening nature of consecutive discharges is likely sufficient to produce a strong fear-anxiety response about future ICD discharges. These experiences also can produce misunderstandings about how ICD therapy works, requiring additional reassurance and education about the actions of the device following these experiences. Thus, attending health care providers should be cognizant of the adjustment challenges of both younger ICD patients and patients who experience high rates of discharges, as well as aware of misunderstandings related to ICD activity that may complicate patient adjustment to the ICD.

Additional risk factors that interfere with psychosocial adjustment in patients with heart disease have been discussed at length elsewhere.^{30,31} These risk factors include significant psychological history, poor social support, and increased disease severity and/or speed of disease onset. Significant history of psychological or psychiatric difficulties may render patients more likely to experience future mental health problems due to a range of factors including changes in life stressors, interpersonal relationships, or health status. The typical cardiac patient presents with some knowledge of cardiac symptoms (e.g., chest discomfort or dizziness), a frightened family member (e.g., spouse, child), and concern about survival. A patient's ability to cope with this threatening situation may depend on his ability to activate a positive social support network and utilize effective coping strategies in order to muster the emotional resources to engage successfully in the recovery process. When patients are not able to adjust to their illness sufficiently, problems may manifest themselves in exaggerated perceptions of physical limitations and limited role functioning.

Taken together, ICD patients may face both ICD-specific adjustment issues, as well as the more general cardiac illness concerns, over their treatment course. Attending clinicians can target specific symptoms or observations that indicate the pos-

sible benefit from consultation with a mental health professional. For example, significant anxiety and depressive symptoms would include but not be limited to patient report of excessive worry, feelings of panic, activity avoidance, depressed mood, anhedonia, or suicidal ideation. Table III provides specific indications for consultation that we have distilled from both the ICD literature and the general cardiac literature. The indications listed are not exhaustive in scope, but rather are the problems most likely to manifest themselves in the clinical cardiology setting.

Conclusions and Future Directions

Research examining the psychosocial impact of the ICD has provided healthcare professionals with important information regarding the psychological and behavioral outcomes of ICD implantation. Generalizability and interpretation of research findings, however, are limited by numerous methodological constraints apparent in conducting research with this population. Much of the research reviewed is hindered by small sample sizes, lack of sufficient theoretical bases, patient selection biases, nonstandardized assessment measures, lack of baseline assessment, and the lack of long-term follow-up data. Despite the methodological limitations of the current research, several tentative conclusions about the psychosocial impact of the ICD can be drawn to aid health care professionals in working with ICD patients.

1. *ICD patient quality of life and acceptance of the device are generally quite good.* Many ICD patients report quality of life comparable with that of their same-aged peers and with that of other patients in similar medical populations. Most ICD patients readily accept their condition and the device with few difficulties and would recommend it to others. Favorable return to work rates have been demonstrated, but some areas of postimplantation functioning, such as limitations on driving, remain a concern for patients.^{32,33}

TABLE III Postimplantation risk factors for psychosocial difficulties and indications for mental health professional consultation in recipients of implantable cardioverter defibrillators (ICD)

Psychosocial adjustment risk factor	Indication for psychological consultation
ICD-specific	
Young ICD recipient (age < 50)	Excessive or unnecessary avoidance of previously engaged-in activities
High rate of device discharges	Excessive fear associated with ICD discharge, death, device malfunction, or embarrassment. Increased feelings of depression and hopelessness
Poor knowledge of ICD device	Demonstration of unrealistic beliefs or expectations regarding the functioning of the device
General-cardiac	
Significant history of psychological problems	Poor medical compliance, evidence of family conflict, and significant symptoms of depression and/or anxiety
Poor social support	Frequent contact with medical provider, limited socialization, and significant symptoms of anxiety and/or depression
Increased medical severity	Prominent concerns of death, denial, and significant symptoms of anxiety and/or depression

2. *Symptoms of anxiety appear to be the most significant and most common psychological change for patients post ICD implantation.* Research suggests that 24 to 87% of ICD recipients experience increased symptoms of anxiety after receiving an ICD. Diagnostic rates for clinically significant anxiety disorders, however, range from approximately 13–38% and are similar to the rates reported for other cardiac populations. Generalized anxiety disorder is considered the most commonly used diagnostic classification. Psychological theory suggests that ICD patients may present with a high degree of negative, catastrophic thoughts associated with ICD discharges. Patient education about the meaning, or lack thereof, of ICD discharges may help reduce symptoms of anxiety and clarify their experience of receiving discharges.
3. *ICD-related fears are universal and may be the most pervasive psychosocial adjustment challenge that ICD recipients face.* Psychological theory suggests that symptoms of fear and anxiety may be a result of a classical conditioning paradigm in which certain stimuli or behaviors are coincidentally paired with an ICD shock and are thereby avoided in the future. Due to fear of present and/or future discharges, fearful patients increasingly limit their range of activities and inadvertently diminish their quality of life.
4. *Depressive symptoms also are common in ICD patients.* Reported prevalence rates range from 24–33% and do not appear to be significantly different from rates of depression for general cardiac populations. Psychological theory suggests that a state of “learned helplessness” may result from a perceived lack of control over one’s medical condition, secondary to ICD discharges. Depression in the ICD patient may manifest itself in both obvious and subtle ways, and a mental health consultation should be considered if depressive symptoms are suspected.
5. *Certain characteristics can be used to identify ICD recipients at special risk for the development of psychosocial adjustment problems.* Young ICD patients and those who experience high rates of discharges, either cumulative or in an “ICD storm,” require specific psychosocial attention to assist in their adjustment to their condition and to the functioning of the device. Additional coping resources, such as ICD patient education, social support, and for some patients, a referral to a mental health specialist, may facilitate overall psychosocial adjustment. If a mental health consultation is warranted, patients should be given sufficient rationale for the referral. The ICD recipients should be told that anxiety and depression are common and expected side effects for many medical patients including ICD patients, and for that reason, attending to the psychosocial aspects of adjustment is part of the overall treatment strategy. This rationale of a “stress management”-based approach is broadly acceptable to most patients.³¹

The establishment of the ICD as a life-saving device represents a marvelous medical achievement. This success allows for closer examination and refinement of the psychosocial impact of the device to facilitate the design of clinical interventions that will assist patients in achieving optimal quality of life outcomes after implantation. The typical ICD recipient must overcome both the stress of experiencing life-threatening arrhythmias and the challenges of adjusting to the ICD to return to full pre-morbid functioning. Psychosocial research can lead to an improved understanding about the stressors ICD patients face and provide a means for identifying patients who may be at risk for psychological complications. Psychosocial interventions also can be developed to augment the medical management of ICD recipients and optimize the quality of life outcomes for all ICD recipients.

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