

Psychosocial Issues of Patients With Implantable Cardioverter Defibrillators

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PSYCHOSOCIAL ISSUES OF PATIENTS WITH IMPLANTABLE CARDIOVERTER DEFIBRILLATORS

By Sandra B. Dunbar, RN, DSN. From Nell Hodgson Woodruff School of Nursing, Emory University, Atlanta, Ga.

Use of implantable cardioverter defibrillators has become standard therapy for patients at high risk for life-threatening ventricular arrhythmias. Although acceptance of the device is generally high among patients and their families, quality of life and psychosocial issues associated with use of the defibrillators deserve greater attention to improve outcomes. Psychosocial issues, their ramifications, and theory- and evidence-based approaches to improving outcomes are described. (American Journal of Critical Care. 2005;14:294-303)

Use of implantable cardioverter defibrillators (ICDs) has become the standard of care for patients at high risk for life-threatening ventricular arrhythmias. Compared with other available treatments, in clinical trials, ICDs have had a consistent, superior effect on mortality. In high-risk patients with cardiac disease, use of the devices decreased mortality risk 30% to 54%¹ by decreasing the incidence of sudden cardiac death.² Although many of the early studies of the benefits of ICDs included patients with ischemic heart disease and low left ventricular ejection fraction, clinical studies³⁻⁵ are revealing increased indications for the ICDs in patients with heart failure, nonischemic cardiomyopathy, and familial cardiac problems.

Cardioverter defibrillators reduce mortality by 30% to 54%.

ICDs are a welcome addition for the prevention of sudden cardiac arrest. Although risk for sudden cardiac arrest has declined during the past 50 years,⁶

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more than 3 million persons die of it annually in the developed parts of the world. In the United States, the estimated number of cases of sudden cardiac arrest is 300 000 to 450 000 annually,^{7(p13)} and the percentage of deaths considered sudden has increased from 38% in 1989 to 47% in 1999.⁸ Sudden cardiac arrest accounts for more deaths each year than does the total number of deaths due to AIDS, lung and breast cancer, and stroke combined. Sudden cardiac arrest is the first indication of heart disease in 50% of men and 63% of women who die suddenly of coronary heart disease.^{7(p13)} Of particular concern is the recent report⁹ of a 21% increase between 1989 and 1998 in sudden cardiac arrest among women 35 to 44 years old.

Sudden cardiac arrests account for more deaths each year than the total number of deaths from AIDS, lung and breast cancer, and stroke combined.

Survivors of sudden cardiac arrest experience anxiety, fear, and symptoms of depression. Thus, it is logical to explore the psychological outcomes of living with an ICD for prevention of sudden cardiac arrest or life-threatening ventricular arrhythmia. Family members of both survivors and nonsurvivors of sudden cardiac arrest also experience anxiety and

fear, and these responses can be profound. However, the following material is limited to patients' psychological responses to having an ICD.

Sudden cardiac arrest is the first manifestation of cardiac disease in 63% of women who die suddenly from coronary heart disease.^{7(p13)}

With willing and insightful colleagues, I have had the opportunity during the past 15 years to study the psychological responses of patients with ICDs. I am so very honored by the American Association of Critical-Care Nurses for their recognition of our work through the 2005 Distinguished Research Lecturer Award and appreciate the support of Philips Medical Systems (Andover, Mass), sponsor of this award for 4 consecutive years. I am also indebted to the American Heart Association, the National Institutes of Health, the National Institute of Nursing Research, Emory University, Medtronic (Minneapolis, Minn), and Guidant (Indianapolis, Ind) for their support of our studies over the years.

The first ICD implant in a human took place in the early 1980s¹⁰; thus, we are now celebrating 25 years of experience and success with this treatment. ICDs have evolved from large, nonprogrammable devices that required thoracotomy for insertion to sophisticated, miniaturized multiprogrammable devices that are implanted by using less invasive procedures. Current devices incorporate tiered therapy of bradycardia pacing, antitachycardia pacing, low-energy shocks, and high-energy defibrillation. Dual-chamber pacing and combined ICD-biventricular pacing to enhance cardiac performance in patients with heart failure are available.⁸ As the technology for ICDs expands and new populations of eligible patients are defined, an understanding of the impact of living with an ICD is required to improve outcomes of patients and their families beyond the mortality benefit.

What Is the Evidence on Psychosocial Responses to ICDs?

After implantation of an ICD, the most common psychological problems are anxiety, depression, anger, and fear.¹¹⁻¹⁵ Patients fear that they will be shocked by the device, that the device will not work, that they may die, and that physical activity will trigger the device; other concerns center on body image, changes in the patient's role and cognition, driving restrictions, and sexual activity.¹⁶⁻²⁰ In a comprehensive review, Sears et

al²¹ found that 24% to 87% of patients with ICDs experienced some degree of anxiety, 13% to 38% had clinically diagnostic anxiety, and 9% to 15% had clinically relevant depression. Despite these responses, acceptance of ICDs tends to be high; only a few patients express extended, intense negativity about the device.

Anxiety, depression, anger, and fear are the most common psychosocial responses after implantation of an implantable cardioverter defibrillator.

Psychological distress in the form of mood disturbance is highest at the time of hospitalization for implantation, which usually corresponds with immediate distress after resuscitation or the initial diagnosis of being at high risk for life-threatening ventricular arrhythmia.^{22,23} For most patients with ICDs, the level of mood disturbance declines over time, but for some, psychological distress in the form of anxiety, symptoms of depression, and hypervigilance about the device persists. Determining the factors associated with psychological distress is important so that (1) patients at risk can be identified, and (2) if modifiable, the factors can be targeted through effective and preventive interventions.

Factors associated with increased psychological distress and reduced functioning have included age, being female, low social support, multiple comorbid conditions, ineffective or passive coping behaviors, negative interpretations (illness appraisal) of the meaning of ventricular arrhythmia and its treatment with an ICD, increased numbers of symptoms and associated distress, reduced physical functioning, and multiple ICD activations and storms.^{15,23-28} Younger recipients of ICDs have wider variation in adjustment and appear to have a higher level of anxiety than do older recipients at the time of insertion of the devices, but levels of anxiety decrease over time in the younger patients and tend to increase in the older patients.^{25,29} For women, the ICD takes on special meaning related to roles and to concerns about childbearing and routine mammograms, and compared with men, women may have increased pain during recovery because of the sensitivity of breast tissue and women's greater use of arms for activities of daily living.^{27,28,30}

Personality types or traits that may predispose patients with ICDs to psychological distress have also been explored. In one study,³¹ having a type D person-

ality, characterized by 2 stable traits of negative affectivity and social inhibition, was an independent determinant of anxiety and symptoms of depression in both ICD patients and the patients' partners. In another study,³² higher levels of trait optimism, or the tendency to view situations as likely to turn out positive, were associated with better mental health and social functioning scores several months after ICD implantation. Trait optimism was also an important covariate in better psychological outcomes in patients who received ICD shocks.³³ Although these factors cannot influence who receives an ICD, they may help differentiate approaches to providing information and can be used to recognize patients who should receive greater psychological attention during follow-up care. Different strategies in the way information is provided and tailored information based on age, sex, and disposition may be required.

Kuiper and Nyamathi³⁴ studied stressors and coping strategies of patients 4 to 14 months after insertion of an ICD. They found that patients used both problem- and emotion-focused coping and that optimistic strategies were effective. In a longitudinal study of 15 survivors of sudden cardiac arrest who had ICDs, Dougherty¹³ found that denial as a coping strategy remained high during the first year. In other studies,^{23,35} patients who used avoidant or emotion-focused coping tended to have greater emotional distress than did patients who used problem-focused coping, and patients who used more problem-focused coping behaviors had better emotional and functional outcomes. Research on coping with ICDs and other cardiac problems suggests that emotion-focused coping may not be effective in the context of intense physical symptoms and/or novel stressors and may lead to more negative emotional outcomes than problem-focused coping does^{36,37}; thus, interventions to promote problem-focused coping are warranted.

Pain, awareness of the ICD, and sleep disturbances are also stressors for patients who have ICDs.^{23,38-40} In the early stage of recovery, the incision for insertion in the upper part of the chest causes pain or physical discomfort, especially when patients move their arms or sleep on the affected side. Sleep disturbances may also be attributed to fear of shocks during sleep, dreams, nightmares, and anxiety that interferes with the onset of sleep.^{24,39} Patients who have both an ICD and heart failure may have disrupted sleep because of orthopnea, sleep apnea, and changes in circadian rhythms.⁴¹ Interactions of age, psychosocial factors, reduced activity levels, and medications can also lead to sleep disturbances. The impact of sleep deprivation is reduced quality of life, mood changes, alterations in

circadian rhythms, and compensatory changes in the length of subsequent sleep stages.⁴¹ For patients with dysrhythmia, changes in sleep stages, such as increased rebound rapid-eye-movement (REM) states, increase the risk for dysrhythmia due to the increased autonomic activity during REM sleep.⁴¹ Identification of changes in symptoms in terms of frequency and patterns over time in patients with ICDs and effective interventions will contribute to improvements in patients' psychological outcomes.

Are Shocks Important to Patients and Patients' Families?

The purpose of an ICD is to monitor cardiac rhythms and deliver therapy in the form of antitachycardia pacing, cardioversion, or defibrillation. Cardioversion and defibrillation involve delivery of an unexpected jolt that can cause a variety of sensations. Patients' descriptions of the jolt include "a tingle," "touching an electric fence," "being kicked in the chest," and "having lightening-like intensity."^{16,42,43} The most distressing aspects of shocks are lack of warning, multiple shocks, and progressively increased sensations associated with tiered therapy.¹⁶ In one study,⁴⁴ both patients who received shocks during 9 months of follow-up after implantation of an ICD and their family members had higher levels of mood disturbance than did patients who did not receive shocks and the latter's family members. In a study⁴⁵ of the quality of life after implantation of an ICD, patients who received a shock within 1 year of implantation had significantly higher scores for mood disturbance and distress due to increased symptoms than did patients who did not receive a shock. These results^{44,45} support the findings of Schron et al,⁴⁶ who reported reduced quality of life in patients who received shocks; patients who received shocks had decreased physical and mental functioning scores and increased number of concerns compared with patients who did not receive shocks. Several investigators^{47,48} suggested that increases in the number of times the device fires (≥ 5 per year) result in lowered levels of quality of life, whereas others⁴⁴⁻⁴⁶ reported lower scores in patients who had at least 1 shock or more shocks. Regardless of the number, shocks are important to patients and patients' families. Of interest, none of the research on the effects of shocks included consideration of what preparation the patients received before implantation of an ICD. Although many clinicians subscribe to the approach of not wanting to "scare" patients, on the basis of these findings, my colleagues and I suggest that discussion of shocks should be at the forefront of preparing patients and patients' families for living with an ICD.

Discussions of the shock should be at the forefront of discharge education for patients with an implantable cardioverter defibrillator.

Why Do Shocks Negatively Affect Psychological States?

In addition to causing patients stress by making them feel a loss of control, shocks are another reminder that a close call with a life-threatening arrhythmia has occurred. My colleagues and I found that patients who received shocks had greater threat appraisals and greater use of fatalistic and avoidance coping than did patients who did not receive shocks.⁴⁹ These types of appraisals and coping responses lead to increases in mood disturbance, anxiety, and depression.

Predicting which patients will receive appropriate shocks by their ICDs is inexact, although more severe indications of heart failure (as indicated by New York Heart Association class) and ejection fractions less than 0.20 are risk factors.⁵⁰ In spite of the exquisite technology of ICDs and the accuracy and effectiveness of diagnosing and treating ventricular arrhythmias, a proportion of patients, ranging from 8% to 10%, experience inappropriate interventions.⁵¹ Inappropriate shocks are frustrating for patients and clinicians but should be acknowledged as factors that may contribute to psychological distress. Known predictors of inappropriate shocks are history of atrial tachyarrhythmia and recurrent ventricular tachycardia that has triggered appropriate therapy.⁵¹ Hybrid therapy, which consists of combining devices, drugs, and radiofrequency catheter ablation as required, has become the standard of care for reducing the number of both appropriate and inappropriate shocks, and both patients and clinicians will welcome continued advances in these areas.

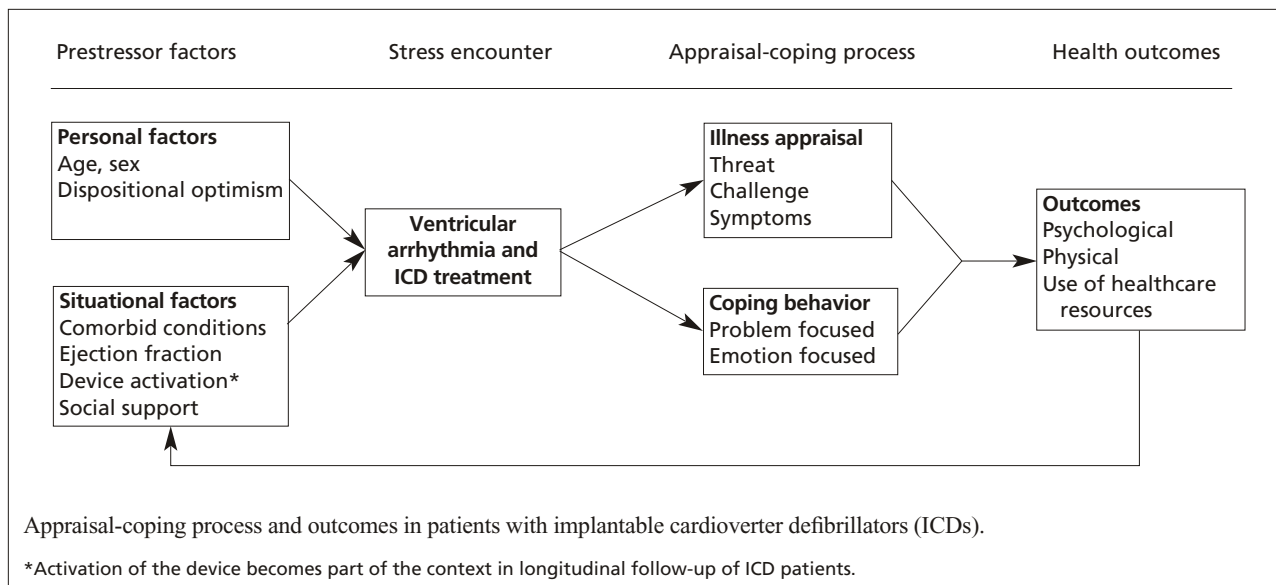
Defibrillator or electrical storms are another contributing factor to psychological distress. Defined as the clustering of multiple episodes of recurrent ventricular tachycardia, fibrillation, and ICD shocks during a 24-hour period, defibrillator storms occur in approximately 10% to 20% of patients who have ICDs and are linked to poor outcomes and death.^{52,53} Other triggers of defibrillator storm are supraventricular tachycardia, electrolyte imbalance, acute myocardial ischemia, lead fracture, and intense electromagnetic interference.⁵⁴ The peak time of occurrence is around 9.2 months after implantation.⁵³ The number of shocks delivered in a storm ranges from 3 to 10 (and may be as high as >100), with a mean of 17 (SD 17) in a 24-

hour period.⁵⁴ In-depth interviews with 6 patients who had experienced ICD storms revealed varied responses in perceived pain, depending on the number of shocks received, and a strong fear of doing something that would retrigger shocks or a storm.⁵⁵ Helpful coping strategies were returning to work and usual activities, relying on the support of family and friends, and relying on faith in God. Although patients' family members were not interviewed, patients reported that their family members wanted to help but did not know what to do during the storm episodes.⁵⁵

These findings provide directions for counseling and educating patients who have experienced storms, including assessment of patients' and family members' understanding of the ICD and what triggers shocks, discussions of the cause of storms and preventable actions if indicated, reassurance about reprogramming or modifications that were done, encouragement of patients to return to usual activities and avoid self-restriction of physical and social activity, and separate discussions with patients' family members.⁵⁵ For patients who have intense anxiety and/or manifest symptoms of posttraumatic stress disorder, consultation with a psychologist may be warranted.⁵⁶ Preparation of all ICD patients for possible adverse events and/or multiple shocks has been suggested⁵⁷; however, this is controversial and the most effective way to present this information has not been studied.

Defibrillator storm, a clustering of multiple episodes of shocks by the implanted cardioverter defibrillator, occurs in 10% to 20% of patients.^{52,53}

Psychological distress in ICD patients is important because psychological functioning is an important component of quality of life. Additionally, higher levels of psychological distress may affect health by increasing risk for cardiac arrhythmia. In one study,⁵⁸ total mood disturbance was an independent predictor of arrhythmia events monitored by the ICD even when the influence of heart failure, antiarrhythmic medications, and history of coronary artery disease were controlled for. Emotional states such as anger, mental stress, and anxiety can precipitate arrhythmia in ICD patients, alter the ventricular tachycardia cycle length, and make ventricular tachycardia more difficult to terminate.^{59,60} Depression also contributes to adverse outcomes and reduced quality of life in patients with coronary artery disease and after acute myocardial



infarction.^{61,62} Musselman et al⁶³ hypothesize that depression and anxiety contribute to adverse events through mechanisms of sympathoadrenal hyperactivity and increased levels of catecholamines, diminished heart rate variability (HRV), ventricular instability and myocardial ischemia in reaction to mental stress, and alterations in platelet receptors and/or reactivity and secretion of immune factors.⁶³ These mechanisms are also arrhythmogenic mechanisms.

In a substudy⁶⁴ of our current work with ICD patients, my colleagues and I obtained measures of HRV at the time of implantation and 3 and 6 months later to elucidate the relationships among arrhythmia events, autonomic balance, and psychological states. We found no relationship between the HRV measures and either depression or anxiety scores obtained at the same time points. In fact, the low HRV in both the linear and nonlinear domains in these ICD patients did not change within 6 months. This lack of variance with HRV measures in our ICD patients reflects the severity of their cardiac illness and poor neurocardiac modulation. More sensitive measures may be required to study these interrelationships.

How Can We Better Understand These Problems?

Our research on the adaptation of patients and their families to an ICD is based on a conceptual framework synthesized from the transactional stress model,^{65,66} psychophysiological perspectives of stress,^{67,68} and adaptation to chronic illness (see Figure). We use the framework as a guide for the proposed variables and measures in our studies (Table 1) and in the psychoeducational intervention currently under study. In the

framework, individuals are viewed as bringing certain characteristics (prestessor factors) to the context of the stressful encounter, which is then evaluated for meaning, degree of threat, and coping resources. The stressful encounter is living with the life-threatening ventricular arrhythmia and treatment with an ICD.

Prestessor factors include personal and situational factors such as sociodemographics, cardiac status, and comorbid conditions, many of which cannot be modified. An important antecedent in patients with cardiac disease is dispositional optimism or the expectancy that good rather than bad outcomes will generally occur.⁶⁹ Over time, recurrent activations of an ICD also become part of the prestessor context, influencing the ongoing adaptation to living with the ICD. The dynamic interaction of cognitive appraisal and coping helps patients deal with the demands of the stressor. Cognitive appraisal refers to the interpretation of the illness situation, the seriousness and controllability of the situation, and the adequacy of coping resources.⁶⁶ In chronically ill patients, appraisal of illness as harm or threat can explain 46% of the variance in poor adjustment to illness.⁷⁵ Symptoms are evaluated and interpreted in the larger context of the appraisal of the illness, and Wiklund et al⁸¹ contend that symptoms influence appraisals by reminding patients of cardiac impairment and by perpetuating concerns about health.

Coping, defined as the constantly changing cognitive and behavioral efforts to manage stress,⁶⁵ serves 2 primary purposes: alleviation of emotional discomfort and increased ability to deal with the problem. Problem-focused coping (eg, seeking information and assistance, resolving problems) and emotion-focused coping (eg,

Table 1 Concepts and measures used in studies of patients with implantable cardioverter defibrillators (ICDs)

Concept or variable	Measure or instrument
<i>Prestressor factors</i>	
Demographics	Age, sex, education, marital status
Comorbid conditions	Charlson Comorbidity Index
Cardiac function	Left ventricular ejection fraction, New York Heart Association classification of heart disease
Medications	Medications and changes in medication
Optimism	Life Orientation Tool ⁶⁹
Social support	Enriched Social Support Inventory ⁷⁰
<i>Appraisal and coping</i>	
Patients' concerns	Patient Concerns Assessment ⁷¹ Interviews
<i>Symptoms</i>	
Pain	Brief Pain Inventory ⁷²
Sleep disturbances	Pittsburgh Sleep Quality Inventory ⁷³ Epworth Sleepiness Scale ⁷⁴
Cognitive appraisal	Threat and Challenge subscales from the Meaning in Illness Questionnaire ⁷⁵
Coping	Jalowiec Coping Scale ⁷⁶
<i>Outcomes</i>	
Data on ICD activity	ICD activation form ¹⁶
Number of episodes of pacing, cardioversion, defibrillation, and inappropriate therapy	Computer interrogation of ICD
<i>Psychological outcomes</i>	
Anxiety	Speilberger State Anxiety Inventory ⁷⁷
Depression	Beck Depression Inventory-II ⁷⁸
Total mood disturbance	Profile of Mood States ⁷⁹
<i>Physical outcomes</i>	
Functional status	Duke Activity Status Inventory ⁸⁰
Use of healthcare resources	Health Resource Use Questionnaire

withdrawing, crying, accepting the inevitable) are used interchangeably by patients with varied effectiveness depending on the context and individual appraisal of the situation.⁸² Cardiac patients with greater use of problem-focused coping have better psychological and social adjustment³⁶ and fewer symptoms of depression⁸³ than do patients with less use of this type of coping. Because recovery after implantation of an ICD and adaptation to the device require learning new information and behaviors for specific self-care, problem-focused coping is more desirable than emotional-focused coping. Patients can be taught active coping behaviors to reduce feelings of helplessness and depression, resulting in improvements in health outcomes.^{84,85}

Social support, an important coping resource that changes demands and enables coping,⁸⁶ has been linked

to decreased mortality in patients with cardiac disease,^{87,88} and emotional support may be beneficial because of hypothesized stress-buffering effects.^{89,90} Effective social support can be provided by persons who have experienced similar stressful circumstances.⁹¹

Ineffective coping with novel stressors appraised as being uncertain or unpredictable results in negative emotions such as helplessness, anxiety, and depression^{67,92} and in neuroendocrine arousal.⁶⁷ Persistent, negative emotions are associated with increased serum levels of catecholamines (resulting in vasoconstriction and increased heart rate and automaticity) and corticosteroid stimulation (resulting in decreased healing, negative affect, and potentiated effects of catecholamines), which further compromise patients at high risk for ventricular arrhythmia.^{68,93} Unresolved symptoms such as pain and sleep disturbance amplify the emotional and neuroendocrine responses.^{94,95} Effective coping reduces the impact of the stressor and leads to adaptive outcomes of improved psychosocial and physical function, quality of life, and health status.⁶⁵⁻⁶⁸ The theoretical framework explains why interventions that enable less threatening interpretations of ICD activations and ventricular arrhythmia and enhance effective coping may improve psychological and physical outcomes, and ultimately reduce use of healthcare resources.

Intervention Studies

Studies on psychoeducational intervention in ICD patients are few but have included tests of support groups, cognitive behavioral therapy (CBT), telephone counseling, and a combination of symptom management and CBT. In 2 studies,^{96,97} differences in psychological measures between patients who did and did not attend support groups were not significant, although anecdotal notes suggested improved perceptions of ability to cope in patients who attended support groups. In other research,^{98,99} the results suggested that support groups may be beneficial for ICD patients and the patients' families, and patients reported benefits of discussing how a shock feels with other ICD patients. In another study,¹⁰⁰ use of an Internet discussion board encouraged information sharing. Although educational approaches have been recommended,^{101,102} limited time and access to patients in acute care for teaching the large amounts of information related to life with an ICD are problematic, and few interventions to reinforce or facilitate patients' retention of knowledge have been reported.

Sneed et al¹⁰³ tested a psychosocial intervention with 34 ICD patients and the patients' caregivers. The intervention involved inpatient counseling by a psychiatrist, telephone contacts weekly in the first month

after implantation of the device and biweekly in the second month, and an ICD support group. Scores on the Profile of Mood States and the Psychosocial Adjustment to Illness Scale 4 months after implantation did not differ between the treatment group and the control group¹⁰³; however, the conclusion that adjustment occurred regardless of the intervention should be viewed in light of the limited participation in the support groups, the small sample size, and the possible diffusion of intervention effects. In 2 case reports,^{104,105} use of individualized CBT resulted in beneficial outcomes of reduced levels of depression, anxiety, and panic. Additionally, in a study¹⁰⁶ in which CBT was compared with usual care, patients who had CBT had lower levels of depressive symptoms, anxiety, and overall distress and fewer reported sexual problems after 9 months.

Most recently, Dougherty et al¹⁰⁷ compared usual care with a telephone-counseling intervention delivered by expert nurses in 168 survivors of sudden cardiac arrest. The scripted sessions for the 8-week intervention included education and counseling based on social cognitive theory. Compared with patients who received usual care, patients in the intervention group had reduced concerns about ICD-related physical symptoms at 1 month and less anxiety and increased knowledge by 3 months. However the intervention had no effect on depression or use of healthcare resources. An interesting finding was that the patients in the intervention group telephoned their provider more often than did the patients in the other group because of problems identified by the nurses, suggesting the intervention may have been beneficial in early recognition and prevention of adverse outcomes. This intervention has great potential for translation into clinical practice and follow-up care; 96% of the participants rated the intervention as very helpful in their recovery.

In our current work with ICD patients, my colleagues and I are using a randomized design to compare usual care with a psychoeducational intervention that combines symptom management (for pain, sleep disturbance, and shocks), information, and CBT. To date, 240 first-time recipients of ICDs have been enrolled in the study and have received either the intervention or usual care during the early period of recovery after implantation of an ICD. Collection of follow-up data through the first 3 months has been completed. The study outcomes are anxiety, symptoms of depression, pain and sleep disturbances, physical function, arrhythmia events, and use of healthcare resources as measured by the corresponding instruments noted in Table 1. Appraisal and coping interventions were designed by using these components of the model (see

Figure) to address patients' specific (symptoms) and global (threat) appraisals associated with having an ICD, improve coping with chronic life-threatening cardiac dysrhythmia and ICD implantation, and expand coping resources through increased access to information and support. We hypothesize that the intervention will provide patients with accurate, realistic, and specific information on which to base cognitive appraisal of their symptoms and illness, thereby enhancing normalcy and reducing feelings of threat and fear; expand patients' repertoires of active coping strategies in relation to demands encountered in early and later recovery after implantation of an ICD; and foster a greater sense of control and mastery, thereby increasing the likelihood that patients will have positive psychological and functional outcomes. If these outcomes are accompanied by reductions in the psychophysiological stress response, additional benefits may accrue in the form of decreased arrhythmia and ICD activity.

Although the outcome data have not been examined by intervention group, preliminary analyses^{108,109} of data collected at baseline and 1 month and 3 months after receiving the implant indicate some differences. Women reported greater symptoms of pain and sleep disturbance than did men,¹⁰⁸ and patients who received cardiac resynchronization therapy combined with an ICD had different pain and psychological responses than did patients who received an ICD without such therapy.¹⁰⁹ Additionally, patients who received ICD shocks or experienced defibrillator storms by 3 to 6 months after implantation had higher scores for symptoms of depression than did patients who did not receive shocks or experience storms ($P = .02$), and patients with more severe heart disease (as indicated by New York Heart Association classification) had higher scores for anxiety than did patients with less severe disease.¹¹⁰ Another interesting finding on sleep disturbances was that depression was predictive of nocturnal sleep disturbances in ICD patients at 3 months; functional status, depression, presence of comorbid conditions, and history of snoring were predictive of daytime sleepiness at 3 months.¹¹¹ We anticipate that the results of this large project will provide information on (1) which interventions reduce distress related to symptoms and enhance psychological and physical outcomes for ICD patients and (2) which factors are related to psychological responses in ICD patients.

Although studies are needed to determine the best methods for intervention in ICD patients and their families, the theoretical formulations and the descriptive and experimental data published to date suggest approaches that may be effective (Table 2). These

Table 2 Theory- and evidence-based approaches for improving patients' psychological responses to implantable cardioverter defibrillators (ICDs)

Provide patients and patients' families focused education on care of the implantation incision and the ICD, projected progress of recovery, shock management, electromagnetic interference, driving, and physical and sexual activity
Provide concrete objective information about shocks: pain and sensations, timing, and responses
Educate patients on management of pain, sleep difficulties, and fatigue
Provide women and younger patients tailored additional education on adaptation to the ICD
Provide anticipatory guidance for expected psychological responses over time
Give clear, honest answers to questions and concerns of patients and patients' families
Correct misperceptions about causal attributions of shocks and storms; inform patients about modifications in ICD settings and leads when modifications are made
Promote adherence to use of medications and attention to dietary levels of electrolytes to prevent arrhythmia and shocks
Assess patients for anxiety, symptoms of depression, fear, and hypervigilance during follow-up visits; provide therapeutic counseling and reinforce education as needed
Assess patients' psychological responses after they receive a shock
Refer patients to a mental health clinical nurse specialist or a psychologist if indicated
Facilitate opportunities for ICD patients to talk with each other

interventions include education and information, use of therapeutic communication techniques, follow-up assessment and interventions, and psychological approaches. Although patients and their families cannot be instructed on each and every rare and possible event they may encounter with ICDs, shocks, and complications, they can be supported through anticipatory guidance, focused problem solving, and strong relationships with their healthcare providers.

Preliminary data show female patients with an implantable cardioverter defibrillator report greater pain and sleep disturbance than do men. Patients experiencing storm have more depressive symptoms.

What Does the Future Hold?

As the number of persons eligible for ICDs continues to grow, psychological issues must be incorpo-

rated into clinical care and the study of how patients respond to implantable devices. As ICD patients live longer, issues associated with end-of-life care and turning off defibrillators will need to be more effectively addressed in terms of decisions by healthcare providers and patients' preparation and preferences.¹¹² New technological innovations in preventing and treating arrhythmia most likely will result in miniaturized devices, enhanced remote monitoring of heart rhythms and therapy, leadless systems, and use of metabolic sensors with subsequent intracardiac administration of pharmacological agents, pacing, or modulation of autonomic activity.¹¹³ As these envisioned advances evolve, cardiovascular nurses need to be at the forefront, examining the responses of patients' and patients' families and testing cost-effective and efficacious interventions to improve outcomes, especially psychosocial states. I offer a special thank-you to all the brilliant engineers, scientists, electrophysiologists, cardiologists, psychologists, and nurses who have helped patients with ICDs during the past 25 years.

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Commentary by Mary Jo Grap (see shaded boxes).

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