# Chapter 10
# Psycho-educational Support Interventions for Patients with an Implantable Cardioverter Defibrillator

**Giada Pietrabissa, Francesco Borgia, Gian Mauro Manzoni, Riccardo Proietti, Luca Alessandro Gondoni, Mariella Montano, Ferruccio Nibbio, Anna Maria Titon, Gian Andrea Bertone, and Gianluca Castelnuovo**

**Abstract** The implantable cardioverter defibrillator (ICD) has established superiority in reducing mortality for survivors of cardiac arrest or patients at high risk of sudden death. However, because of the nature of their spontaneous, chronic, and potentiality life-treating condition, patients with an ICD are at risk of developing mild to serious psychological distress. Critical events, such as ICD shocks or ICD recalls may occur, significantly altering the course of individuals' psychosocial adjustment; a number of studies from different countries demonstrate that patients with an ICD that experience higher emotional difficulties undergo a greater incidence of shock therapy.

G. Pietrabissa (✉) • G. Castelnuovo
Psychology Research Laboratory, Ospedale San Giuseppe, IRCCS Istituto Auxologico Italiano, Oggebbio (VCO), Italy

Department of Psychology, Università Cattolica del Sacro Cuore, Milan, Italy
e-mail: giada.pietrabissa@unicatt.it

F. Borgia
Department of Psychology, Università Cattolica del Sacro Cuore, Milan, Italy

G.M. Manzoni
Psychology Research Laboratory, Ospedale San Giuseppe, IRCCS Istituto Auxologico Italiano, Oggebbio (VCO), Italy

Faculty of Psychology, eCampus University, Novedrate, Como, Italy

R. Proietti
Department of Cardiology, Ospedale Luigi Sacco, Milan, Italy

Cardiac Center, Morriston Hospital, University of Swansea, Swansea, UK

L.A. Gondoni • F. Nibbio • A.M. Titon • G.A. Bertone
Division of Cardiological Rehabilitation, Ospedale San Giuseppe, IRCCS Istituto Auxologico Italiano, Oggebbio (VCO), Italy

M. Montano
Department of Cardiology, Ospedale Castelli, Verbania, Italy



R. Proietti et al. (eds.), *Psychological, Emotional, Social and Cognitive Aspects of Implantable Cardiac Devices*, DOI 10.1007/978-3-319-55721-2_10

A proper biopsychosocial assessment and conceptualization of the needs of patients with an ICD, and the delivery of tailored interventions is, therefore, mandatory for ensuring optimal clinical care.

Brief education sessions are effective in reducing concerns among patients with mild levels of psychosocial distress, and a continuum of treatment strategies is available as the recipients' severity of psychological distress and associated maladaptive behavior grows, spanning in ICD support groups, individual consultations using cognitive behavioral techniques and pharmacotherapy.

Yet, while short-term positive outcomes are usually achieved, applicable and effective long-term management of psychological symptoms secondary to ICD implantation is still a challenge for healthcare providers, and the high degree of heterogeneity in content and methodology across studies has made it difficult to formulate broad conclusions on the feasibility and effectiveness of existing interventions. Further research producing valid and reliable data needs to be undertaken in order to maximize positive patient outcomes.

**Keywords** Implantable cardioverter defibrillator • Psychological distress • Biopsychosocial assessment • Psycho-educational intervention

## Introduction

Clinical trials data consistently demonstrate that ICD implantation markedly improves survival in persons at high risk of Sudden Cardiac Death (SCD), and that the majority of patients with an ICD experience a desirable Quality of Life (QoL) and a high acceptance rate [1]. However, whereas somatic symptoms seem to have little or no influence on QoL [2, 3], 30–40% of patients with an ICD report mild to serious psychological distress because of the nature of their spontaneous, chronic, and potentiality life-treating condition [4]. Specifically, as activation of the device is unpredictable and sometimes painful, both meta-analysis and individual trials indicate that patients who experienced ICD shock to achieve cardioversion or defibrillation are more likely to show impaired QoL [5–8] and to engage in avoidance patterns [9, 10]. Behavioral limitations, in fact, may be prescribed, but are more often due to perceived inability and individuals' erroneous association of the shock to those everyday life activities that take place/occur during shock (i.e., showering, gardening, working situations, driving, sexual activity and, particularly, physical exercise), even when there is no inherent connection [1]. Patients with an ICD may also fear that the device will suddenly stop functioning or operate incorrectly and therefore experience constant psychological distress [11].

Especially, r*ecipients younger* than 50 years at implantation, female patients and those with poor social support are more prone to experience adjustment difficulties to the ICD than their device-baring counterpart [12].

Distressed personality (type-D personality), the tendency to experience negative affectivity paired with social inhibition, is another risk marker for poor QoL in

patients with an ICD [13]; and the severity of the disease, the presence of comorbidities, as well as a poor understanding of the therapy may furthermore make patients with and ICD more vulnerable to a number of psychological issues, such as anxiety, depression and anger [3, 14, 15].

Anxiety is a common problem for those implanted with a biomedical technology device, to the point that the term shock anxiety has been coined to indicate the particular fear and anticipation of shock that is unique to this patient population. Shock anxiety may be experienced in isolation or within the context of psychological disorders, independently from having received a shock [4]. The presence of anxiety has been documented in 13–38% of device recipients across multiple studies [4], and it may exist on a continuum from normalized fear, generalized anxiety, panic disorder, to Post Traumatic Stress Disorder (PTSD) [10].

Notably, anxiety symptoms increase avoidance behavior, fear of increasing autonomic arousal, sleep disturbances, sexual dysfunction, irritability, and difficulty concentrating [16]. Similarly, 24–46% of patients express ICD-related depression, most likely as a response to perceived physical and mental disabilities associated with daily life activities [6]. The incidence of anger is also higher in the ICD population than in the general population or other disease populations [17].

The main psychological theories explaining the appearance of distress among patients with an ICD are classical conditioning, operant conditioning, cognitive distortions and learned helplessness. *Classical conditioning* can be observed when recipients develop anxiety or fear (unconditioned response) that causes them to avoid the activity they were doing when a discharge occurred (unconditioned stimulus) [18], including those actions that patients once enjoyed; and the employment of consequences (or lack thereof) to modify the occurrence of the behavior contribute to maintaining avoidance patterns over time (*operant conditioning*). Patients implanted with a biomedical technology device may also overestimate the negative consequences of an ICD discharge or overgeneralize its occurrence; studies show that catastrophic cognitions about future events [19] are important determinants of psychological problems among patients with an ICD as well as prospective predictors of the occurrence of subsequent arrhythmias and shocks [20]. By definition, c*ognitive distortion* refers to biased ways of thinking and perceiving reality. Individuals' thoughts and emotions are structured in a negative and inflexible way, this results in errors of interpretation related to personal performance and judgment of external situations [21, 22]. Cognitive reactions include making faulty conclusions that the ICD is actually harmful, instead of life-saving and that physical exertion will cause the ICD to discharge, this leads to learned helplessness. The theory of l*earned helplessness* suggests that psychological distress stems from the patients' perceived inability to handle situations that are believed inescapable and uncontrollable [23, 24] and it is thought to be one of the main underlying causes of depression [25].

Despite the fact that the manifestation of emotional distress has been generally attributed to ICD shocks, in reality, concerns about shock, rather than the shock itself, as well as psychosocial adjustment difficulties that are typical of those living with this particular biomedical technology (i.e., distressful changes in body image due to implantation, worries about scars, poor body satisfaction) need to be carefully investigated and promptly addressed [4].

In fact, recent research demonstrates that patients who reveal *device acceptance*, that is "the psychological accommodation and understanding of the advantages and disadvantages of the device, the recommendation of the device to others, and the derivation of benefit in terms of biomedical, psychological, and social functioning" (p. 385) [26] have better QoL [27].

It is crucial for mental health providers to normalize recipients' reaction to an abnormal event (ICD implantation or shock) and to articulate a clear treatment plan for recovery that may involve specific ICD- psychological interventions.

## Assessment and Treatment for Patients with an ICD in Routine Clinical Practice

A proper biopsychosocial assessment of patients with an ICD and conceptualization of their needs is mandatory for ensuring effective clinical care, since it allows the implementation of tailored intervention [28]. Firstly, medical factors such as, device indication, history of device therapies, cardiac disease severity/prognosis, surgical history, neurological deficits related to hypoxia, and comorbid diseases must be considered.

Moving onto the psychosocial field, anxiety, depression, QoL, psychiatric history, risk for self-harm, coping skills, social support strengths and deficits, financial distress, as well as general and health literacy represent common domains to explore. Healthy behaviors, related to tobacco, alcohol and drug use, physical activity level, medication observance, eating habits, and monitoring of medical parameters (i.e., blood pressure, weight) that frequently influence both medical and psychosocial outcomes also maximizes identification of potential difficulties [29] and recognition of behavioral change strategies to enhance adherence to therapy and to help patients living with the device. Routine clinical assessment for patients with and ICD is summarized in Table 10.1.

### *Assessment Tools*

Both generic and specific tools are available to measure psychological distress and adjustment in patients with an ICD, with particular attention to the level of anxiety and depression experienced by the individuals, as well as to their QoL. Table 10.2 provides a summary of the main measures of psychological concerns that are available [29].

Individuals should be screened for emotional distress before and after the device is implanted. Potential patients must be well informed about the ICD, a sincere conversation about the risk of death, focused on positive risk (i.e., ICD is superior to medication in terms of saving lives) and increased QoL associated with the device, should be carried out by cardiologists through *supportive communication* that conveys empathy and shows respect for the person. To provide information and

**Table 10.1** Clinical-based psychosocial assessment strategies (adapted from [1])

| | | |
|---|---|---|
| • *Risk factors* analysis | Socio-demographic | – Age < 50 |
| | | – Female gender |
| | | – Unemployment |
| | | – Ethnicity |
| | ICD-related | – ICD size |
| | | – >5 Defibrillations (appropriate or inappropriate) |
| | | – Negative cognitive appraisal of ICD discharge |
| | | – Operation under anesthesia |
| | | – Previous resuscitation |
| | | – Comorbidities |
| | | – Premorbid psychiatric diagnosis |
| | | – Lifestyle measures |
| | | – Time for implant |
| | | – Inappropriate patients education |
| | Psycho-social | – Type-D personality |
| | | – Negative coping strategy |
| | | – Poor social support |
| | | – Hyper-protective family |
| • *Risk behavior* reported, such as avoidance of physical exertion, sex or recreational activities | | |
| • *Behavioral/clinical observations* indicating poor psychosocial functioning (i.e., tearfulness, display of distress, hopelessness, anger, catastrophizing, symptoms of hypervigilance, significant family discord, etc.) | | |
| • *Critical event experience* that may have changed how patients see themselves or the device, including poor implant experience or multiple shock experience, device recall, and end-of-life concerns | | |
| • *Existence of* any *referral source* with some familiarity with the psychosocial issues common in patients with an ICD (i.e., clinical health psychologist, consulting psychiatrist, clinical social worker) | | |
| • *Brief diagnostic interview questions* that would confirm the presence of psychological impairments (i.e., depressed mood, anxiety, PTSD, anhedonia, suicidal ideation, device regret or device discontinuation) | | |
| • Use of *diagnostic questionnaires* for further evaluation | | |

opportunities for patients to verbalize fear or concerns related to the device not only enhances the patient-physician communication, but it also empowers and induces confidence in the person, as well as sets the stage for the ultimate outcome, which is the individuals' perception of greater safety because of the ICD (i.e., patient acceptance) [1]. To this aim Eads et al. [30] suggested seven principles of rehabilitation which medical professionals must be skilled in effectively communicating in routine clinical practice [30]: (1) *Defining the problem* asking patients about their specific concerns about having an ICD; (2) *Providing information* answering individuals' doubts or questions about the ICD; (3) *Creating team support* by reassuring patients with an ICD and producing an expectation of participation on the treatment team; (4) *Normalizing fears* as a normal reaction to ICD implantation, (5) *Eliciting emotional release* giving patients the opportunity to discuss troublesome issues;

**Table 10.2** Assessment tools for measuring psychological distress in patients with ICD (adapted from [29])

| Measure | Concept measured | Subscales | No. of items |
|---|---|---|---|
| *Device-specific measures* | | | |
| Florida Patient Acceptance Scale | Device acceptance | Return to function, device-related distress, body image concerns | 18 |
| Florida Shock Anxiety Scale | Device-specific anxiety | Consequence of shock, trigger of shock | 10 |
| ICD Concerns Questionnaire | Device-related concerns | Device-specific concerns, perceived limitations | 20 |
| Brodsky ICD Questionnaire | Device-related concerns | Embarrassment, suffering, worry, fear, wishes, experience, effect on significant other, changes in lifestyle | 46 |
| The Implanted Device Adjustment Scale | Adjustment to an implanted device | Fear/anxiety, attitude, preparation, and body awareness | 22 |
| *Generic measures* | | | |
| Cardiac Anxiety Questionnaire | Disease-specific anxiety | Fear, avoidance, heart-focused attention | 18 |
| Hospital Anxiety and Depression Scale | Depression and anxiety in non-psychiatric medical settings | Anxiety, depression | 14 |
| Beck Anxiety Inventory | Anxiety | N/A | 21 |
| State-Trait Anxiety Inventory | Anxiety | State anxiety, trait anxiety | 40 |
| Beck Depression Inventory II | Depression | N/A | 21 |
| Patient Health Questionnaire | Depression | N/A | 9 |
| Brief Symptom Inventory-18 | Psychological distress | Somatization, depression, anxiety | 18 |
| Impact of Event Scale—Revised | PTSD | Avoidance, hyperarousal, intrusion | 22 |
| PTSD Checklist | PTSD | N/A | 17 |
| Mishel Uncertainty in Illness Scale | Uncertainty related to symptom, diagnosis, treatment, relationship with caregivers, and planning for the future | Multi-attributed ambiguity, unpredictability | 30 |
| The Control Attitude Scale | Perceived control on heart disease (for patients and their family members) | N/A | 4 |
| Quality of Life Index—Cardiac version | QOL in terms of satisfaction and importance with respect to various aspects of life | Health and functioning, social and economic aspects, psychological and spiritual status, family and relationships | 36 |

**Table 10.2** (continued)

| Measure | Concept measured | Subscales | No. of items |
|---|---|---|---|
| Medical Outcomes Study (MOS) 36-Item Short Form Health Survey | Health status | Vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, mental health | 36 |
| Profile of Mood States | Mood state | Tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia, vigor-activity, confusion-bewilderment | 65 |
| Impact of Events Scale—revised | Post-trauma phenomena | Intrusion, avoidance, hyperarousal | 22 |

(6) *Instilling hope* that the physical discomfort and emotional distress patients are experiencing will likely diminish with time and (7) *Encouraging* patients *to take action*, thus to enhance their self-care abilities and self-efficacy.

## Clinic-Based Therapeutic Intervention for Patients with and ICD

To properly detect and manage psychosocial issues in ICD clinics, cardiology practitioners should refer to the "four A's checklist" [24]: Ask, Advise, Assist, and Arrange referral. Specifically, research shows that the primary components of patient education, relaxation/stress management training, and group social support provide benefits by increasing health and psychosocial outcomes (Table 10.3).

*Brief education sessions* have proven effectiveness in reducing patients' initial concerns or post-ICD discharge distress among individuals with mild levels of psychosocial distress, but they may not be appropriate for those recipients suffering from severe psychological distress [31]. Physicians should, therefore, arrange a consultation with a mental health specialist [24] that will assess patients for clinical distress.

A continuum of treatment strategies is available for patients with an ICD experiencing psychosocial difficulties, spanning in *ICD support groups*, and *individual consultations* using *cognitive behavioral techniques*. *Support groups* can serve as an adjunctive intervention and are especially useful for those individuals with poor social support or families experiencing high levels of distress. Through education, social support, and vicarious learning, group participation provides an opportunity for normalization of fears and mobilization of coping resources [32]. However, as the severity of psychological distress and associated maladaptive behavior grows, the need for *individualized psychosocial interventions* increases accordingly. These may include individualized relaxation training, cognitive restructuring, and

**Table 10.3** Clinic-based psychosocial care components (adapted from [1])

| Patient-specific information component | Clinical task |
|---|---|
| Patient education | Provide information on proper device functioning, strengths and weaknesses of living with an ICD, and stress the importance of clinic and remote monitoring |
| Psychosocial information | – Acknowledge challenges of living with a cardiac disease, and reassure patients that they will be able to cope well; |
| | – Assistance/support will be available if/when needed; |
| | – Highlight that patient and family outlook involving a positive and hopeful future is reasonable and health promoting |
| Identify and support physical activities | Short-term follow-up |
| | Help patient and family:<br>1. Recognize the importance of returning to appropriate activity level to prevent activity avoidance;<br>2. Understand the patients' expectation of return to activity |
| | Long-term follow-up |
| | Health care team should:<br>– Assess for signs of emotional distress or avoidance of activity<br>– Seek cardiac rehabilitation referral for support in return to activity |
| Discuss clinic plan to communicate and manage a ICD recalls | |
| Discuss a standard for managing future ICD shock | – If you get a single shock and feel fine, please call the clinic and schedule appointment or remote monitor transmission |
| | – If you get a single shock and experience problematic symptoms (i.e., chest pain, dizziness, coughing, weakness), seek emergency medical attention |
| | – If you get two or more shocks in 24 h period, seek emergency care |
| Offer reassurance for end-of-life concerns | |

systematic desensitization. Specifically, the latter provides patients with skills to manage physiological arousal and distressing thought patterns associated with the ICD [33]. *Pharmacologic* approaches are also appropriate for patients with excessive levels of fear, anxiety, or depression [30].

Patients with an ICD may also express difficulties in reporting emotional problems because of embarrassment, lack of insight, or the nature of their symptoms. They may also present symptoms that do not meet specific diagnostic criteria, but that still impair their QoL and functioning.

## Cognitive and Behavioural Techniques

### *CBT-Based Psychoeducational Intervention*

Brief cognitive-behavioral interventions focused on subclinical specific behavioral or psychological symptoms may help to address mild mood impairments, treatment adherence problems, reduced health, risk behaviors, and given the uniqueness of the

**Table 10.4** Brief CBT interventions for common psychological symptoms in ICD patients (adapted from [34])

| Behavioral or psychological symptoms | CBT intervention |
|---|---|
| Medication nonadherence | Motivation interviewing and problem-solving techniques |
| Tobacco use or substance abuse | – Motivational interviewing |
| | – Provide referral for tobacco cessation or substance abuse counseling |
| Poor knowledge about ICD and ICD shock | – Review established benefit of ICD |
| | – Verbally prepare patient and family to respond to ICD shock(s) and provide them handout on the topic |
| Concerns about sexual activity with an ICD | – Verbally confirm safety of sexual activity with patient |
| | – Provide patient handout on sexual activity in ICD patients |
| Concerns about ICD device recall | – Verbally prepare patient to respond to a device recall and provide him/her handout on the topic |
| | – Review low probability of device malfunction and extensive monitoring of device reliability |
| Family expresses questions or concerns about patient's ICD | – Acknowledge, normalize, and discuss the relatively increased stress in ICD partners and families |
| | – Verbally prepare patient and family to cope with an ICD and provide them handout on the topic |
| Mild, intermittent depressive symptoms | Behavioral activation. Provide referral for further psychological treatment, if indicated |
| Weight management | – Promote goal setting as a strategy to make changes in daily food consumption |
| | – Provide referral to nutritionist (if available) |
| | – Prescribe an exercise program or referral to CR |
| Physical inactivity | – Review eventual activity restrictions |
| | – Promote goal setting as a strategy to increases in daily physical activity |
| | – Encourage use of personal activity trackers like Fitbit |

challenges faced by both patients with an ICD and their family, increase ICD device knowledge and acceptance [11, 34]. This type of single-session intervention is particularly helpful within a hospital setting where professional consultations need to be short term and goal oriented (Table 10.4).

### Traditional Cognitive-Behavioral Interventions with Stress Management Techniques

Studies indicate that Cognitive Behavioral Therapy (CBT) and stress management frameworks are particularly well-suited for ICD-related adjustment issues [11, 35], since they provide tailored intervention strategies aimed at addressing common cognitive, affective, and behavioral difficulties experienced by patients with an ICD. This form of psychotherapy is effective not only in managing stress and

symptoms related to anxiety, and minimizing catastrophic thoughts related to depressive symptoms in patients with an ICD, but also in reducing the number of arrhythmias that result in ICD discharges [36].

The CBT protocol comprises four to six sessions and has four key components: (1) patient education, (2) relaxation/stress management training, (3) cognitive reframing techniques, and (4) promotion of social support. The first component focuses on increasing the patient's knowledge about both the device and the likelihood of ICD shocks, thus reducing the uncertainty and ambiguity that perpetuates shock-related anxiety and equipping recipients with the information needed to understand and discuss their medical condition, thus increasing their self-efficacy and QoL [37]. The second component of the CBT-driven intervention for patients with an ICD aims to help recipients identify and increase distress tolerance, and to address the psychological and physical rigors of living with cardiac disease and an ICD; and standard procedures that promote a state of deep relaxation [38] such as *yoga* techniques [39], *diaphragmatic breathing, progressive muscle relaxation exercises* and *self-hypnosis* may be introduced, practiced in session, and assigned as homework.

In presence of patients exhibiting a traumatic response to ICD shock, professionals might also consider the use of *mindfulness-based cognitive strategies* [40] and *Eye Movement Desensitization and Reprocessing (EMDR) therapy* [41].

Since CBT is based on the assumption that emotional and behavioral problems arise as a result of distorted or dysfunctional manners with which patients perceive events, which influence the persons' sociability and behavior [11], the third phase of treatment makes use of cognitive reframing techniques to help patients with an ICD to identify and reframe inaccurate cognitions related to the ICD or shocks [42]. It is not uncommon, in fact, that patients with an ICD might interpret electrical discharges as a sign of device malfunctioning. Some people may also associate social activities, physical effort, and sex with the occurrence of electric shocks, thus deliberately avoiding such behaviors [10]. Finally, social support is promoted.

Patients with an ICD are further helped to cope with events and emotions that trigger their desire to engage in problematic behaviors [35] by: (a) establishing weekly goals to enable them to return to normal daily life activities; (b) forming groups to facilitate the sharing of coping strategies, feelings, experiences, and the provision of emotional support from people in similar circumstances; and (c) structuring a set of daily exercises compatible with their physical condition [35]. Evidence shows that CBT strategies also prepare patients with an ICD for future run-ins with shock and cardiac dysfunction, and that CBT is a more effective treatment for PTSD symptoms than pharmacologic therapy or even their combination [43].

Despite being considered the gold standard in the treatment of chronic conditions, evidence of the beneficial effects of CBT-based psychosocial interventions in patients with an ICD is only short-term and further research able to overcome the methodological limitations of past studies aimed at assessing its effectiveness needs to be undertaken to refine the data collected so far.

## *ICD Support Groups*

The rapid acceleration of the use of the ICD over the past decade led health care practitioners to the development of adjunctive treatments aimed at supporting the health literacy and adjustment of patients and their families, and the most common approach by medical treatment centers has been the initiation of ICD support groups. They can take many forms, ranging from provider-led question and answer groups or didactic classes, to patient-led groups that encourage emotional expression or peer-to-peer support [29].

The active ingredients of support groups consist on the universality of the concerns of patients and the sharing of information and strategies for aiding in adaptation and encouraging psychological adjustment after receiving an ICD [44]. Lifestyle and family role changes, fear of shocks and limitations of daily life activity, battery and device failure, etc. are some of the main issues of concern that commonly arise from storytelling of ICD patients [24]. Even though the efficacy and effectiveness of ICD support groups has not been adequately investigated, they likely activate the known benefits of group interventions, such as universality of concerns, generation of hope, information sharing, and acquisition of coping skills via vicarious learning [29].

## *Cardiac Rehabilitation and Exercise Training*

The main goal in the rehabilitation of ICD patients is to guarantee professional care during the transition period between acute therapy and ambulatory care, and to prevent re-hospitalizations. The beneficial effects of secondary prevention on the physiological and psychosocial functioning of cardiac patients are generally well-established [45].

However, the ICD has major implications on the physical and emotional status of the patients, and the referral to CR centers of patients with an ICD is usually negatively influenced by fear of inappropriate shock delivery during exercise [46]. Since negative emotions among patients with an ICD might be the cause rather than the result of arrhythmia, and that psychological distress might increase the risk of shock [47] and mortality [48], this particular patient population should receive special attention as their needs differ from those of ordinary heart patients. A comprehensive CR program including control of coronary risk factors, psycho-educational interventions and individualized exercise programs is, therefore, greatly recommended for restoring physical function and improving QoL [49].

*Physical activity and exercise* has a substantial role in enabling patients with an ICD to take control of their condition, and enhancing their ability to perform everyday activities (25). Sport participation is allowed at least 6 months after ICD implantation or after the most recent arrhythmic episode, in order to reduce the risk of inappropriate shock related to sinus tachycardia induced by exercise [9]. During

**Table 10.5** ICD: type of exercise (adapted from [9])

| Modes | Goals |
|---|---|
| *Aerobic* | |
| Large muscle activity | • Increase functional capacity and ability to perform daily life activity |
| | • Increase self-efficacy |
| *Strength* | |
| Circuit training | • Increase ability to perform leisure, occupational, and daily life activities |
| | • Increase muscle strength and endurance |
| *Flexibility* | |
| Upper and lower body range of motion activity | |

CR, exercise training is performed safely, under careful supervision and according to the patient medical condition, thus permitting patients to overcome personal limits without adverse effects, and therefore increase their psychological and physical outcomes [50]. The cut-off heart rate for the ICD patient needs to be appropriately set by exercise testing and 24-h Holter monitoring [9].

The mode of exercise required must be similar to daily activity, in order to gain the most from exercise sessions and maintain the effect over years (Table 10.5).

*However, the benefits of CR in increasing adherence to treatment recommendations among patients with an ICD are not yet established, and maintenance of physical activity* in *daily life* still appears challenging. A long-term approach to exercise is essential to ensure greater benefits among recipients. Hospital follow-up visits and/or remote patient monitoring via telemedicine and mHealth (see Chap. 11) *is thus recommended in order to maintain and improve* health outcomes among patients with an ICD.

## *End of Life Intervention*

The last stage in the treatment of patients with an ICD is a conversation regarding the deactivation of the device. The majority of implanted patients are not aware that the shock therapy can be deprogrammed and that the deactivation of the ICD allows for a more comfortable death [51]. Concerns associated with the device at the end of life include, the belief that the ICD will deliver painful shocks during the dying process, as well as ethical concerns related to turning off such a device. The basic principles of medical ethics (Autonomy, Beneficence, Non-maleficence, and Justice) must be kept in mind by healthcare professionals, since potentially conflicting at the end of life [52].

A frank discussion of ICD therapy, including the option of deactivation, must be conducted with potential recipients pre-implantation in order to ensure informed

consent and address eventual doubts and concerns. A simple approach for physicians to assess patients with an ICD is to ask whether they have documented the circumstances, if any, in which they would want their ICD turned off, so as to prevent subsequent uncertainty [53]. Professionals can also advise the patients that "if at some future date, you decide you no longer want the device, it can easily be disabled", awareness of their control over the deactivation option is empowering for patients, and at the same time provides an opportunity to contemplate their wishes. Importantly, health care providers should use an organized approach that identifies palliative needs, thus ensuring that the care plan is in alignment with patient and family preferences and goals [54].

### *Pharmacological Interventions*

Since ICD shock is associated with adverse psychological outcomes within 30 days following the event [55], cardiologists often start psychiatric mental health medications. Patients may benefit from pharmacological intervention, but studies focusing on the cardiovascular side effects of psychotropic treatments on patients with an ICD suggest that certain classes of medications should be avoided. Physicians should, therefore, be aware of the cardiovascular risks associated with various psychotropic medications and consider their giving in conjunction with other form of psychological treatment [34].

## Conclusion

Empirical data supports the feasibility and efficacy of various treatment modalities to improve the emotional well-being and to reduce device-specific distress in patients living with an ICD and their families [20]. Providers should be equipped with the knowledge to recognize symptoms of psychological difficulties among recipients, so as to provide them with information about the device, and to deliver evidence-based care in a brief consultation and longer-term clinical settings. Specifically, treatments involving cognitive-behavioral interventions and exercise training have demonstrated efficacy in improving patients' psychological and cardiovascular health [27]. Evidence of the benefits of psychological intervention in ICD patients is most convincing for symptoms of anxiety and exercise capacity [27], but the effect of these treatments on depressive symptoms, heart rate variability, and shocks are weaker ([36, 56]). These research findings, however, should be viewed in the context of their studies, characterized by small sample sizes, high heterogeneity of participants as well as large variability in their methodological quality, and further research is warranted to increase the generalizability of research findings, in order to provide optimal care [57]. Specific attention should also be given to the choice of instruments used to evaluate the effect of the different interventions [27].

Moreover, to date, there is a lack of trials aimed at testing partner-focused interventions [58]. In fact, to ensure positive outcomes in the immediate post-ICD implantation period after returning home, clinical psychosocial attention must also be given to the patients' support network [59], especially spouses [60]. Since the intimate partners' experience may influence that of the recovering patient [61], it is of great importance in the healthcare context to properly assess their physical and mental health and to equipt spouses to provide effective social support [62]. Also, while short-term positive outcomes are usually achieved, to ensure effectiveness of evidence-based interventions in the long-term mental health providers need to fully understand the complex array of medical, psychological, and social factors that lead to the development and maintenance of psychological distress in patients with an ICD. In this regard, a web-based intervention may be worth considering, as it is accessible and can reach underserved populations [63]. Moreover, the impact of psychological interventions on health care utilization and the cost-effectiveness of the intervention is poorly understood in this population and should be the focus of future investigations.

## References

1. Sears SF, Matchett M, Conti JB. Effective management of ICD patient psychosocial issues and patient critical events. [Meta-analysis research support, non-U.S. Gov't review]. J Cardiovasc Electrophysiol. 2009;20(11):1297–304. doi:10.1111/j.1540-8167.2009.01526.x.
2. Exner DV, Schron E, Yao Q. Defibrillator shocks and self-perceived quality of life in the antiarrhythmics versus implantable defibrillators (AVID) trial. J Am Coll Cardiol. 2000;35(Suppl A):153a.
3. Godemann F, Butter C, Lampe F, Linden M, Werner S, Behrens S. Determinants of the quality of life (QoL) in patients with an implantable cardioverter/defibrillator (ICD). Qual Life Res. 2004;13(2):411–6.
4. Sears SF, Matchett M, Vazquez LD, Conti JB. Innovations in psychosocial care for implantable cardioverter defibrillator patients. In: Allan R, Fisher J, editors. Heart and mind: the practice of cardiac psychology. 2nd ed. Washington, DC: American Psychological Association; 2012. p. 524.
5. Francis J, Johnson B, Niehaus M. Quality of life in patients with implantable cardioverter defibrillators. Indian Pacing Electrophysiol J. 2006;6(3):173–81.
6. Kamphius HCM, de Leeuw JRJ, Derksen R, Hauer RNW, Winnubst JAM. Implantable cardioverter defibrillator recipients: quality of life in recipients with and without ICD shock delivery. A prospective study. Europace. 2003;5:381–9.
7. Mark DB, Anstrom KJ, Sun JL, Clapp-Channing NE, Tsiatis AA, Davidson-Ray L, Lee KL, Bardy GH. Quality of life with defibrillator therapy or amiodarone in heart failure. [Comparative study multicenter study randomized controlled trial research support, N.I.H., Extramural research support, non-U.S. Gov't]. N Engl J Med. 2008;359(10):999–1008. doi:10.1056/NEJMoa0706719.
8. Schron EB, Exner DV, Yao Q, Jenkins LS, Steinberg JS, Cook JR, Kutalek SP, Friedman PL, Bubien RS, Page RL, Powell J. Quality of life in the antiarrhythmics versus implantable defibrillators trial: impact of therapy and influence of adverse symptoms and defibrillator shocks. [Clinical trial comparative study multicenter study randomized controlled trial research support, non-U.S. Gov't research support, U.S. Gov't, P.H.S.]. Circulation. 2002;105(5):589–94.

9. Hussein NA, Thomas MA. Rehabilitation of patients with implantable cardioverter/defibrillator: a literature review [Review]. Acta Cardiol. 2008;63(2):249–57. doi:10.2143/AC.63.2.2029535.
10. Sears SF Jr, Todaro JF, Lewis TS, Sotile W, Conti JB. Examining the psychosocial impact of implantable cardioverter defibrillators: a literature review. [Meta-analysis research support, non-U.S. Gov't]. Clin Cardiol. 1999;22(7):481–9.
11. Maia AC, Braga AA, Soares-Filho G, Pereira V, Nardi AE, Silva AC. Efficacy of cognitive behavioral therapy in reducing psychiatric symptoms in patients with implantable cardioverter defibrillator: an integrative review. [Evaluation studies research support, non-U.S. Gov't review]. Braz J Med Biol Res. 2014;47(4):265–72. doi:10.1590/1414-431X20133418.
12. Sears SF, Burns JL, Handberg E. Young at heart: understanding the unique psychosocial adjustment of young implantable cardioverter defibrillators recipients. Pacing Clin Electrophysiol. 2001;24:1113–7.
13. Denollet J, Tekle FB, Pedersen SS, van der Voort PH, Alings M, van den Broek KC. Prognostic importance of distressed (Type D) personality and shocks in patients with an implantable cardioverter defibrillator. [Multicenter study research support, non-U.S. Gov't]. Int J Cardiol. 2013;167(6):2705–9. doi:10.1016/j.ijcard.2012.06.114.
14. Tsuyoshi S, Tsuyoshi S, Katsuji N. Psychological distress in patients with an implantable cardioverter defibrillator. J Arrhythm. 2013;29(6):310–3.
15. Undavia M, Goldstein NE, Cohen P, Sinthawanarong K, Singson M, Bhutani D, Munson T, Gomes JA, Fischer A, Mehta D. Impact of implantable cardioverter-defibrillator recalls on patients' anxiety, depression, and quality of life. [Research support, N.I.H., Extramural research support, non-U.S. Gov't]. Pacing Clin Electrophysiol. 2008;31(11):1411–8. doi:10.1111/j.1540-8159.2008.01204.x.
16. Metoyer PA. The importance of psychological support for the implantable cardioverter defibrillator patient. EP Lab Digest. 2005; 5(10). http://www.eplabdigest.com/article/4744.
17. Lampert R. Anger and ventricular arrhythmias. [Case reports review]. Curr Opin Cardiol. 2010;25(1):46–52. doi:10.1097/HCO.0b013e32833358e8.
18. Beck JS. Cognitive therapy: basics and beyond. New York: Guilford Press; 1995.
19. Pauli P, Wiedemann G, Dengler W, Blaumann-Benninghoff G, Kuhlkamp V. Anxiety in patients with an automatic implantable cardioverter defibrillator: what differentiates them from panic patients? [Comparative study research support, non-U.S. Gov't]. Psychosom Med. 1999;61(1):69–76.
20. Dunbar SB, Kimble LP, Jenkins LS, Hawthorne M, Dudley W, Slemmons M, Langberg JJ. Association of mood disturbance and arrhythmia events in patients after cardioverter defibrillator implantation. [Comparative study research support, U.S. Gov't, P.H.S.]. Depress Anxiety. 1999;9(4):163–8.
21. Frizelle DJ, Lewin RJ, Kaye G, Hargreaves C, Hasney K, Beaumont N, Moniz-Cook E. Cognitive-behavioural rehabilitation programme for patients with an implanted cardioverter defibrillator: a pilot study. [Clinical trial randomized controlled trial]. Br J Health Psychol. 2004;9(Pt 3):381–92. doi:10.1348/1359107041557039.
22. Irvine J, Firestone J, Ong L, Cribbie R, Dorian P, Harris L, Ritvo P, Katz J, Newman D, Cameron D, Johnson S, Bilanovic A, Hill A, O'Donnell S, Sears S Jr. A randomized controlled trial of cognitive behavior therapy tailored to psychological adaptation to an implantable cardioverter defibrillator. [Comparative study multicenter study randomized controlled trial research Support, non-U.S. Gov't]. Psychosom Med. 2011;73(3):226–33. doi:10.1097/PSY.0b013e31820afc63.
23. Range BP, Marlatt GA. Cognitive-behavioral therapy for alcohol and drug use disorders. Rev Bras Psiquiatr. 2008;30(2):S88–95.
24. Sears SF Jr, Conti JB. Quality of life and psychological functioning of icd patients. [Review]. Heart. 2002;87(5):488–93.
25. Vollmayr B, Gass P. Learned helplessness: unique features and translational value of a cognitive depression model. [Research support, non-U.S. Gov't review]. Cell Tissue Res. 2013;354(1):171–8. doi:10.1007/s00441-013-1654-2.

26. Burns JL, Serber ER, Keim S, Sears SF. Measuring patient acceptance of implantable cardiac device therapy: initial psychometric investigation of the Florida Patient Acceptance Survey. [Comparative study research support, non-U.S. Gov't]. J Cardiovasc Electrophysiol. 2005;16(4):384–90. doi:10.1046/j.1540-8167.2005.40134.x.
27. Pedersen SS, Spindler H, Johansen JB, Mortensen PT, Sears SF. Correlates of patient acceptance of the cardioverter defibrillator: cross-validation of the Florida Patient Acceptance Survey in Danish patients. [Research support, non-U.S. Gov't validation studies]. Pacing Clin Electrophysiol. 2008;31(9):1168–77. doi:10.1111/j.1540-8159.2008.01158.x.
28. Kirian K, Sears SF, DeAntonio H. Sudden cardiac arrest: a biopsychosocial approach to patient management of ventricular fibrillation and implantable cardioverter defibrillators. In: Dornelas EA, editor. Stress proof the heart. New York: Springer; 2012. p. 25–43.
29. Whited A, Sears SF, Cahill J, Chelu MG. Psychological consultation for patients with implantable cardioverter defibrillator: confounding challenges of cardiac disease, technology, and the patient experience. In: Alvarenga ME, Byrne D, editors. Handbook of psychocardiology. Singapore: Springer; 2016. p. 1–16.
30. Eads AS, Sears SF Jr, Sotile WM, Conti JB. Supportive communication with implantable cardioverter defibrillator patients: seven principles to facilitate psychosocial adjustment. [Review]. J Cardpulm Rehabil. 2000;20(2):109–14.
31. Sotile WM, Sears SF. You can make a difference: brief psychosocial interventions for ICD patients and their families. Medtronic, Incorporated. 1999.
32. Badger JM, Morris PLP. Observations of a support group for automatic implantable cardioverter-defibrillator recipients and their spouses. Heart Lung. 1989;18:238–43.
33. Sears SF Jr, Conti JB, Curtis AB, Saia TL, Foote R, Wen F. Affective distress and implantable cardioverter defibrillators: cases for psychological and behavioral interventions. [Case reports review]. Pacing Clin Electrophysiol. 1999;22(12):1831–4.
34. Rosman L, Whited A, Ford JH, Nekkanti R, Cahill J, Sears SF. Adding psychological intervention to high-tech care for patients with implantable cardioverter defibrillators. In: Byrne ME, Alvarenga D, editors. Handbook of psychocardiology. Singapore: Springer Science + Business Media; 2016. p. 1–16.
35. Smith LC, Fogel D, Friedman S. Cognitive-behavioral treatment of panic disorder with agoraphobia triggered by AICD implant activity. [Case reports research support, non-U.S. Gov't research support, U.S. Gov't, P.H.S.]. Psychosomatics. 1998;39(5):474–7. doi:10.1016/S0033-3182(98)71311-8.
36. Kohn CS, Petrucci RJ, Baessler C, Soto DM, Movsowitz C. The effect of psychological intervention on patients' long-term adjustment to the ICD: a prospective study. [Clinical trial comparative Study randomized controlled trial research support, non-U.S. Gov't]. Pacing Clin Electrophysiol. 2000;23(4 Pt 1):450–6.
37. Powell VB, Abreu N, Oliveira IR, Sudak D. Cognitive-behavioral therapy for depression. [Research support, non-U.S. Gov't review]. Rev Bras Psiquiatr. 2008;30(Suppl 2):s73–80.
38. Habibovic M, Burg MM, Pedersen SS. Behavioral interventions in patients with an implantable cardioverter defibrillator: lessons learned and where to go from here? [Research support, N.I.H., Extramural research support, non-U.S. Gov't review]. Pacing Clin Electrophysiol. 2013;36(5):578–90. doi:10.1111/pace.12108.
39. Toise SC, Sears SF, Schoenfeld MH, Blitzer ML, Marieb MA, Drury JH, Slade MD, Donohue TJ. Psychosocial and cardiac outcomes of yoga for ICD patients: a randomized clinical control trial. [Randomized controlled trial research support, N.I.H., Extramural research support, non--U.S. Gov't]. Pacing Clin Electrophysiol. 2014;37(1):48–62. doi:10.1111/pace.12252.
40. Salmoirago-Blotcher E, Crawford S, Carmody J, Rosenthal L, Ockene I. Characteristics of dispositional mindfulness in patients with severe cardiac disease. J Evid Based Complementary Altern Med. 2011;16(3):218–25. doi:10.1177/2156587211405525.
41. Engelhard IM, van den Hout MA, Janssen WC, van der Beek J. Eye movements reduce vividness and emotionality of "flashforwards". [Research support, non-U.S. Gov't]. Behav Res Ther. 2010;48(5):442–7. doi:10.1016/j.brat.2010.01.003.

42. Lewin RJ, Coulton S, Frizelle DJ, Kaye G, Cox H. A brief cognitive behavioural preimplantation and rehabilitation programme for patients receiving an implantable cardioverter-defibrillator improves physical health and reduces psychological morbidity and unplanned readmissions. [Multicenter study randomized controlled trial research support, non-U.S. Gov't]. Heart. 2009;95(1):63–9. doi:10.1136/hrt.2007.129890.
43. Ansari S, Arbabi M. Cognitive behavioral therapy (CBT) in a patient with implantable cardioverter defibrillator (ICD) and posttraumatic stress disorder (PTSD). Iran J Psychiatry. 2014;9(3):181–3.
44. DeBasio N, Rodenhausen N. The group experience: meeting the psychological needs of patients with ventricular tachycardia. Heart Lung. 1984;13(6):597–602.
45. Ades PA. Cardiac rehabilitation and secondary prevention of coronary heart disease. [Research support, non-U.S. Gov't research support, U.S. Gov't, P.H.S. review]. N Engl J Med. 2001;345(12):892–902. doi:10.1056/NEJMra001529.
46. Vanhees L, Kornaat M, Defoor J, Aufdemkampe G, Schepers D, Stevens A, Van Exel H, Van Den Beld J, Heidbüchel H, Fagard R. Effect of exercise training in patients with an implantable cardioverter defibrillator. Eur Heart J. 2004;25:1120–6.
47. Steinberg JS, Arshad A, Kowalski M, Kukar A, Suma V, Vloka M, Ehlert F, Herweg B, Donnelly J, Philip J, Reed G, Rozanski A. Increased incidence of life-threatening ventricular arrhythmias in implantable defibrillator patients after the World Trade Center attack. [Comparative study evaluation studies]. J Am Coll Cardiol. 2004;44(6):1261–4. doi:10.1016/j.jacc.2004.06.032.
48. Ladwig KH, Baumert J, Marten-Mittag B, Kolb C, Zrenner B, Schmitt C. Posttraumatic stress symptoms and predicted mortality in patients with implantable cardioverter-defibrillators: results from the prospective living with an implanted cardioverter-defibrillator study. [Research support, non-U.S. Gov't]. Arch Gen Psychiatry. 2008;65(11):1324–30. doi:10.1001/archpsyc.65.11.1324.
49. Berg SK, Pedersen PU, Zwisler AD, Winkel P, Gluud C, Pedersen BD, Svendsen JH. Comprehensive cardiac rehabilitation improves outcome for patients with implantable cardioverter defibrillator. Findings from the COPE-ICD randomised clinical trial. [Comparative study randomized controlled trial research support, Non-U.S. Gov't]. Eur J Cardiovasc Nurs. 2015;14(1):34–44. doi:10.1177/1474515114521920.
50. Fitchet A, Doherty PJ, Bundy C, et al. Comprehensive cardiac rehabilitation programme for implantable cardioverter-defibrillator patients: a randomised controlled trial. Heart. 2003;89:155–60.
51. Beattie J. Implantable cardioverter defibrillators in patients who are nearing the end of life. London: British Heart Foundation; 2007.
52. Gillon R. Medical ethics: four principles plus attention to scope. [Review]. Br Med J. 1994;309(6948):184–8.
53. Wright GA, Klein GJ, Gula LJ. Ethical and legal perspective of implantable cardioverter defibrillator deactivation or implantable cardioverter defibrillator generator replacement in the elderly. [Review]. Curr Opin Cardiol. 2013;28(1):43–9. doi:10.1097/HCO.0b013e32835b0b3b.
54. Lowery D, Carpenter CR. Cardiac patients at end of life in the emergency department. In: Goodlin SJ, Rich MW, editors. End-of-life care in cardiovascular disease. London: Springer; 2014. p. 91–105.
55. Mark DB, Anstrom KJ, Sun JL, Clapp-Channing NE, Tsiatis AA, Davidson-Ray LD, Bardy GH. Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT) Investigators: Quality of life with defibrillator therapy or amiodarone in heart failure. N Engl J Med. 2008;359:999–1008.
56. Dunbar SB, Langberg JJ, Reilly CM, Viswanathan B, McCarty F, Culler SD, O'Brien MC, Weintraub WS. Effect of a psychoeducational intervention on depression, anxiety, and health resource use in implantable cardioverter defibrillator patients. [Randomized controlled trial research support, N.I.H., Extramural]. Pacing Clin Electrophysiol. 2009;32(10):1259–71. doi:10.1111/j.1540-8159.2009.02495.x.

57. Crespo EM, Kim J, Selzman KA. The use of implantable cardioverter defibrillators for the prevention of sudden cardiac death: a review of the evidence and implications. Am J Med Sci. 2005;329:238–46.
58. Dougherty CM, Thompson EA, Kudenchuk PJ. Development and testing of an intervention to improve outcomes for partners following receipt of an implantable cardioverter defibrillator in the patient. [Randomized controlled trial research support, N.I.H., Extramural]. ANS Adv Nurs Sci. 2012;35(4):359–77. doi:10.1097/ANS.0b013e318271d2e8.
59. Miller PJ, Wikoff R. Spouses' psychosocial problems, resources, and marital functioning post-myocardial infarction. [Research support, non-U.S. Gov't]. Prog Cardiovasc Nurs. 1989;4(2):71–6.
60. Coyne JC, Rohrbaugh MJ, Shoham V, Sonnega JS, Nicklas JM, Cranford JA. Prognostic importance of marital quality for survival of congestive heart failure. [Comparative study research support, U.S. Gov't, P.H.S.]. Am J Cardiol. 2001;88(5):526–9.
61. Cleland JG, Ghosh J, Freemantle N, Kaye GC, Nasir M, Clark AL, Coletta AP. Clinical trials update and cumulative meta-analyses from the American College of Cardiology: WATCH, SCD-HeFT, DINAMIT, CASINO, INSPIRE, STRATUS-US, RIO-Lipids and cardiac resynchronisation therapy in heart failure. [Review]. Eur J Heart Fail. 2004;6(4):501–8. doi:10.1016/j.ejheart.2004.04.014.
62. Carlson LE, Bultz BD, Speca M, St Pierre M. Partners of cancer patients: Part II. Current psychosocial interventions and suggestions for improvement. J Psychosoc Oncol. 2000;18(3):33–43.
63. Kuhl EA, Sears SF, Conti JB. Using computers to improve the psychosocial care of implantable cardioverter defibrillator recipients. Pacing Clin Electrophysiol. 2006;29:1426–33.