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Reliability and Validity of the Self Efficacy Expectations and Outcome Expectations After ICD Implantation Scales

Cynthia M. Dougherty, ARNP, PhD. [Research Associate Professor],

Biobehavioral Nursing and Health Systems, University of Washington School of Nursing, Box 357266, Room T608D, Seattle, WA 98195, USA, (206) 221-7927 Phone, (206) 543-4771 FAX, Nurse Practitioner, VA Puget Sound Health Care System, Seattle, cindy.d@u.washington.edu

Sandra K. Johnston, APRN, PhD. [Senior Fellow], and

University of Washington School of Nursing, Seattle, WA, USA, stonessk@u.washington.edu

Elaine Adams Thompson, PhD, RN [Professor]

Psychosocial and Community Health, University of Washington School of Nursing, Seattle, WA, USA, elainet@u.washington.edu

Abstract

The purpose of this study was to assess the reliability and validity characteristics of two new scales that measure self-efficacy expectations (SE-ICD) and outcome expectations (OE-ICD) in survivors ($n=168$) of sudden cardiac arrest (SCA), all of whom received an implantable cardioverter defibrillator (ICD). Cronbach's alpha reliability demonstrated good internal consistency (SE-ICD $\alpha = 0.93$ and OE-ICD $\alpha = 0.81$). Correlations with other self-efficacy instruments (general self-efficacy and social self-efficacy) were consistently high. The instruments were responsive to change across time with effect sizes of 0.46 for SE-ICD, and 0.26 for OE-ICD. These reliable, valid, and responsive instruments for measurement of self-efficacy expectations and outcome expectations after an ICD can be used in research and clinical settings.

Keywords

self-efficacy; sudden cardiac arrest; ICD; measurement; instruments; cardiac

Introduction

The theory of self-efficacy is based on social cognitive theory (Bandura, 1997), which is frequently used to predict and explain changes in behavior using the key concepts of self-efficacy expectations, outcome expectations, and person characteristics. Self-efficacy expectations are the person's belief in his or her self-confidence to carry out a specific behavior. Outcome expectations are the beliefs that carrying out a specific behavior will lead to a given outcome. Both types of efficacy expectations play a role in the adoption and maintenance of specific behaviors, with efficacy expectations explaining the majority of the variance in behavior change (Bandura, 1977). Behavioral change is both population and situation specific. No previously developed self-efficacy scales have addressed the population or the specific behavioral changes required in adapting to sudden cardiac arrest and receiving an implantable

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cardioverter defibrillator (ICD). Therefore, the purpose of this paper is to report the reliability and validity of two new measures of efficacy expectations and outcome expectations in patients who received an ICD for life threatening cardiac arrhythmias or resuscitation from sudden cardiac arrest: the Self-Efficacy Expectations after an ICD (SE-ICD) and Outcome Expectations after an ICD (OE-ICD) Scales.

Social Cognitive Theory

Social Cognitive Theory proposes that self-efficacy, an individual's conviction in one's ability to perform a particular behavior, is required to produce a particular outcome (Bandura, 1977; 1986; 1997). Behavioral change and maintenance are functions of both: 1) expectations about the outcomes that will result from engaging in a behavior and 2) expectations about one's ability to execute the behavior required. (Figure 1). Self-efficacy reflects a belief in one's own capabilities, not to general personality trait overall. Thus, self-efficacy expectations will vary greatly depending on the particular task and the context. Self-efficacy interventions reduce emotional reactions such as anxiety and distress (Bandura, 1977, 1986). Social Cognitive Theory served as the structure for the development and initial testing of the instruments in this study.

Self-efficacy in dealing with chronic disease is not simply a matter of knowing what to do. It reflects a capability to organize and integrate cognitive, social, and behavioral skills to meet a variety of purposes. Coping with challenges posed by chronic disease requires not only knowledge and skills, but also a belief in one's ability to use those skills in realistic contexts and a belief that the use of the skills will produce desired outcomes (Bandura, 1997). Individuals tend to avoid tasks and situations that they believe exceed their capabilities but readily undertake activities they judge themselves capable of performing. Judgments of efficacy also determine how much effort and persistence people will expend in the face of obstacles. Those who judge themselves inefficacious in coping with the demands imposed by SCA and subsequent ICD implantation may dwell upon their perceived deficiencies and see difficulties as more formidable than they could be. Because self-efficacy expectations are highly context specific, measurement tools must be developed with respect to a specific task or situation for each special population. The types of outcome expectations people anticipate depend on their judgments of how well they will be able to perform the behavior. That is, those individuals who consider themselves to be highly efficacious will expect favorable outcomes.

Efficacy expectations are increased through four mechanisms: (1) performance accomplishments (learning by doing), (2) vicarious experiences (observing others or role models), (3) verbal persuasion from expert sources, and (4) minimizing emotional arousal (reducing anxiety) (Bandura, 1997). Successful performances of difficult tasks that afford mastery result in increased self-efficacy and are the most powerful sources of efficacy expectations (Lewis & Zahlis, 1997). Successive mastery facilitates the development and refinement of coping skills. Observing another person demonstrate mastery over situations that are feared or perceived as difficult can also enhance one's own efficacy expectations. Effective modeling must demonstrate mastery over difficult situations through determined effort and the model must be similar to the observer in regard to other characteristics such as age and gender. Modeled behaviors coupled with rewarding outcomes are more effective than modeling with unclear outcomes. Verbal persuasion from health care providers viewed as "experts" have aided individuals to change their behavior. Importantly, high emotional arousal impairs performance of behavior as people are more likely to expect failure when emotionally distressed. High anxiety with accompanying physiological responses (increased heart rate, trembling, sweating) may cause individuals to misinterpret performance and extinguish further efforts (Bandura, 1977;1989).

Outcome expectations are the judgments that one makes about whether engaging in a given behavior will produce a given outcome. Outcome expectations take three forms: 1) physical effects that accompany behavior such as pleasant sensory experiences or physical discomfort, 2) social reactions such as expressions of interest, social recognition, or social status, and 3) self-evaluative influences such as self-sanctions, self-satisfaction, and self-worth. The motivating influence of outcome expectations is partly governed by self-efficacy beliefs. The willingness of an individual to engage in a certain behavior is related to the positive benefits expected if that behavior is performed (Bandura, 1997). Outcome expectations are important to consider when changing behavior, however efficacy expectations have been found to have greater predictive power on overall outcomes (Bandura, 1997).

There are no research investigations reported that describe self-efficacy and outcome expectations following sudden cardiac arrest. However, enhancing self-efficacy to affect health behavior change in cardiac patients has been studied extensively. Self-efficacy has been shown to impact performance in cardiac-related lifestyle changes (Allen, Becker, & Swank, 1990; Evon and Burns, 2004; Taylor, Bandura, Ewart, Miller, & DeBusk, 1985), motivational level, and emotional reactions to stressful situations (Bandura, 1982;1986). Higher levels of self-efficacy following a diagnosis of congestive heart failure is predictive of longer survival (Rohrbaugh, Showhan, Coyne, Cranford, Sonnega, Nicklas, 2004). In patients recovering from acute myocardial infarction (MI) and coronary artery bypass graft (CABG) surgery, interventions designed to enhance efficacy expectations have been shown to be positively associated with adherence to exercise programs (Carroll, 1995; Lau-Walker, 2004; Robertson & Keller, 1992; Rankin, Butzlaff, Carroll, & Reedy, 2005). Changes in self-efficacy scores have predicted both duration and intensity of subsequent home activity and correlated with performance on treadmill tests (Oka, Demarco, & Haskell, 2005; Ewart et al., 1983). Interventions that enhance self-efficacy have been shown to improve adherence to cardiac-related lifestyle changes compared with standard instructional interventions following cardiac surgery (Evon & Burns, 2004; Thomas, 1993; Izawa, Watanabe, Omiya, Hirano, Oka, Osada, & Iijima, 2005; Sniehotta, Scholz, Schwarzer, Fuhrmann, Kiwus, & Voller, 2005).

In sum, the quantification of self-efficacy concepts has not been previously described in sudden cardiac arrest survivors who receive an ICD for the first time. Enhancing self-efficacy expectations and outcome expectations are expected to result in significant behavioral change in this population. The scales self-efficacy expectations (SE-ICD) and outcome expectations (OE-ICD) were constructed to measure these concepts in this population. Self-efficacy theory offers a framework for the design of future nursing intervention programs.

Preliminary Development and Pilot Testing

The content for the items for the SE-ICD and OE-ICD scales were derived from concepts identified in a longitudinal study of "Domains of Concern Following Sudden Cardiac Arrest" (Dougherty, Benoliel, & Bellin, 2000). Using grounded theory methods, this study explored the most common problems and concerns of patients during the first year after sudden cardiac arrest and ICD implantation. Seven domains of concern were identified: preventative care, health care providers, partner relationship, activities of daily living, physical changes, emotional challenges, and dealing with ICD shocks. At least one item of the SE-ICD and OE-ICD scales represents each area of concern in recovery after sudden cardiac arrest and receiving an ICD. Additionally, content validity was established by review from 23 physician and nurse experts in the care of sudden cardiac arrest survivors. Fifteen sudden cardiac arrest survivors reviewed the items on the instrument for clarity and content. Feedback from both groups was used to revise the items before the scales were used for testing.

Self-Efficacy Expectations After ICD Implantation Scale (SE-ICD)

The self-efficacy after ICD implantation scale (SE-ICD) is a 16 item scale that focuses on self-efficacy expectations about one's ability to manage common problems encountered after surviving sudden cardiac arrest and receiving an ICD. The first 8 items in the scale measure self-efficacy expectations and the second 8 items measure behaviors required to manage common problems after ICD implantation. Individuals are requested to rate their confidence or behavior on a 0-10 scale, with 0 meaning not at all confident to 10 meaning very confident. Items in the scale are found in Appendix 1. The scale is scored by summing the numerical ratings for each response and dividing by the number of responses.

Outcome Expectations After ICD Implantation Scale (OE-ICD)

The outcome expectations after ICD Implantation Scale (OE-ICD) is a 7 item scale that focuses on perceived consequences of engaging in self-management behaviors after receiving an ICD. The items of the OE-ICD scale also were derived from concepts identified in "Domains of Concern Following Sudden Cardiac Arrest" (Dougherty et al., 2000). The participants are asked to rate their level of agreement with statements in the scale: 1) definitely true, 2) true, 3) maybe true, 4) probably not true, and 5) definitely not true. The scale is scored by summing the numerical ratings for each response and dividing by the number of responses. Scale items are found in Appendix 1.

Reliability and Validity Testing

Sample

Initial testing of the SE-ICD and OE-ICD scales was conducted with study participants (N=168) from a randomized clinical trial of a self-efficacy based nursing intervention (Dougherty, Thompson, & Lewis, 2005). This study included individuals who had experienced a first time sudden cardiac arrest or life threatening arrhythmia that required an ICD for the secondary prevention of cardiac arrest (Gregoratos et al., 1998). Additional inclusion criteria were the ability to read, speak, and write English, have telephone access, and willingness to be followed for one year. Individuals were excluded from the study if they had significant clinical comorbidities that impaired their ability to return home after hospitalization, or if they were less than 21 years of age. Confirmation of SCA and the need for an ICD were verified through medical records and electrophysiological study (EPS) reports. All participants were screened with the short Blessed cognitive screening tool (Katzman et al., 1983) at recruitment. Short Blessed scores of 10 or greater indicated cognitive impairment too severe for participation (ENRICH, 2000).

Procedure

Individuals were approached to participate in the study after IRB approval and written informed consent was obtained, and the individual had been discharged from the hospital following initial ICD implantation. The SE-ICD and OE-ICD scales were self-administered as a mailed questionnaire at hospital discharge and then repeated at 3 months following ICD implantation.

Other Measures

The following measures were used in addition to the SE-ICD and OE-ICD scales: General Self-efficacy Scale, State Trait Anxiety Inventory (STAI), and demographic information.

- *General Self-Efficacy Scale* (Sherer & Adams, 1983; Sherer & Maddux, 1982) is a 23 item inventory that measures the general level of confidence that a person possesses in implementing life activities and is based on Bandura's social cognitive theory (Bandura, 1977, 1982). The scale consists of 2 subscales: general self-efficacy (GSE)

and social self-efficacy (SSE). The self-efficacy scale has been found to predict success in vocational, educational, and military areas. Higher scores are associated with better self-efficacy. In this study Cronbach's alpha reliability for the General Self-Efficacy scale was 0.84 and for the Social Self-Efficacy scale was 0.65.

- *State-Trait Anxiety Inventory* (STAI) (Spielberger, Gorsuch, & Lushene, 1970) is a 20 item tool for assessment of both state and trait anxiety and has been used in over 2000 published studies (Bloom, 1979). Only the state questions that measure of how a person is currently feeling were used in this study. The instrument is averaged so that higher scores denote higher anxiety. Extensive normative data have been collected for comparison, reliability, and validity. The STAI has been used extensively in cardiovascular populations, specifically in hypertension, coronary artery disease, and sudden cardiac arrest. Cronbach's reliability for our sample was 0.84
- *Demographic variables* include age, gender, ethnicity, family income, highest level of education, occupation, height, weight, and other illness characteristics were collected from an interview or from medical records.

Analysis

The psychometric elements examined in the SE-ICD and OE-ICD scales were reliability, validity, and responsiveness to change. Reliability estimation consisted of internal consistency reliability using Cronbach's alpha. Alpha levels of 0.80 or greater were considered desirable, with 0.70 or above viewed as adequate. Ease of use was calculated as the percentage of missing items on each scale. Concurrent validity was assessed using Pearson correlation coefficients between the new scales and other measures (GSE and STAI) thought to be distinct, but related constructs. Construct validity was determined using factor analysis using the principal axis extraction method. Analyses were conducted using data from the baseline measures collected at hospital discharge to maximize acceptable subject-to-item ratios and ensure novelty of the instruments for subjects. Theoretically, the scale was designed to measure two factors (SE and OE), thus a two-factor solution was used. The factor solution was examined for eigenvalues > 1.00. Varimax and oblique rotations were conducted and resulted in the same results, thus the varimax values are reported here. For sample sizes greater than 150, Hair et al. (1995) suggest loadings > 0.40 should be considered important. Responsiveness to change was calculated using mixed factorial ANOVA, comparing from baseline to three months in an intervention group that received a self-efficacy based nursing intervention and an usual care group. Effect size was calculated using Cohen's D formula (Cohen, 1988).

Results

Demographics

Sample demographics are detailed in Table 1. The average age of the sample was 64 ± 12.3 years. Most participants were Caucasian (89%) and male (77%). The majority of SCA survivors were in a relationship with a spouse or significant intimate partner (75%) and lived in an independent living situation with that partner (98.2%). At hospital discharge, SCA survivors made an average of two "errors" on the short Blessed screening tool. One third (30.4%) of participants had an annual combined household income of \$30,000-49,999; over half of the participants (52.4%) were retired from full-time work. The average level of education was "some college" for 23.8%, and a two year college degree or higher degree for 41.1%. The average body mass index of the entire sample was 28.33 cm/m^2 , defined as overweight by the National Heart, Lung, and Blood Institute criteria. The average ejection fraction was 33.75%, which is below the normal range of 50-60% and represents a moderate degree of myocardial impairment. Enrolled patients experienced out-of-hospital ventricular fibrillation (VF) cardiac

arrest or had life threatening arrhythmias that required EPS testing and ICD placement. There were no patients enrolled in the study who received an ICD for primary prevention of sudden cardiac arrest who had congestive heart failure. The study sample is reflective of the United States population of persons who experience SCA and life threatening arrhythmias and obtain an ICD for the secondary prevention of sudden cardiac arrest.

The completion rates for both instruments were greater than 95% (Table 2), demonstrating that the instrument was easy to use. It was anticipated that if the instrument was difficult to complete, subjects might be less likely to answer questions, and completion rates would fall below 70%. The questions with the lowest completion rate related to the topic of driving. Participants found it most difficult to adjust to driving restrictions placed on them after receiving an ICD, and often left this item missing possibly because they did not want health care providers to know that they were driving despite being advised against it. Item #5 of the OE-ICD Scale was often left missing when the participant did not have a partner.

Reliability Testing

The internal consistency of the SE-ICD and OE-ICD scales is detailed in Table 2. The Cronbach's reliability was 0.93 for the SE-ICD scale, and was 0.81 for the OE-ICD scale. Total item correlation coefficients on the SE-ICD scale ranged from 0.40 (Item 16) to 0.75 (Item 3), with only one item (Item 16) having a coefficient less than 0.50. Total item correlation coefficients on the OE-ICD scale ranged from 0.42 (Item 7) to 0.64 (Item 1), with only one item (Item 7) having a coefficient less than the desired 0.50. Both scales demonstrated acceptable internal consistency.

Validity Testing

Qualitative data analysis was used to establish content validity for the items on the instruments and is reported elsewhere (Dougherty et al., 2000). Factor analysis (construct validity) and inter-instrument correlations (concurrent validity) were used to examine validity at baseline hospital discharge.

Construct Validity—The items of each instrument were combined and subjected to a single factor analysis using principal axis extraction, varimax rotation, with selection criteria of eigenvalues above 1.0. A confirmatory factor solution with two factors was specified. Factor loadings from the confirmatory factor analysis for the two scales are shown in Table 4. Item loadings were examined to determine the match with the proposed scales SE-ICD and OE-ICD, and to detect the presence of dual loadings of individual items.

The SE-ICD scale consisted of 16 items (8 items representing self-confidence and 8 items representing efficacy behaviors). Factor 1 had an eigenvalue of 7.45, explaining 32.4% of the variance (Table 4). All items except one loaded .50 or greater on the first factor. Item 16 of the SE-ICD, measuring ability to manage an ICD shock should it occur, loaded weakly on Factor 1.

The OE-ICD scale consisted of 7 items representing beliefs that enacting a particular behavior will result in a desired outcome relevant to post-ICD recovery. Factor 2 had an eigenvalue of 3.30, explaining 14.4% of the variance (Table 4). All items loaded .40 or greater on this second factor. The cumulative percent of variance explained with two factors was 46.76%, though moderate, this value is consonant for behavioral measures factored using principal axis factor analysis (Hair et al, 1995). Factor analysis supported the construct validity of the SE-ICD and OE-ICD scales, but suggested that one item on the SE-ICD should be re-examined, re-worded, or dropped in order for better understanding.

Concurrent Validity—Inter-correlations between the General Self-Efficacy Scale, STAI, and the new SE-ICD and OE-ICD scales (Table 3) were used to establish concurrent validity. The SE-ICD and OE-ICD were expected to be positively correlated with GSE, an established measure of general self-efficacy, and negatively correlated with the anxiety as measured by the STAI (i.e., lower anxiety associated with greater self-efficacy). The SE-ICD scale correlated 0.48 with the GSE and -0.61 with the STAI. The OE-ICD scale correlated 0.40 with the GSE and -0.38 with the STAI. The SE-ICD and OE-ICD scales were correlated at 0.47. The results of this analysis supported the concurrent validity of the SE-ICD and OE-ICD scales.

Responsiveness to change

Responsiveness to change and effect size for the two instruments were based on comparisons between intervention and usual care groups for measures taken at baseline and collected again at three months post-intervention. The mixed factorial ANOVA and effect sizes used to evaluate responsiveness of the scales are listed in Table 5. The magnitude of the differences from baseline to three months was based on the effect size of the intervention x group interaction term. The effect size for the SE-ICD scale over three months was 0.46 (medium) and the effect size of the OE-ICD over three months was 0.26 (small) (Cohen, 1988). The SE-ICD Scale revealed statistically significant change in the appropriate direction post-intervention, indicating that the measure of self-efficacy expectations and behaviors was sensitive to change over time.

The OE-ICD Scale scores improved in the self-efficacy intervention group, while remaining the same in the usual care group. Mean differences between the groups at three months however, were not statistically significant. According to Bandura (1997), outcome expectations may change as a result of enacting self-efficacy behaviors, but self-efficacy expectations account for much of the improvement in overall self-efficacy, consistent with these results. Additionally, changes in *outcome* expectations follow changes in *self-efficacy* expectation, perhaps accounting for non-significant changes observed at 3 months.

Recommendations

The content of the questions developed for the SE-ICD and OE-ICD were derived from qualitative concept analysis with previous sudden cardiac arrest survivors who received an ICD, and therefore has established content validity. The findings indicate that the SE-ICD and OE-ICD scales capture self-efficacy expectations and outcome expectations in this population. Testing the instruments with a larger sample, however, is needed.

The SE-ICD Scale performed well in psychometric tests including tests to establish construct validity (factor analysis), concurrent validity (inter-instrument correlations), reliability (internal consistency), and measure responsiveness or sensitivity to change. One item in the SE-ICD scale, measuring self-efficacy expectations for managing an ICD shock plan, needs further examination, and perhaps re-working due to a low factor loading. Participants often reported that they had not had the opportunity to enact an ICD shock plan at the point when the measures were administered (hospital discharge) and saw this experience as futuristic. Therefore the item was often marked ‘not applicable,’ yielding low item variance. The item may be more reliable if it addressed the *preparation* of an ICD shock plan, i.e. ‘successfully prepared an ICD shock plan’, rather than addressing the behavior of responding to an ICD shock. A second version of the SE-ICD Scale will test the factor loadings and reliabilities of the revised instrument in a similar patient population.

The OE-ICD Scale performed well in psychometric testing, but proved to be less responsiveness than the SE-ICD Scale to change after 3 months. The effect size reflecting change for OE-ICD was small (0.26) as defined by Cohen (1988). Theoretically, changes in

outcome expectations are posited to follow changes in self-efficacy expectations (Bandura, 1997), suggesting the need to test this measure's responsivity to change over a longer periods.

Implications for Clinical Research

This investigation describes the development of two new scales for capturing self-efficacy and outcome expectations in sudden cardiac arrest survivors who get an ICD for the first time. Future studies should use a larger more diverse sample and structural equation modeling techniques to confirm the factor structure observed in this study, and to test for factor invariance across age, gender, and ethnicity groupings. Measurement of self-efficacy expectations and outcome expectations enhance our understanding of factors that explain health outcomes and adaptive behaviors after receiving an ICD. This knowledge, in turn is important to designing and implementing nursing interventions to enhance self-efficacy to improve health outcomes in this population.

Implications for Clinical Practice

Social cognitive theory and the concepts of self-efficacy are useful in nursing practice because patients must have access to both knowledge and skills in order to change behavior in adaptation to chronic illnesses. In making behavioral changes in dietary habits, weight management, exercise, smoking cessation, and others, having the self-confidence and the belief that behavioral changes are worthwhile serve to motivate patients in changing. Specific interventions appropriate to stages of change and strategies to build self-confidence to make behavioral changes are fundamental to nursing practice. Therefore, nurses working in outpatient and acute care settings who are assisting patients to make lifestyle changes to reduce the risk of disease and affect positive health outcomes will find these scales useful. For nurses working with patients who receive ICD implantations for the first time, the SE-ICD and OE-ICD scales offer a practical means to assess self-efficacy, facilitating the incorporation of such information into nursing interventions designed to assist patients in making behavioral changes when adapting to an ICD.

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SE-ICD and OE-ICD Scale Items

Appendix 1

Item	Question	Response Options										
		Not at all Confident					Very Confident					
1	SE-ICD "Rate the confidence you feel today": I am able to deal with the physical changes caused by the insertion of the defibrillator	0	1	2	3	4	5	6	7	8	9	10

Item	Question	Response Options										
2	I can successfully deal with limits placed on my driving since the cardiac arrest & defibrillator	0	1	2	3	4	5	6	7	8	9	10
3	I can manage my own nervousness since the cardiac arrest & defibrillator	0	1	2	3	4	5	6	7	8	9	10
4	I feel confident that I can eventually get back to my normal activities around the house and at work	0	1	2	3	4	5	6	7	8	9	10
5	I have the skills to deal with the pressures the cardiac arrest & defibrillator are causing in my close relationships.	0	1	2	3	4	5	6	7	8	9	10
6	I am able to manage interactions with my doctors, nurses, and other health care providers.	0	1	2	3	4	5	6	7	8	9	10
7	I can avoid environmental hazards that may cause my defibrillator to malfunction.	0	1	2	3	4	5	6	7	8	9	10
8	I have the ability to deal with defibrillator activation when it occurs.	0	1	2	3	4	5	6	7	8	9	10
“Mark the number which best describes the extent to		Not at all					Totally					

Item	Question which you have”:	Response Options										
9	Dealt with the physical changes caused by the insertion of your ICD.	0	1	2	3	4	5	6	7	8	9	10
10	Dealt with driving restrictions.	0	1	2	3	4	5	6	7	8	9	10
11	Managed your nervousness since your ICD.	0	1	2	3	4	5	6	7	8	9	10
12	Resumed normal household & work activities.	0	1	2	3	4	5	6	7	8	9	10
13	Dealt with pressure in your close relationship since the ICD.	0	1	2	3	4	5	6	7	8	9	10
14	Managed interactions with doctors & nurses successfully.	0	1	2	3	4	5	6	7	8	9	10
15	Avoided environmental hazards to your ICD.	0	1	2	3	4	5	6	7	8	9	10
16	Dealt satisfactorily with ICD shocks when they occurred.	0	1	2	3	4	5	6	7	8	9	10
OE-ICD “Rate your agreement or disagreement as of today”:		Definitely True					Definitely not True					
1	If I have a plan in place for dealing with defibrillator shocks, then I	5			4		3		2		1	

Item	Question	Response Options				
	will feel safer if this occurs.					
2	If I address my emotional reactions to the cardiac arrest and defibrillator, then I am less likely to be distressed by them.	5	4	3	2	1
3	If I have my defibrillator checked routinely, then problems with my ICD function can be more readily addressed.	5	4	3	2	1
4	If I share information related to my ICD shocks and heart symptoms, then my health care providers can more effectively treat them.	5	4	3	2	1
5	If my partner and I are open to each other's experiences about my cardiac arrest and defibrillator, then we can begin to deal with this together.	5	4	3	2	1
6	If I follow the safe activity suggestions prescribed by my health care providers, then complications related to my ICD will be reduced.	5	4	3	2	1
7	If I am physically active during my recovery from the	5	4	3	2	1

Item	Question	Response Options
	defibrillator, then my physical recovery will be faster.	

References

- Allen JK, Becker DM, Swank RT. Factors related to functional status after coronary artery bypass surgery. *Heart & Lung* 1990;19:337–43. [PubMed: 2370166]
- Bandura A. Human agency in social cognitive theory. *American Psychologist* 1989;44(9):1175–1184. [PubMed: 2782727]
- Bandura A. Self-efficacy mechanism in human agency. *American Psychologist* 1982;37:122–147.
- Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review* 1977;84(2):191–215. [PubMed: 847061]
- Bandura, A. Self-efficacy: The exercise of control. New York: W. H. Freeman; 1997.
- Bandura, A. Social Foundations of Thought and Action. New Jersey: Prentice-Hall; 1986.
- Bloom L. Psychology and cardiology's collaboration in coronary treatment and prevention. *Professional Psychology* 10:485–90.
- Carroll DL. The importance of self-efficacy expectations in elderly patients recovering from coronary artery bypass surgery. *Heart & Lung* 1995;24:50–59. [PubMed: 7706100]
- Charlson ME, Pompei P, Ales KL, Mackenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. *Journal of Chronic Disease* 1987;40(5):373–83.
- Cohen, J. Statistical Power Analysis for Behavioral Sciences. Vol. Revised. Orlando, FL: Academic Press; 1988.
- Dougherty CM, Benoliel JQ, Bellin C. Domains of nursing intervention after sudden cardiac arrest and automatic implantable cardioverter defibrillator implantation. *Heart and Lung: The Journal of Critical Care* 2000;29(2):79–86.
- Dougherty CM, Thompson EA, Lewis FM. Long-term outcomes of a telephone intervention after an ICD. *Pacing and Clinical Electrophysiology: PACE* 2005;(11):1157–67.
- Enhancing Recovery in Coronary Heart Disease Patients (ENRICH). Study design and methods. *American Heart Journal* 2000;138:1–9.
- Evon DM, Burns JW. Process and outcome in cardiac rehabilitation: an examination of cross-lagged effects. *Journal of Consulting and Clinical Psychology* 2004;72(4):605–16. [PubMed: 15301645]
- Ewart CK, Taylor CB, Reese LB, DeBusk RF. Effects of early post-myocardial infarction exercise testing on self-perception and subsequent physical activity. *American Journal of Cardiology* 1983;51(7):1076–80. [PubMed: 6837450]
- Gregoratos G, Chetlin MD, Conill A, Epstein AE, Fellows C, Ferguson TB Jr, et al. ACC/AHA guidelines for implantation of cardiac pacemakers and antiarrhythmia devices: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Journal of the American College of Cardiology* 1998;31:1175–1209. [PubMed: 9562026]
- Hair, JF.; Anderson, RE.; Tatham, TL.; Black, WC. Multivariate data analysis with readings. Vol. 4th. Englewood Cliffs, New Jersey: Prentice Hall; 1995.
- Izawa KP, Watanabe S, Omiya K, Hirano Y, Oka K, Osada N, Iijima S. Effect of the self-monitoring approach on exercise maintenance during cardiac rehabilitation: a randomized, controlled trial. *American Journal of Physical Medicine and Rehabilitation* 2005;84(5):313–21. [PubMed: 15829777]
- Katzman R, Brown T, Fuld P, Peck A, Schechter R, Schimmel H. Validation of a short orientation-memory-concentration test of cognitive impairment. *American Journal of Psychiatry* 1983;140:734–39. [PubMed: 6846631]
- Lau-Walker M. Relationship between illness representation and self-efficacy. *Journal of Advanced Nursing* 2004;48(3):216–25. [PubMed: 15488035]

- Lewis FM, Zahlis EH. The nurse as coach: A conceptual framework for clinical practice. *Oncology Nursing Forum* 1997;24(10):1695–1702. [PubMed: 9399268]
- Oka RK, DeMarco T, Haskell WL. Effect of treadmill testing and exercise training on self-efficacy in patients with heart failure. *European Journal of Cardiovascular Nursing* 2005;4(3):215–9. [PubMed: 15908277]
- Rankin SH, Butzlaff A, Carroll DL, Reedy I. FAMISHED for support: Recovering elders after cardiac events. *Clinical Nurse Specialist* 2005;19(3):142–149. [PubMed: 15897771]
- Robertson D, Keller C. Relationships among health beliefs, self-efficacy, and exercise adherence in patients with coronary artery disease. *Heart & Lung* 1992;21:58–63.
- Rohrbaugh MJ, Shoham V, Coyne JC, Cranford JA, Sonnega JS, Nicklas JM. Beyond the “self” in self-efficacy: Spouse confidence predicts patient survival following heart failure. *J of Family Psychology* 2004;18(1):184–93.
- Sherer M, Adams CH. Construct validation of the self-efficacy scale. *Psychological Reports* 1983;53:899–902.
- Sherer M, Maddux JE. The self-efficacy scale: Construction and Validation. *Psychological Reports* 1982;51:663–671.
- Sniehotta FF, Scholz U, Schwarzer R, Fuhrmann B, Kiwus U, Voller H. Long-term effects of two psychological interventions on physical exercise and self-regulation following coronary rehabilitation. *International Journal of Behavioral Medicine* 2005;12(4):244–55. [PubMed: 16262543]
- Speilberger, C.; Gorsuch, R.; Lushene, R. Manual for the State-Trait Anxiety Inventory (self-evaluation questionnaire). Palo Alto, CA: Consulting Psychologists; 1970.
- Taylor CB, Bandura A, Ewart CK, Miller NH, DeBusk RF. Exercise testing to enhance wives confidence in their husbands cardiac capability soon after clinically uncomplicated acute myocardial infarction. *American Journal of Cardiology* 1985;55:635–38. [PubMed: 3976503]
- Thomas JJ. Cardiac inpatient education: The impact of educational methodology on self-efficacy. *Journal of Cardiopulmonary Rehabilitation* 1993;13:398–405.

Figure 1.

Social Cognitive Theory*

*Bandura A. Self-Efficacy: The Exercise of Control. New York: WH. Freeman and Company, 1997.

Table 1

Demographics of study sample (N=168)

Variable		N=168
Age (mean $\pm$ SD)		64.04 (12.28)
Ejection Fraction (mean $\pm$ SD)		33.75 (13.64)
Body Mass Index (cm/m ³) (mean $\pm$ SD)		28.33 (6.32)
Charlson Co-morbidity Index (mean $\pm$ SD)		4.35 (2.33)
Short Blessed Score (mean $\pm$ SD)		2.43 (2.92)
Gender N (%)	Male	129 (76.8 %)
	Female	39 (23.2 %)
Partner N (%)	With Partner	126 (75.0 %)
Prior Myocardial Infarction N (%)		93 (55.4 %)
Ethnicity N (%)	White	150 (89.3 %)
	American Indian/Alaska	3 (1.8 %)
	Asian/Pacific Islander	4 (2.4 %)
	Black/African	7 (4.2 %)
	Other	3 (1.8 %)
Employment N (%)	Full-Time	37 (22.0 %)
	Part-Time	19 (11.3 %)
	Unemployed	8 (4.8 %)
	Retired	88 (52.4 %)
	Full-Time Housewife	4 (2.4 %)
Income N (%)	Disabled	12 (7.1 %)
	< \$10k	6 (3.6 %)
	10k – 29,999k	37 (22.0 %)
	30k – 49,999k	51 (30.4 %)
	50k – 69,999k	23 (13.7 %)
	70k – 89,999k	16 (9.5 %)
Education N (%)	> 90k	14 (8.3 %)
	Some High School or less	21 (12.5 %)
	High School Diploma	38 (22.6 %)
	Some College	40 (23.8 %)
	Finished Vocational Program	5 (3.0 %)
	Finished 2 year College Program	18 (10.7 %)
	Graduated from 4 year College	21 (12.5 %)
ICD reason N (%)	Graduate Education	25 (14.9 %)
	VF arrest or required cardioversion	65 (38.7 %)
	VT or VF inducible on EPS	103 (61.3 %)

VF = ventricular fibrillation, VT = ventricular tachycardia

Table 2
Item Statistics, Total Scale Reliability, and Completion Rates (N=168)

Question Number and Description	Item M $\pm$ SD	Range	Item-Total Correlation	Count of Missing Answers
SE-ICD				
1. I am able to deal with physical	8.42 $\pm$ 2.11	0-10	0.71	0
2. I can successfully deal with driving	7.91 $\pm$ 2.75	0-10	0.63	9
3. Manage nervousness	8.55 $\pm$ 2.13	1-10	0.75	0
4. Get back to normal activities	8.50 $\pm$ 2.39	0-10	0.51	0
5. Skills to deal with pressures	8.56 $\pm$ 2.16	0-10	0.73	2
6. Manage interactions with providers	9.21 $\pm$ 1.46	3-10	0.71	0
7. Avoid hazards to ICD	8.97 $\pm$ 1.66	2-10	0.61	0
8. ICD shock	7.81 $\pm$ 2.68	0-10	0.70	0
9. Dealt with physical ICD	8.04 $\pm$ 2.45	0-10	0.70	0
10. Dealt with driving	8.00 $\pm$ 2.84	0-10	0.67	13
11. Managed nervousness	8.14 $\pm$ 2.44	0-10	0.83	0
12. Resumed normal activity	6.29 $\pm$ 3.44	0-10	0.52	0
13. Dealt with pressures	8.03 $\pm$ 2.61	0-10	0.74	6
14. Managed interactions with providers	9.11 $\pm$ 1.63	0-10	0.69	2
15. Avoided environmental hazards	9.15 $\pm$ 1.81	0-10	0.52	0
16. Dealt with ICD shocks	7.78 $\pm$ 3.80	0-10	0.40	2
Total Scale	8.32 $\pm$ 1.63	3.56-10	0.93 ^a	98.8% ^b
OE-ICD				
1. If I have a plan shocks	3.95 $\pm$ 0.89	1-5	0.64	0
2. If I address emotional	4.14 $\pm$ 0.76	1-5	0.58	0
3. If I have ICD check	4.52 $\pm$ 0.59	2-5	0.52	1
4. If I share information	4.66 $\pm$ 0.51	3-5	0.48	0
5. If I and partner open	4.43 $\pm$ 0.67	1-5	0.63	22
6. If I follow safe activity	4.48 $\pm$ 0.57	3-5	0.56	0
7. If I am physically active	4.18 $\pm$ 0.78	1-5	0.42	1
Total Scale	4.32 $\pm$ 0.49	3.95-4.65	0.81 ^a	97.8% ^b

^aTotal scale Cronbach's alpha.

^bTotal scale Completion rate

Table 3

Pearson Correlations of SE-ICD and OE-ICD with General Self-Efficacy, Social Self-Efficacy and Anxiety

	SE-ICD	OE-ICD
General Self-Efficacy (GSE)	0.48 **	0.40 **
Social Self-Efficacy (SSE)	0.36 **	0.13
Anxiety (STAI)	-0.61 **	-0.38 **
Outcome Expectancies (OE-ICD)	0.47 **	1.00

**
 $p < 0.01$

Note: STAI: State-Trait Anxiety Inventory.

Table 4

Principal Components Factor Analysis of SE-ICD and OE-ICE Scales

Factor Loadings		
Items SE-ICD	Factor 1 Self-Efficacy	Factor 2 Outcome Expect.
1	0.80 [*]	0.20
2	0.66 [*]	0.09
3	0.78 [*]	0.27
4	0.50 [*]	0.21
5	0.74 [*]	0.19
6	0.75 [*]	0.26
7	0.67 [*]	0.14
8	0.74 [*]	0.19
9	0.66 [*]	0.29
10	0.67 [*]	0.19
11	0.81 [*]	0.31
12	0.51 [*]	0.16
13	0.69 [*]	0.27
14	0.68 [*]	0.26
15	0.52 [*]	0.17
16	0.36 [*]	0.18
Items OE-ICD	Factor 1 Self-Efficacy	Factor 2 Outcome Expect
1	0.18	0.68 [*]
2	0.26	0.66 [*]
3	0.16	0.59 [*]
4	0.09	0.55 [*]
5	0.25	0.67 [*]
6	0.28	0.59 [*]
7	0.14	0.44 [*]
Eigenvalue	7.45	3.30
% of Variance Explained	32.39	14.37
Cumulative %	32.39	46.76

* Identifies to which factor the item loads.

Table 5
Sensitivity to Change in SE-ICD and OE-ICD Scales 3-months Post Nursing Intervention

Instrument	Group*	M ± SD Baseline	M ± SD 3 months	F	p	Effect Size**	Power
SE-ICD	UC	8.57 ± 1.46	8.86 ± 1.41	6.14	0.01	0.46	0.70
SE-ICD	INT	8.08 ± 1.76	8.87 ± 1.35				
OE-ICD	UC	4.38 ± 0.48	4.39 ± 0.48	2.11	0.15	0.26	0.30
OE-ICD	INT	4.26 ± 0.50	4.40 ± 0.52				

* UC=usual care, INT=intervention group

** calculated using Cohen's D formula (Cohen, 1988).