

The Psychological Consequences of Cardiopulmonary Resuscitation Training for Family Members of Patients at Risk for Sudden Death

ABSTRACT

Objectives. The purpose of this study was to determine psychological consequences of teaching cardiopulmonary resuscitation (CPR) to family members of patients at risk for sudden death.

Methods. Patient-family pairs ($n = 337$) were randomized into one of four groups: control, CPR only, CPR with cardiac risk factor education, and CPR with a social support intervention. Only family members received CPR training. Data on emotional state and psychosocial adjustment to illness were collected at baseline, 2 weeks, and 3 and 6 months following CPR training.

Results. There were no significant differences in the emotional states of family members across the four groups. However, significant differences in psychosocial adjustment and emotional states occurred in patients across treatment groups following CPR training. Patients whose family members learned CPR with the social support intervention reported better psychosocial adjustment and less anxiety and hostility than patients in the other groups. Control patients reported better psychosocial adjustment and less emotional distress than patients in the CPR-only and CPR-education groups.

Conclusions. These findings support tailoring family CPR training so that instruction does not result in negative psychological states in patients. The findings also illustrate the efficacy of a simple intervention that combines CPR training with social support. (*Am J Public Health*. 1997; 87:1434-1439)

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Introduction

Sudden cardiac death is a major public health problem. It is the leading cause of death in Western countries, with approximately 500 000 deaths occurring each year in the United States alone.¹ Survival from sudden cardiac death requires immediate cardiopulmonary resuscitation (CPR),²⁻⁷ as well as early defibrillation, resuscitative pharmacology, and effective ventilation. Bystander CPR coupled with the prompt delivery of advanced cardiac life support significantly improves the prognosis of a person with out-of-hospital cardiac arrest.^{3,5,7-9}

As many as 50 million Americans have been trained to perform CPR, making mass CPR training one of the most successful recent public health initiatives.¹⁰ However, clinicians and researchers have begun to question the wisdom of communitywide CPR instruction.¹¹ Scarce resources might be better utilized if subgroups who are more likely to use CPR were targeted for training. Since three out of four sudden cardiac death events occur in the home in the presence of family members,⁹ family members of individuals at risk for sudden cardiac death are the most appropriate target for CPR instruction.

Despite the compelling logic of targeting family members for CPR training, these individuals do not seek CPR training,¹² and most physicians do not actively recommend it.¹³ For example, in one study, 79% of physicians surveyed stated that CPR training for family members was important, but only 6% recommended it to the families in their practices.¹⁴ One impediment to targeting family members for CPR training is concern about the psychological effects of such training on both cardiac patients and

their families.¹⁵ Findings from one study suggest that such concern might be justified. In a randomized trial, cardiac patients whose family members received CPR training were more anxious and depressed at follow-up than patients whose family members did not receive CPR training or who attended an education class about heart disease and cardiac risk factors without CPR training.¹⁶

If CPR is to be taught to family members of individuals with cardiac disease, the intervention must be enhanced to reduce any deleterious psychological effects. We hypothesized two additions to CPR training that might reduce its stressful psychological effects. First, CPR combined with didactic instruction about cardiac risk factors should enhance the sense of predictability, thereby increasing feelings of control in both patients and families. Second, CPR followed by a support group intervention should enhance the expression of feelings by the CPR-trained person, thereby reducing the stress associated with training. Specifically, the social support intervention was designed to reduce family members' anxiety about the occurrence of future cardiac emergencies and the frustration that they might experience in feeling responsible for the patient's well-being 24 hours a day. Therefore, we conducted a randomized clinical trial comparing these

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This paper was accepted November 15, 1996.

two methods with the usual method of teaching CPR without such content. The aim was to identify the psychological impact of various methods of CPR training for family members of patients at risk for future cardiac arrest. We hypothesized that the most positive effects, in both family members and patients, would be seen with CPR combined with social support and that the most negative effects would be seen with CPR-only training.

Methods

Sample Selection

Patients were considered eligible for the study if they were 25 to 80 years of age; were at increased risk for sudden death by virtue of coronary artery disease (documented by coronary angiography or indicated by acute or previous myocardial infarction, recurrent ventricular arrhythmia or cardiac arrest, or post-coronary artery bypass status) or cardiomyopathy; and had at least one adult family member residing in the same household. Patients and family members were excluded if either had a serious comorbid medical or psychiatric diagnosis based on hospital chart review and attending physician assessment. Family members were also excluded if they had coronary artery disease or if they had taken a CPR class within the preceding 2 years.

Four hundred fifty-three patient-family pairs were recruited from six large metropolitan area hospitals on the West Coast and randomized to one of three CPR intervention groups or a control group. Seventy-four percent of the enrolled subjects ($n = 674$ or 337 pairs) completed all instruments at the four data collection points and data from these subjects were used in all analyses.

Patients and family members who completed the study were compared with those who had incomplete data on sociodemographic characteristics (i.e., age, sex, marital status, race, work status, and education level), marital adjustment scores, and baseline dependent variables. In general, patients with incomplete data were not significantly different from patients with complete data. However, family members with incomplete data were significantly more anxious, more depressed, and younger (mean age 55 years vs 59 years) than family members who completed all data collection instruments ($P < .05$). Finally, there were significant differences by family member occupational status: a larger proportion of

homemakers was seen in the incomplete data group and a larger proportion of retired persons was seen in the complete data group ($P < .05$).

Sample characteristics are summarized in Table 1. The majority (317 or 94%) of the 337 participating family members were spouses of the patients. The remaining 20 family members were adult children or live-in partners. On average, patients were middle-aged (mean age 63 years), male, employed, White, and in New York Heart Association class I or II. (New York Heart Association class is a measure of functional status that ranges from I to IV, with the worst functional status indicated by class IV. Patients classified as class I are asymptomatic with ordinary physical activity; class II patients are symptomatic with physical activity; class III patients are symptomatic with minimal activity; and class IV patients are symptomatic at rest.) Family members were predominately middle-aged (mean age 59 years), female spouses, and White.

Procedure

After researchers obtained institutional review board approval and attending physician consent to approach the patient and family, eligible subjects signed an informed consent form. Subjects were randomized into control or experimental groups on the basis of their time of entry into the study. The sequence of the four groups was the same for each hospital and was determined randomly. The sequence was CPR-social support, CPR-education, control, and CPR-only. Subjects were assigned to a specific group until the group reached a target number of 112 pairs. Target numbers were based on a power analysis using $\alpha = .05$, $\beta = .80$, and a moderate effect size with an anticipated dropout rate over the 6 months of study of 25%. This method of randomization was chosen because the numbers of family members were insufficient to allow for simultaneous group assignment and it prevented contamination of subjects at the various treatment sites.

All subjects in the three CPR intervention groups attended a single CPR training class, which lasted approximately 90 minutes. Classes were attended by two to six family members at a time to ensure maximal individual attention and time for practice. All classes were taught by cardiovascular clinical nurse specialists certified by the American Heart Association as Basic Life Support instructors. Classes were structured to maximize CPR

TABLE 1—Baseline Characteristics of Cardiac Patients and Family Members Enrolled in the Psychosocial Consequence of CPR Training Study

	Patients (n = 337)	Family (n = 337)
Gender, %		
Male	84.3	16.9
Female	15.7	83.1
Marital status, %		
Never married	2.9	0.9
Married	94.1	94.9
Divorced	1.8	1.5
Widowed	0.6	1.8
Separated	0.6	0.9
Race, %		
White	92.0	90.2
Black	2.7	2.4
Hispanic	0.6	1.5
Asian	3.0	4.5
Other	1.8	1.5
Work status, %		
Unemployed	3.3	0.9
On sick leave	3.8	0.3
Part-time	9.2	17.2
Full-time	35.5	30.0
Homemaker	6.2	24.3
Retired	41.4	23.7
Missing	0.6	3.6
Mean age, y, \pm SD	62.9 \pm 10.1	59.0 \pm 10.9
Mean education, y, \pm SD	14.5 \pm 3.2	14.1 \pm 2.7

skills learning and retention, and subjects demonstrated appropriate CPR technique at the completion of the class.¹⁷ Patients did not attend the classes.

Recent American Heart Association recommendations¹⁰ were incorporated as follows: only one-person CPR was taught, the teaching of CPR was divided into discrete segments emphasizing the individual components, and each segment was practiced and reinforced before new segments were taught. A videotape was used to ensure consistency among classes and instructors. The tape was designed to be stopped as each discrete skill was shown, with subsequent demonstration by the instructor and practice by the participants on a resuscitation mannequin. At the tape's end the instructor demonstrated several CPR sequences, followed by another demonstration by the participants.

Finally, participants were asked to perform CPR for four uninterrupted and uncoached cycles.

The CPR-social support group received CPR training as above, followed by a 30- to 45-minute group discussion led by the same clinical nurse specialist who taught CPR. The group discussion addressed family members' psychological responses to having learned CPR. The goals of the support group were to help families identify and reduce inappropriate feelings of responsibility for the outcome of a cardiac emergency and to reduce potential negative emotional responses by identifying anticipatory grief responses and acknowledging the normalcy of these feelings.

The CPR-education group also received CPR training as described above. In addition, the group watched a didactic videotape presentation about heart disease and cardiac risk factors. The videotape was stopped at regular intervals so that a clinical nurse specialist could clarify any misconceptions and answer questions. The discussion included information about atherosclerotic heart disease, risk factors, and heart attack warning signs.

The CPR-only group received CPR training as described above without any additional intervention. The control group completed all questionnaires but family members did not attend any intervention class.

Research Instruments

All subjects completed the research questionnaires at baseline, 2 weeks, 3 months, and 6 months after CPR training. Control subjects completed questionnaires according to the same time frame. Psychological adjustment was defined as anxiety, depression, hostility, and psychosocial adjustment to illness.

The Multiple Affect Adjective Checklist measures state anxiety, depression, and hostility.¹⁸⁻²⁰ This instrument is composed of 132 adjectives, alphabetically arranged. Subjects check all adjectives that describe their feelings. It has shown sensitivity to changes in anxiety, depression, and hostility associated with stressful or stress-alleviating conditions, with higher scores indicating higher levels of these emotions.¹⁸ Concurrent validity and internal reliability have been established by means of a variety of self-report instruments and clinical interviews.^{19,20} The range of scores is 0 through 21 for anxiety, 0 through 40 for depression, and 0 through 30 for hostility. In a recent study of 132 cardiac patients with advanced

heart failure in which the same instrument was used, the mean anxiety score was 10.4, the mean depression score was 19.5, and the mean hostility score was 11.5.²¹

Adjustment to illness was assessed by the Psychosocial Adjustment to Illness Scale developed by Derogatis.²² This scale, which consists of 46 self-report questions, was administered at baseline and at 3 and 6 months. It measures seven domains: health care orientation, vocational environment, domestic environment, sexual relationships, extended family relationships, social environment, and psychological distress. Raw scores were converted to standardized area T scores on the basis of cardiac patient normative scores established by Derogatis and Lopez.²³ Higher scores indicate poorer adjustment across all domains. Adequate internal consistency has been demonstrated.²³ Content, construct, and convergent validity have been established in studies involving patients with chronic illness, including cardiac disease.²²⁻²⁴

All patient-family pairs who were married completed the Spanier Dyadic Adjustment Scale,²⁵ an instrument that assesses satisfaction with the marital relationship. The 32-item scale is divided into four subscales: satisfaction, dyadic cohesion, consensus, and affectional expression. The range is 1 through 150, with higher scores denoting greater satisfaction. The instrument has established criterion-related validity and concurrent validity based on a comparison with the Locke-Wallace Marital Adjustment Scale. Internal consistency by Cronbach's coefficient alpha has been established at .96.²⁵

The majority of patients had been married for over 20 years, making it unlikely that the CPR intervention would affect their level of marital adjustment. However, we hypothesized that marital adjustment would moderate the relationship between type of CPR training and psychological states of patients and family members.

Statistical Analysis

Patients and family members were analyzed separately in all analyses. To test the randomization procedures and identify any baseline differences among the four groups, we compared baseline sociodemographic characteristics and values on dependent variables among the four study groups, using analysis of variance for continuous level data and chi-squared tests for categorical and ordinal level data.

The hypothesis that the four groups would differ on the major dependent

variables (anxiety, depression, hostility, and psychosocial adjustment to illness) at 2 weeks, 3 months, and 6 months was examined by means of repeated measures multivariate analysis of variance with post hoc comparisons to identify sources of difference. When a significant group effect was identified, a univariate analysis of variance was conducted to determine on which dependent variables the groups differed; then comparisons were carried out with *t* tests to investigate the nature of the effect. Significance was set at .05. Continuous data are presented as means plus or minus standard deviation. A post hoc power analysis using a moderate effect size (calculated from our data) and $\alpha = .05$ revealed that our sample had sufficient power ($1 - \beta > .85$) to detect between-group differences.

Results

To confirm the equivalency of the four treatment groups, sociodemographic characteristics and dependent variables at study entry were compared. There were no significant differences among the four patient and four family groups. Marital adjustment scores were also compared among groups and no significant differences were found among either the patient or spouse groups. The analysis revealed patients and spouses who were relatively satisfied with their marriages (mean score = 111 ± 18).

It was anticipated that stronger effects would be seen in family members than in patients, since only family members attended the CPR training classes, but the predicted results were not found. In fact, patients demonstrated the more dramatic response to treatment assignment.

Patients

A multivariate analysis of variance for repeated measures revealed a significant group effect ($P = .005$) when the four patient groups were compared on all dependent variables over time. The psychological adjustment of patients was negatively affected when family members learned CPR without a social support intervention (Table 2). Patterns of change were similar across the dependent variables. Univariate analysis of variance revealed significant differences at 3 months in total psychosocial adjustment to illness scores ($P = .02$) and at 6 months in anxiety ($P = .04$), hostility ($P = .007$), and total psychosocial adjustment to illness scores ($P = .003$).

As seen in Table 2, patients in the CPR-only group reported the worst psychological adjustment and patients in the CPR-social support group reported the best psychological adjustment over time. Patients in the control group had patterns approximating those of patients in the CPR-social support group, and patients in the CPR-education group appeared more similar to the patients in the CPR-only group.

Specifically, at 3 months' follow-up the patients whose family members learned CPR only were significantly less well adjusted emotionally than patients whose family members learned CPR followed by a social support intervention. At 6 months' follow-up, patients in the CPR-only group were significantly more anxious and hostile and had poorer psychosocial adjustment to illness than patients in the control group or the CPR-social support group. The only other paired group comparison that revealed a significant difference was between the CPR-only group and the CPR-education group. Patients in the former group had higher (worse) psychosocial adjustment to illness scores than patients in the latter group.

To determine the influence of potential confounding variables on the differences seen between the four patient groups, we analyzed the following characteristics, using multifactorial analysis of variance: previous CPR training by family member, gender, education (using 14 years as the median split), and marital adjustment (using the median of the Spanier Dyadic Adjustment Scale). No significant interactions were noted.

Families

With regard to trends across time, family groups demonstrated psychosocial trajectories that were more negative than those of the patients. At 6 months' follow-up, the three CPR groups had higher anxiety, depression, and hostility scores than the control group, although baseline mean values for depression and hostility were slightly lower in the control group than in the three CPR groups (Table 3). However, there were no statistically significant differences between CPR groups on any dependent variables when family members were compared at each time point.

Discussion

Teaching CPR to family members of cardiac patients is controversial. On the

TABLE 2—Comparison of Emotional States and Psychosocial Adjustment among Patients in Cardiopulmonary Resuscitation (CPR) Treatment Groups and Control Group across Time (Mean Scores \pm SD)

	Control Group (n = 99)	CPR- Social Support Group (n = 74)	CPR- Education Group (n = 74)	CPR-Only Group (n = 90)
Anxiety (range, 0–21)				
Baseline	6.3 \pm 4.7	6.1 \pm 4.7	7.3 \pm 4.6	6.6 \pm 4.6
2 wk	6.9 \pm 4.6	5.8 \pm 4.8	7.1 \pm 4.7	7.0 \pm 4.9
3 mo	5.8 \pm 4.2	5.6 \pm 4.3	7.2 \pm 4.7	7.3 \pm 4.6
6 mo ^a	5.6 \pm 4.1	5.2 \pm 4.6	7.2 \pm 4.8	7.4 \pm 4.9
Depression (range, 0–40)				
Baseline	11.8 \pm 7.0	12.4 \pm 6.4	11.8 \pm 5.5	12.9 \pm 7.1
2 wk	12.5 \pm 7.8	11.3 \pm 7.4	11.8 \pm 6.2	13.2 \pm 7.9
3 mo	11.4 \pm 6.5	11.8 \pm 7.3	12.1 \pm 5.6	13.3 \pm 7.1
6 mo	11.0 \pm 6.4	11.3 \pm 7.2	12.2 \pm 5.9	13.5 \pm 8.0
Hostility (range, 0–30)				
Baseline	7.4 \pm 4.3	8.1 \pm 4.5	8.4 \pm 4.2	8.7 \pm 4.8
2 wk	8.2 \pm 4.4	7.6 \pm 4.4	8.3 \pm 4.0	8.7 \pm 5.0
3 mo	7.5 \pm 4.5	7.6 \pm 4.2	8.6 \pm 3.9	8.8 \pm 5.2
6 mo ^b	7.2 \pm 4.4	7.0 \pm 4.4	8.4 \pm 4.1	9.3 \pm 5.8
Psychosocial adjustment to illness (range, 0–100)^c				
Baseline	42.6 \pm 10.0	40.0 \pm 9.4	42.8 \pm 1.9	45.4 \pm 12.5
3 mo ^d	41.6 \pm 10.5	39.0 \pm 9.9	41.5 \pm 10.2	45.2 \pm 12.9
6 mo ^e	41.3 \pm 9.2	38.2 \pm 9.0	40.6 \pm 9.5	45.4 \pm 13.3

Note. Data were collected before family members attended CPR training, then 2 weeks, 3 months, and 6 months following CPR training. Family members in the control group did not attend CPR training.

^a*P* = .004 for univariate analysis of variance (ANOVA); for post hoc comparisons, *P* = .03 for CPR-only group vs CPR-social support group, *P* = .04 for CPR-only group vs control group.

^b*P* = .007 for univariate ANOVA; *P* = .02 for CPR-only group vs CPR-social support group, *P* = .02 for CPR-only group vs control group.

^cHigher scores indicate poorer adjustment.

^d*P* = .02 for univariate ANOVA; *P* = .005 for CPR-only group vs CPR-social support group, no significant differences for other group comparisons.

^e*P* = .003 for univariate ANOVA; *P* = .001 for CPR-only group vs CPR-social support group, *P* = .03 for CPR-only group vs CPR-education group, *P* = .03 for CPR-only group vs control group.

one hand, these individuals are a readily identifiable, cost-effective target group for CPR training.¹⁶ On the other hand, most physicians do not recommend CPR training to this group for fear of increasing the psychological burden of both patients and family members.^{12,13} This fear is not unfounded or trivial. Psychological and social factors play a significant, well-documented role in morbidity and mortality in patients with coronary artery disease. For example, anxiety early after myocardial infarction is associated with a fivefold increased risk for subsequent in-hospital complications such as recurrent ischemia, reinfarction, and sustained ventricular tachycardia.²⁶ This increased risk is independent of conventional clinical and demographic risk factors for myocardial infarction complications. Recall of an anger-producing experience can impair ventricular function in patients with coronary artery disease,²⁷ while

personally relevant mental stress can result in silent myocardial ischemia, reduced ejection fraction, and ventricular wall motion abnormalities.²⁸ Both depression and elevated psychological stress, detected during hospitalization for myocardial infarction, are significant independent predictors of later out-of-hospital mortality.^{29–31} Thus, the concern of clinicians that conventional CPR training may result in negative psychological consequences is linked to previous research documenting the deleterious physical consequences of dysphoria on cardiac patients.

A previous study found that CPR training of family members of high-risk cardiac patients had negative psychological consequences for patients up to 6 months after family instruction.¹⁵ In the present study we used three methods of teaching CPR to family members and contrasted groups taught by these methods with a control group who did not learn

TABLE 3—Comparison of Emotional States among Family Members in Cardiopulmonary Resuscitation (CPR) Treatment Groups and Control Group across Time (Mean Scores \pm SD)

	Control Group (n = 99)	CPR-Social Support Group (n = 74)	CPR- Education Group (n = 74)	CPR-only Group (n = 90)
Anxiety (range, 0–21)				
Baseline	7.4 \pm 4.7	6.8 \pm 4.4	8.0 \pm 4.7	6.9 \pm 4.5
2 wk	7.7 \pm 4.2	6.8 \pm 5.0	8.0 \pm 4.8	7.6 \pm 4.6
3 mo	7.8 \pm 4.3	7.2 \pm 5.0	7.5 \pm 4.7	8.0 \pm 4.9
6 mo	7.4 \pm 4.8	7.5 \pm 4.9	8.3 \pm 4.7	7.8 \pm 4.5
Depression (range, 0–40)				
Baseline	11.8 \pm 6.1	12.3 \pm 6.3	13.2 \pm 6.8	13.1 \pm 7.1
2 wk	13.1 \pm 6.7	12.9 \pm 7.6	14.4 \pm 6.1	13.9 \pm 7.4
3 mo	12.9 \pm 6.3	12.4 \pm 7.5	12.4 \pm 7.2	12.4 \pm 7.2
6 mo	13.1 \pm 7.5	13.6 \pm 8.6	14.5 \pm 6.4	13.7 \pm 7.5
Hostility (range, 0–30)				
Baseline	7.4 \pm 4.1	8.0 \pm 3.9	8.4 \pm 4.4	8.1 \pm 3.9
2 wk	8.2 \pm 5.0	7.7 \pm 5.1	8.4 \pm 3.8	8.3 \pm 5.0
3 mo	8.0 \pm 3.7	7.6 \pm 4.1	7.9 \pm 4.1	9.8 \pm 4.8
6 mo	8.5 \pm 4.9	8.8 \pm 5.4	9.2 \pm 4.8	9.4 \pm 4.8

Note. Data were collected before family members attended CPR training, then 2 weeks, 3 months, and 6 months following CPR training. Family members in the control group did not attend CPR training. There were no statistically significant differences between groups.

CPR. We compared the CPR training method currently used in the community, in which CPR instruction is combined with education about heart disease and cardiac risk factors, with a second method specially tailored for family members of cardiac patients. The second method included a social support component. In the third intervention, CPR training alone (without an education or social support component) was used to simulate the method often used in cardiac rehabilitation programs and hospitals to teach family members of patients at high risk for sudden death.

Patients whose family members attended a CPR-only training session reported significantly poorer psychosocial adjustment and greater emotional distress at follow-up than patients whose family members learned CPR combined with a social support intervention. Patients whose family members did not learn CPR and those whose family members learned CPR combined with an educational session about cardiac risk factors reported better psychological status than patients in the CPR-only group. These results suggest that the potentially deleterious effects of CPR training on patients can be attenuated with the addition of a short social support intervention.

The data from the present study lend further support to previous findings¹⁵ concerning the negative psychosocial ef-

fects of a CPR-only training session. The following question evolves from these findings: What is it about family members' learning CPR that results in patients' (who do not attend CPR classes) becoming more psychologically distressed, and how does a social support intervention for family members mitigate this distress?

It should be noted that there were differences among CPR groups for both patients and families at 6 months, although only the patient groups were significantly different. However, the impact of the social support intervention was not the same for patients and family members. Patients in the CPR-social support group experienced decreasing anxiety, depression, and hostility over time, while family members experienced the opposite. These patterns lend support to the belief that the social support intervention was more meaningful for patients and that it was somehow communicated to the patients through the family members. Patients may have been more dramatically touched by the issues raised by CPR instruction than spouses, and therefore more affected by the dynamics of the social support intervention.

Despite the problems of definition and measurement that have plagued research on social support,³² there are now a sizable number of studies that support its importance in muting the physical and psychological distress caused by an acute

exacerbation of a chronic disease.^{33–35} Social support serves to blunt the effects of stress and enables the individual to cope with stress more effectively. The resources provided by others in a social support group may help the individual redefine the situation as less threatening or may bolster the individual's ability to cope with the imposed demands.³⁶ The social support intervention in the CPR-social support condition gave family members an opportunity to express their feelings before returning home and may have given them the skills to communicate about the CPR training in a way that was reassuring to the patient.

In summary, the findings of the present study support the importance of tailoring CPR instruction to the special needs of family members of patients at risk for sudden death. It is important that CPR training be designed that is specific to this middle-aged and older population. The patients of family members who attended a class patterned after a standard community CPR class (i.e., CPR training combined with education about heart disease and cardiac risk factors) fared less well than patients whose family members attended CPR training combined with a social support intervention. We recommend that the emotional issues surrounding learning CPR and possibly performing it on a family member be discussed when family members of patients at high risk for sudden cardiac death participate in CPR instruction. \square

Acknowledgment

This study was supported by a grant from the National Heart, Lung, and Blood Institute (RO1 HL32171).

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