

The Impact of HeartMath Resiliency Training on Health Care Providers

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Background: Health care providers must think clearly and make critical decisions under stressful circumstances. Providing effective strategies for managing stress in the moment helps mitigate the physical, emotional, and psychological impacts associated with caring for others and promotes resiliency. Staff may also utilize these techniques with patients and their families to help alleviate the symptoms of stress that may be experienced as the result of illness.

Aim: The purpose of this study was to measure whether HeartMath techniques reduce stress and improve resiliency in health care providers.

Methods: Study participants were asked to complete the Personal and Organizational Quality Assessment–Revised 4 Scale (2016) immediately before the start of training and then again 4 to 6 weeks after completion of the class.

Participants were also asked to voluntarily share their experiences using HeartMath techniques personally or with family, friends, and patients.

Results: Significant improvements were found in 3 of 4 primary scales (organizational stress, emotional stress, and physical stress) and in 6 of 9 subscales on the Personal and Organizational Quality Assessment–Revised 4 Scale indicating a positive impact on employee health, well-being, and performance.

Stories shared by participants posttraining indicated that HeartMath techniques were being used personally and with patients as an adjunct in the management of pain, anxiety, and insomnia.

Conclusions: This study supports existing evidence that HeartMath techniques are effective in managing stress and increasing resiliency. These techniques are also valuable tools for health care providers to use with patients and their families in the management of symptoms such as pain, anxiety, and sleeplessness related to hospitalization and illness.

Keywords: Coherence, Emotions, Healing modalities, Healthy work environment, HeartMath, Resiliency, Stress

[DIMENS CRIT CARE NURS. 2019;38(6):328-336]

The importance of self-care in health care professions cannot be emphasized strongly enough. It is well documented that, if not attended to, the act of “caring” can assess a very high cost on the health care provider, resulting in physical, mental and emotional symptoms, burnout, and compassion fatigue.¹⁻⁵ These can significantly disrupt the personal and professional lives of providers, interfering with their ability to provide safe, quality care to patients and maintain healthy relationships with their families, friends, and colleagues.^{1,6-8} Therefore, developing and sustaining the resiliency of health care providers to mitigate the negative effects associated with caregiving and promote emotional, physical, spiritual, and mental well-being are crucial for individuals, organizations, and those for whom they care.

■ THEORY OF HUMAN CARING AND HEARTMATH

In 2010, the leaders within the Department of Nursing adopted Jean Watson's^{9,10} Theory of Human Caring as the theoretical model supporting nursing practice. Foundational to this model are Caritas processes that recognize the need for self-care of health care providers as well as the necessity of heart-connected caring relationships between patients and their caregivers, integral to the healing process.^{9,10} Recognizing the synergy between caring science and heart science, the Watson Caring Science Institute and the HeartMath Institute embarked upon a collaboration in which caregivers are provided with knowledge of and a foundation in Caring Science along with instruction in HeartMath's research and heart-focused practices.¹¹ It was this partnership that brought HeartMath to the organization in 2014.

■ COHERENCE: A PHYSIOLOGIC EXPRESSION OF RESILIENCY, WELL-BEING, AND CARING

The HeartMath Institute has been researching the relationship between the heart, brain, and body and its association to personal well-being and optimal functioning for over 20 years. Based on extensive research, the institute has developed a program that teaches participants the science behind and techniques designed to reduce the negative effects of stress and increase resilience. The HeartMath Institute defines resilience as “the capacity to prepare for,

recover from, and adapt in the face of stress, challenge, or adversity.”^{12,13}

Fundamental to resilience is the concept of coherence, a state in which the heart, mind, and emotions are aligned.¹⁴ Coherence is an optimal physiological state where there is increased synchronization between the heart and brain and a balancing of the autonomic nervous system with a propensity toward increased parasympathetic activity.¹³ Overall, body systems operate more efficiently and in harmony.¹³ Coherence is associated with enhanced health, improved self-regulatory capacity, emotional stability and cognition, and increased resilience.¹³⁻¹⁵ Although beneficial for all, this is particularly valuable in settings where individuals need to think and communicate clearly under pressure and discern the best solution for a given problem or issue. Consequently, this program and associated techniques are being taught and used by those who need to perform under stress such as in health care, law enforcement, competitive sports, and the military.^{14,15}

HeartMath techniques rely on the individuals' awareness of a stressful moment and the associated emotions that accompany it. Once a HeartMath practitioner identifies such an event or situation, one of several learned practices may be employed to stop the loss of energy experienced with depleting feelings. Heart-focused breathing and positive emotions are 2 of the fundamentals used to help achieve coherence. People who are coherent benefit not only themselves, but also everyone around them. Just as an angry or happy person can have a profound effect on those around them, a coherent individual can bring calm and ease to a situation or relationship. The coherent caregiver is better able to hear, recognize, and meet the needs of those for whom they care and develop more effective relationships with patients and colleagues.^{13,16,17}

Benefits

A multitude of studies demonstrate that HeartMath is an effective stress management program among various groups and in a variety of settings. It is effective to decrease blood pressure in people with hypertension.^{18,19} It reduces stress in patients with congestive heart failure²⁰ and has been associated with reductions in hemoglobin A_{1c} levels in diabetic patients who practiced the techniques regularly.²¹

HeartMath has successfully been used to manage stress in high-pressure groups such as physicians,²² correctional officers,²³ police officers,²⁴ and nurses.^{25,26} Employees who have participated in HeartMath training have shown reduced medical costs when compared with non-participants,²⁷ as well as improved employee and patient satisfaction.²⁸

METHODS

The purpose of this research was to determine if HeartMath resiliency training would result in significant improvements in decreasing stress and increasing resiliency among those who participated, as measured by the Personal and Organizational Quality Assessment–Revised 4 Scale (POQA-r4 2016). We sought to answer the following research questions:

1. Would participants experience an increase in the POQA-r4 emotional vitality scale after completion of HeartMath training?
2. Would participants experience decreases in the POQA-r4 organizational stress, emotional stress, and physical Stress scales after completion of HeartMath training?

Setting and Population

HeartMath resiliency classes were offered monthly to all employees within 1 academic medical center. Participation was voluntary. Participants included nurses, physicians, patient care assistants and technicians, care coordinators, unit coordinators, administrators, and leadership staff. Classes were held in a classroom on hospital premises. A class with 15 to 44 participants ran for 8 hours. Course content was directed by the guidelines set forth by the Institute of HeartMath.¹¹ The organization's institutional review board approved the study.

Design

The study utilized a pretest/posttest model. A fact sheet was provided to participants prior to training explaining the study and emphasizing that participation was voluntary. Preevaluation and postevaluation included the POQA-r4. Participants were asked to complete the survey prior to the start of class and again 4 to 6 weeks after training. Consent was implied by completing the study survey.

Instrument

The POQA-r4 (2016) is a valid and reliable 52-item survey tool developed by the HeartMath Institute that assesses personal health, resiliency, and workplace factors impacting an organization's quality and effectiveness. It is composed of 4 primary scales (emotional vitality, organizational

stress, emotional stress, and physical stress), which are further divided into 9 subscales. These scales assess elements that either enhance or impair work performance, health, well-being, and job satisfaction. The tool also collects 9 demographic points including gender, age range, education, employment status, and experience. The HeartMath Institute has demonstrated internal consistency for the POQA-r4 with α coefficients ranging from 0.76 to 0.92 for the primary scales and 0.76 to 0.90 for 8 of the 9 subscales, with the exception being relational tension ($\alpha = .69$).²⁹

Procedure/Intervention

Prior to the start of each class, the pretest was administered. Attendees were provided with a fact sheet explaining the purpose of the study, as well as information about anonymity, confidentiality, and the voluntary nature of participation. Paper versions of the POQA-r4 were provided, and participants were free to complete all, part, or none of the survey. Participants were instructed to create and enter a unique, 4-digit identifier and enter it on the preintervention and postintervention surveys to deidentify preintervention survey and postintervention survey "pairs" and allow for comparison. An envelope was then circulated into which participants placed their survey, which were mailed directly to the HeartMath Institute for processing. As a result of this process, site investigators were unaware of which attendees completed the surveys.

Course Content

Course content included education on the physiological underpinning of coherent and incoherent states, as well as instruction on heart-focused techniques, such as intentional, heart-centered breathing and recognition and reflection of positive emotions for managing stress, challenge, and adversity. During the 8-hour class, participants were invited to use the Bio-feedback devices (emWave2) obtained through the HeartMath LLC. These biofeedback instruments were used to measure and validate coherence. Participants would practice the learned techniques while visually measuring their success through biofeedback light indicators. Intensity of the light indicators provided visual feedback for achieving coherence. Participants became competent using instructional techniques and were encouraged to practice the techniques outside the classroom and, as they gained confidence, to share them with family, friends, and patients.

Posttest

Four weeks after class completion, primary investigators contacted participants by email to complete the postsurvey. Participants accessed the survey using their unique login-secured web-based link to the HeartMath Institute.

Participants were given 2 weeks to complete the post-survey. They were reminded to use the unique identifier they had created and used during the initial survey. This maintained anonymity, as only the participant knew the 4-digit identifier. All responses were analyzed in the aggregate, compiled after 6 months of course offering. Over this 6-month period, six 8-hour courses were conducted.

RESULTS

At the end of 6 classes over a 6-month period, 59 people had completed the preintervention survey, and 29 completed the postintervention survey. In the end, 26 matched survey “pairs” were found. The demographics of the respondents are included in Table 1. All were female, and of the 26 responses, 25 were in professional roles. Approximately 62% were 51 years or older, 54% had been in the organization for 20 years or more, and 65% were in their

current position for 10 years or more. All participants had a bachelor's level of education, with 27% having a master's degree.

Personal and Organizational Quality Assessment–Revised 4 Scale

The raw score means for both the POQA-r4 primary scales and subscales are presented in Table 2. Significant reductions in the organizational stress, emotional stress, and physical stress primary scales were noted from preintervention to postintervention. Additionally, 6 of the 9 subscales also demonstrated significance.

In comparing these results against a larger sample of health care workers (Figure 1), the organizational, emotional, and physical stress scales were reverse scored to show the amount of improvement over time. All 3 indicated that participants moved from an average to above-average percentile when compared with this larger sample. A similar comparison of the subscales is shown in Figure 2.

TABLE 1 Respondent Demographics

	n	%
Age, y		
31-40	4	15.4
41-50	6	23.1
51-60	12	46.1
61-70	4	15.4
Female sex	26	100
Employment status		
Skilled or clerical	1	3.8
Professional	25	96.2
Highest level of education		
Bachelor's	19	73.1
Masters	7	26.9
Hours worked per week, h		
<25	5	19.2
25-35	25	19.2
36-40	15	57.7
41-50	1	3.8
Years at organization		
2-5	3	11.5
5-10	2	7.7
10-20	7	26.9
>20	14	53.8
Tenure at current job		
6 mo to 1 y	1	3.8
1-2 y	0	0
2-5 y	3	11.5
5-10 y	5	19.2
>10	17	65.4

DISCUSSION

The goal of this study was to determine if HeartMath training decreased stress and increased resilience in health care providers. The preintervention and postintervention scores of the POQA-r4 primary scales and subscales support this premise.

The emotional stress scale asked participants to report on negative emotions they were experiencing. This scale measures the impact these emotions have on quality of life, health, and well-being. A higher score would indicate someone who is emotionally stressed and overwhelmed. Preintervention and postintervention results showed a 24% decrease in emotional stress ($P = .001$). When compared with norms from a larger population of 5971 health care workers and reverse scored to show improvement, scores increased from the 44th to 70th percentile. The emotional stress subscale of anxiety and depression asked participants the frequency with which they felt anxious, worried, uneasy, blue, sad, depressed, and unhappy over the past month. Raw scores decreased from 2.77 to 2.14 (23% change, $P = .001$) with improvements from the 46th to 69th percentile. The anger and resentment subscale showed raw scores moving from 2.79 to 2.07 (26% change, $P = .001$) and percentile comparisons from 42% to 68%. These results indicate employees have decreased emotional stress and therefore are less likely to be overwhelmed and unsatisfied with their lives.

The physical stress scale (3.25 to 2.56, $P = .001$) and the 2 subscales of fatigue (3.98 to 3.18, $P = .001$) and health symptoms (2.76 to 2.15, $P = .001$) all showed significant decreases in raw scores as well as improved percentile rankings when compared with a larger population (49th to 69th, 47th to 64th, and 52nd to 70th, respectively).

TABLE 2 Personal and Organizational Quality Assessment–Revised 4 Scale Raw Score Means

	Pre	Post	% Change	Significance ^a
Organizational stress	4.27	3.81	–11	.001
Pressures of life	3.94	3.77	–4	ns
Relational tension	4.93	4.26	–14	.01
Stress	8.80	6.38	–28	.01
Emotional vitality	4.52	4.56	1	ns
Emotional buoyancy	4.42	4.58	4	ns
Emotional contentment	4.64	4.52	–3	ns
Emotional stress	2.78	2.10	–24	.001
Anxiety and depression	2.77	2.14	–23	.001
Anger and resentment	2.79	2.07	–26	.001
Physical stress	3.25	2.56	–21	.001
Fatigue	3.98	3.18	–20	.001
Health symptoms	2.76	2.15	–22	.001
Intention to quit	2.44	2.58	6	ns

Abbreviation: ns, not statistically significant.

^aPaired *t* test.

The health symptoms subscale included the frequency that participants experienced stress-related physical symptoms such as muscle tensions, body aches, and headaches. The fatigue subscale included the person's perception of adequate sleep. When asked to score the item "my sleep is inadequate," 42% of the participants responded often to always in the preintervention survey; posttraining, that percentage decreased to 19%. When scoring the items "tired," "fatigued," and "exhausted," those choosing often to always decreased from 42% to 20%, 48% to 12%, and 19% to 0%, respectively. Improvements in stress-related symptoms such as these are particularly important when considering that job stress may increase the risk for health problems such as cardiovascular disease, musculoskeletal and psychological disorders, and workplace injury.⁵ When participants were asked how their health has been over the past month, responses of "often" or "always" improved from 63% to 72% posttraining, supporting the belief that decreased physical stress contributes to a decreased risk of health-related issues.

The organizational stress scale provided an overall indication of the tension, pressure, and obstacles experienced by employees and the resultant influence these have on performance, relationships, and the desire to stay in the job. It is composed of 3 subscales: pressures of life, relational tension, and stress. Overall, there was an 11% improvement in preintervention and postintervention scores in this primary scale (4.27 to 3.82, $P = .001$), with significant changes in relational tension (14% change, 4.93 to

4.26, $P = .01$) and stress (28% change, 8.80 to 6.38, $P = .01$) subscales. Intention to quit was also measured. Both pressures of life and intention to quit showed small changes, but neither reached significance.

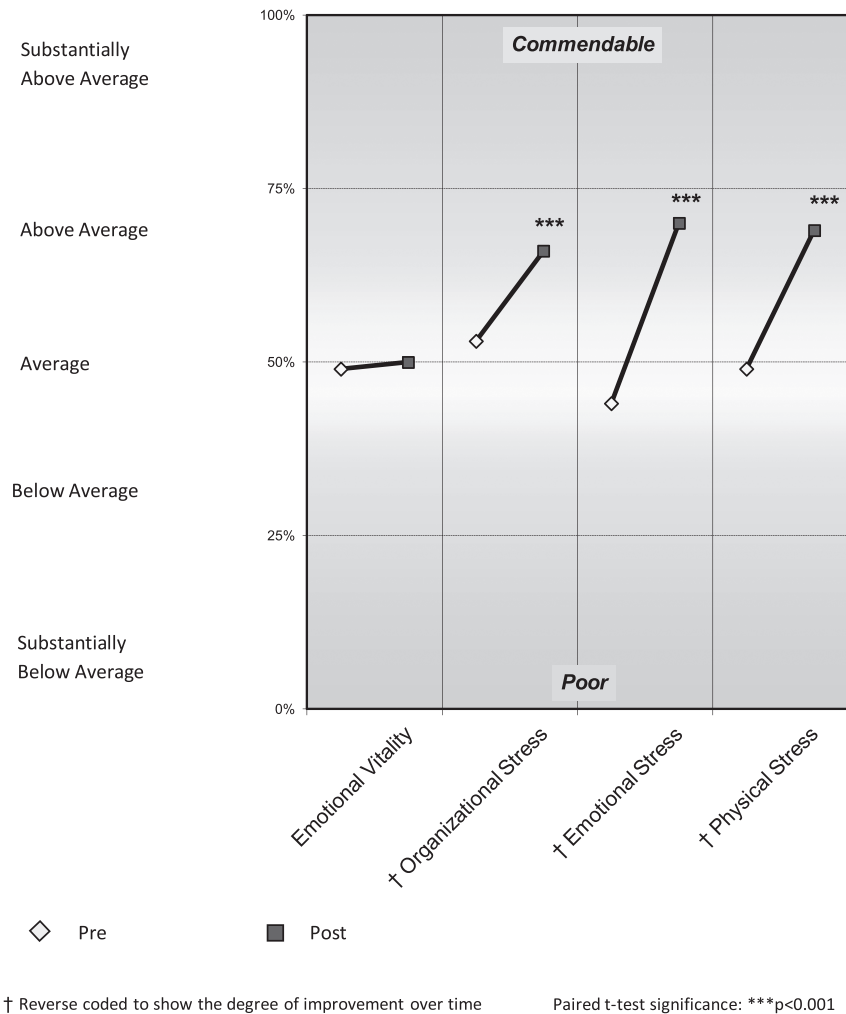
The emotional vitality scale measures the amount of positive energy employees bring to their work. There was a slight improvement in the preintervention and postintervention results (1% change); however, the results were not significant. Compared with the larger group, percentiles remained in the average range (49th to 50th).

These results indicate that HeartMath has led to an improvement in the health care provider's ability to manage and decrease stress levels. At our request, attendees shared stories of how they have used HeartMath personally and with family members and patients. One attendee shared that she did 5 minutes of HeartMath every morning and stated that not only had her sleep improved, but also her hemoglobin A_{1c} levels had decreased enough to reduce the medication she was taking for blood sugar control. She also taught the techniques to her significant other. She said that whenever things started to "spin out of control" they did HeartMath, and as a result, they were much better able to handle the chaos around them. Participants reported how they had taught spouses and children the techniques, and 1 woman noted that her husband's blood pressure had decreased as a result of this practice.

Anecdotally, participants would email or verbally report their experiences using HeartMath techniques to the primary investigators. These follow-up reports suggested that when staff shared HeartMath techniques with patients in distress the patients experienced both physical and emotional benefit. To demonstrate, several nurses shared stories about using the HeartMath Quick Coherence Technique to relieve anxiety, pain, or sleeplessness. The technique is ideal for this purpose as it is simple to teach. It simply requires that the person focus his/her attention to his/her heart while imagining that he/she is taking deep, slow breaths through his/her heart. While doing this "heart-focused" breathing, the person is directed to reexperience a positive emotion such as love, caring, or appreciation.

One reported story involved a participant caring for a very anxious, elderly man admitted to the hospital who shared with his nurse that he had not slept in 4 days, a claim substantiated by his family whom the nurse met during the admission process. As the day progressed, the nurse asked if she could teach the patient HeartMath, and he agreed. She had him place his hand on his chest and instructed him to breathe slowly and deeply in and out through his heart. While he was doing this, she talked to him about his loving family, and in short order, the patient fell asleep for 4 hours!

In another case shared by one of our study participants, a young woman was admitted with a significant



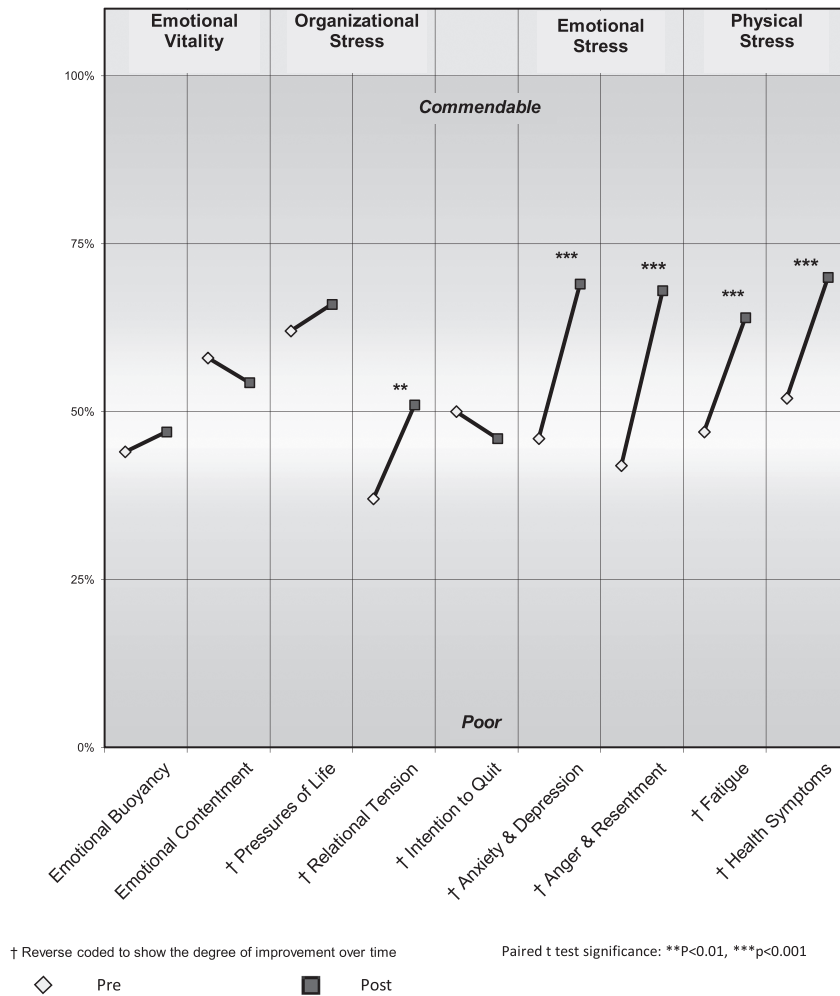
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Figure 1. Preintervention and postintervention comparison of Personal and Organizational Quality Assessment–Revised 4 Scale primary scale results against a normative sample of health care workers (n = 5971). This is available in color online at www.dccjournal.com.

neurological event leaving her with left-sided blindness and paralysis, as well as extreme anxiety. Despite being medicated repeatedly, nothing seemed to relieve her anxiety, and her parents, who were present at her side, were extremely worried. A nurse who had been trained in HeartMath was assigned to this patient and had become well acquainted with the family and learned about a trip the patient had taken the previous year, one that had brought her great joy. In the midst of a particularly difficult episode of fear and nervousness, this nurse placed the patient's hand on her left chest, asking her to focus her attention on her heart while taking deep breaths. The nurse then talked about the patient's trip and the happiness it brought her. The patient quieted and very soon was sleeping. The parents initially thought the patient had been medicated resulting in sleep and were amazed when they discovered

that their daughter's anxiety had been relieved without additional medication.

Nurses who attended training have also found that HeartMath can be an important adjunct to the medical management of pain for some patients. A participant described a man who was transferred from another hospital after a long hospitalization and now required extensive surgery for removal of a tumor. Prior to the surgery, this nurse got to know the patient and his family. Postoperatively, he had extreme pain for which he was receiving maximal pain medication, and despite this, he was extremely agitated, anxious, and unable to sleep due to the pain. He shared this with his wife, who then contacted the floor regarding her frustration with the situation. The nurse who had come to know the patient preoperatively came on duty and assumed his care. After assessing him,



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Figure 2. Preintervention and postintervention comparison of Personal and Organizational Quality Assessment–Revised 4 Scale subscale results against a normative sample of health care workers (n = 5971). This is available in color online at www.dcnjournal.com.

she decided to try HeartMath utilizing the Quick Coherence Technique with his permission. Providing HeartMath in addition to the pain medication he was already receiving, the patient relaxed and was even able to sleep for 1-hour periods. Of note, at discharge, the patient and his wife shared how pleased they were with the pain management provided.

Since the inception of the HeartMath trainings, participants continue to report using these techniques during episodes of care and acknowledge the power and impact of these techniques on the patients, the staff, and the environment. Participants continue to report using it as a valuable tool in caring for patients and themselves. They recognize that when they themselves achieve coherence it changes the way they interact with others and others interact with them. They are able to control their emotions

and reactions and be more present to patients, families, and colleagues.

■ LIMITATIONS

HeartMath training had been conducted in the organization for approximately 15 months prior to this study. Not all participants in the course participated in the study. In addition, only matched pairs could be considered in the results, and several people indicated that they had forgotten or misplaced their unique 4-digit indicator, making it impossible to connect preintervention and postintervention survey data. Fortunately, pooled data from the HeartMath Institute allowed comparison data; using a larger group of health care workers provided context to our results.

The course was also voluntary, so it is unclear whether this self-selected group was more open to the intervention. Survey responses were all self-report. Future research should be conducted with larger groups, diverse settings, and with patients and caregivers. In addition, qualitative and descriptive research on the benefits of coherent employees on the larger health care team and care environment would be valuable.

CONCLUSIONS

HeartMath techniques employ the use of positive emotions, which assist employees in managing stress encountered both in the workplace and their personal lives. Practicing these strategies reduces stress and leads to a state of coherence in which there is emotional, psychological, and physiological alignment. This supports employee well-being and health, enhances job satisfaction, improves resilience, and reduces the risk of emotional and physical consequences of caregiving. It may prove to be a cost-effective and timely tool of alternative medicine and useful for healing modalities. Once taught, this self-directed technique may be used by organizations, providers, and patients to ameliorate suffering associated with components described by the POQA-r4 tool. This non-pharmacologic healing modality may add to the milieu of a healthy work environment.

Acknowledgments

The authors thank Jackie Somerville, PhD, RN, for bringing HeartMath to our organization and to all the wonderful people who attended the class and shared their stories. In addition, a special thank you to Robert Browning, PhD (h.c.) from HeartMath LLC and Jackie Waterman from the HeartMath Institute for their support of this study.

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The authors have disclosed that they have no significant relationship with, or financial interest in, any commercial companies pertaining to this article.

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DOI: 10.1097/01.DCC.00602872.97669.cd