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Stress in medicine: Strategies for caregivers, patients, clinicians

The burdens of caregiver stress

By Michael G. McKee, PhD

The number of people in the United States who spend a significant part of each week working as unpaid caregivers is considerable, and the toll exacted for such work is high. Understanding the profile of the caregiver, the nature of the duties performed, the stress imposed by such duties, and the consequences of the stress can assist the clinician in recognizing the caregiver in need of intervention.

A PROFILE OF THE CAREGIVER

A recent survey estimated that more than 65 million Americans provide unpaid assistance annually to older adults with disabilities.1 The value of that labor has been estimated at $306 billion annually, or nearly double the combined cost of home health care and nursing home care.[2,3]

The typical caregiver is a woman, about 48 years old, with some college education, who spends 20 hours or more each week providing unpaid care to someone aged 50 years or older.[1] The recipients of care often have long-term physical disabilities; mental confusion or emotional problems frequently complicate care.

Caregivers help patients with instrumental activities of daily living (IADL), in addition to helping with tasks such as getting dressed and bathing. IADL might include assisting with transportation, housework, grocery shopping, preparing meals, managing finances, giving medications, and arranging for paid services such as nursing care **(Figure)**.[1]

PSYCHOLOGIC AND PHYSICAL COSTS

Caregiving may take a toll on the caregiver in a variety of ways: behavioral, in the form of alcohol or substance use[4]; psychologic, in the form of depression or other mental health problems[5]; and physical, in the form of chronic health conditions and impaired immune response.[6] About three-fifths of caregivers report fair or poor health, compared with one-third of noncaregivers, and caregivers have approximately twice as many chronic conditions, such as heart disease, cancer, arthritis, and diabetes, compared with noncaregivers.[2,7] Caregiving also exacts a financial toll, as employees who are caregivers cost their employers $13.4 billion more per year in health care expenditures.[8] In addition, absenteeism, workday interruptions, and shifts from full-time to part-time work by caregivers cost businesses between $17.1 and $33.6 billion per year.[9]

The cost of caregiving is higher for women, who exhibit higher levels of anxiety and depression and lower levels of subjective well-being, life satisfaction, and physical health.[10,11] The stress of caregiving has also been identified as a risk factor for morbidity among older (66 to 96 years old) caregivers, who have a 63% greater mortality than noncaregivers of the same age.[12]

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PSYCHOSOCIAL STRESS, UNHEALTHY BEHAVIORS, AND ILLNESS ARE LINKED

Psychosocial stress is a predictor of disease and can lead to unhealthy behaviors such as smoking, substance abuse, overeating, poor nutrition, and a sedentary lifestyle; these, in turn, can lead to physical and psychiatric illness. Behaviors adopted initially as coping skills may persist to become chronic, thereby promoting either continued wellness (in the case of healthy coping behaviors) or worsening levels of illness (in the case of unhealthy coping behaviors).

McEwen and Gianaros[13] have suggested that these stress mechanisms arise from patterns of communication between the brain and the autonomic, cardiovascular, and immune systems, which mutually influence one another. These so-called bidirectional stress processes affect cognition, experience, and behavior.

An integrated model of stress that maps the bidirectional causal pathways among psychosocial stressors, resulting unhealthy behaviors, and illness is needed. Although the steps from unhealthy behaviors to illness are fairly well understood, the links from psychosocial stress, such as those exhibited by caregivers, to unhealthy behaviors are not as clear. Several mediators are under study:

- Personality mediators can be either ameliorative (resilience, self-confidence, self-control, optimism, high self-esteem, a sense of mastery, and finding meaning in life) or exacerbating (neuroticism and inhibition, which together form the so-called type D personality).
- Environmental mediators include social support, financial support, a history of a significant life change, and trauma early in life, which may increase one's subsequent vulnerability to unhealthy behaviors.
- Biologic mediators may include prolonged sympathetic activation and enhanced platelet activation, caused by increased levels of depression and anxiety in chronically stressed caregivers.[14]

IMPLICATIONS FOR INTERVENTION

A significant percentage of caregivers do not need a clinician's intervention to help them cope with stress or unhealthy coping skills. Among caregivers aged 50 years or older, 47% indicated in a recent study that the burden of caregiving is low (ie, 1 or 2 on a 5-point scale).[1] Those who respond to stressors as challenges rather than threats tend to be resilient people who exert control over their lives, often through meditation or similar techniques, and have a strong social support network. Many report that caregiving provides them with an opportunity to act in accordance with their values and feel helpful rather than helpless.

FIGURE. Percentage of caregivers who assist with instrumental activities of daily living (IADL).[1]

Cognitive-behavioral interventions to alleviate stress-related symptoms appear to be more effective if offered as individual rather than group therapy. Teaching caregivers effective coping strategies, rather than merely providing social support, has been shown to improve caregiver psychologic health.[15] Chief among the goals of intervention should be to alter brain function and instill optimism, a sense of control and self-esteem.[13]

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Promoting better outcomes with stress and anxiety reduction

By A. Marc Gillinov, MD

The traditional paradigm for cardiac care has emphasized the use of technology to treat disease. Our focus on technologies such as echocardiography, advanced imaging instrumentation, and cardiac catheterization mirrors the preoccupation of society as a whole with technologic advances.

Attention has only recently been given to the patient's emotional experience and how this might relate to outcomes, recovery, and healing. An expanded paradigm of cardiac care incorporates pain relief, emotional support, spiritual healing, and a caring environment. These elements of patient-centered care aim to relieve stress and anxiety in order to achieve a better clinical outcome.

PATIENT-CENTERED CARE

The importance of patient-centered care is illustrated by the results of a 2007 survey in which 41% of patients cited elements of the patient experience as factors that most influenced their choice of hospital.[1] Accepted wisdom on patient choice has historically centered on medical factors such as clinical reputation, physician recommendations, and hospital location, each of which was cited by 18% to 21% of the patients surveyed. Elements of the patient experience cited in the study include stress-reducing factors such as the appearance of the room, ease of scheduling, an environment that supports family needs, convenience and comfort of common areas, on-time performance, and simple registration procedures.

Székely et al[2] found in a 4-year followup study that high levels of preoperative anxiety predicted greater mortality and cardiovascular morbidity following cardiac surgery. In a study by Tully et al,[3] preoperative anxiety was also predictive of hospital readmission following cardiac surgery. Preoperative stress and anxiety are reliable predictors of postoperative distress.[4]

The variety and relative efficacy of interventions to reduce stress and anxiety are not well studied. Voss et al[5] showed that cardiac surgery patients who were played soothing music experienced significantly reduced anxiety, pain, pain distress, and length of hospital stay. One Cleveland Clinic study of massage therapy, however, was unable to demonstrate a statistically significant therapeutic benefit, despite patient satisfaction with the therapy.[6]

THE ADVENT OF HEALING SERVICES

Identifying patients who exhibit significant preoperative stress and providing, as part of an expanded cardiac care paradigm, emotional care both pre- and postoperatively may ameliorate clinical outcomes. As such, the Heart and Vascular Institute at the Cleveland Clinic formed a healing services division, based on the concept that healing is more than simply physical recovery from a particular procedure. The division's mission statement is: "To enhance the patient experience by promoting healing through a comprehensive set of coordinated services addressing the holistic needs of the patient."

A healing services menu is offered to each patient **(Table)**. Referral for these services can come from the patient, family, physicians, or nurses. Of the first 898

patients admitted for heart surgery who were offered healing services on the third or fourth postoperative day, 582 chose one or more of the services (average, 2.7 interventions; total interventions, 1,514), most frequently spiritual or holistic nursing care. Ninety-three percent of these patients felt the services were helpful, and 90% said that they would recommend them to others. A personal connection between the patient and family and caregivers fosters feelings of a healing partnership that lessens stress and anxiety.

At the Cleveland Clinic, healing services are now integrated with standard services to enhance the cardiac care paradigm. Our standard medical services focus on areas of communication and pain control, both of which affect anxiety and stress. The need for enhanced communication is significant: 75% of patients admitted to a Chicago hospital were unable to name a single doctor assigned to their care, and of the remaining 25%, only 40% of responders were correct.[7]

It is worth noting that communicating more information to a patient is not necessarily better. Patients given detailed preoperative information about their disease and the potential complications of their cardiac surgery had levels of preoperative, perioperative, and postoperative stress, anxiety, and depression similar to those who received routine medical information.[8,9] On the other hand, patients desire information about their postoperative plan of care while they are experiencing it, and value communication with physicians, nurses, healing services personnel, and other caregivers when it is presented in a calm and forthright manner. Communications should emphasize that the entire clinical team is there to help the patient get better.

THE FIFTH VITAL SIGN

Pain control is an aspect of care that was long ignored. The goal of the pain control task force at the Cleveland Clinic is the development of effective, efficient, and compassionate pain management.

The fifth vital sign, one that escapes the electronic medical record, can be addressed by this question: "How are you feeling?" Treating pain will reduce stress and anxiety. Before surgery, pain management priorities are discussed with patients, and at each daily encounter the goal is to set, refine, and exceed expectations for pain control through discussion and frequent pain assessments.

Reducing anxiety and stress is the goal of both standard care services and healing services, resulting in more satisfied patients with better clinical outcomes.

TABLE
Healing services menu

Professional guidance and counseling	Spiritual, social, well-being, future visioning
Touch therapy teams	Reiki, healing touch, massage
Additional holistic interventions	Guided imagery, music, relaxation techniques

CASE: "YOU AND THE TEAM MADE ME GET OUT OF BED AND MOVE FORWARD"

Bobbi is a 78-year-old woman who was initially recovering well following cardiac surgery, including valve surgery, but had to return to the intensive care unit, which is difficult for patients. She was subsequently returned to the floor but was reluctant to walk and progressed slowly, despite normal electrocardiogram, radiographs, and blood panel results. We discovered that her husband was in hospice care in another state, causing Bobbi anxiety as she expressed concern over being her husband's caregiver while being weakened physically herself. She was fearful of moving forward and her recovery stalled.

The primary care nurse referred her to the healing services team. The healing services team provided support for her anxiety and stress, and reviewed options for managing her husband's care. She participated in Reiki, spiritual support, and social work services. During her admission her husband died, so the team provided appropriate support.

When asked about her experience upon leaving the hospital, Bobbi did not mention her surgeon or the success of her heart valve procedure, but commented instead on the healing services team that enabled her to get through the experience.

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Addressing the impact of clinician stress

M. Bridget Duffy, MD

The impact of clinician stress on the health care system is significant. It can adversely affect the patient experience, compromise patient safety, hinder the delivery of care in a manner that is inconsistent with producing quality outcomes, and increase the overall cost of care.

CLINICIAN STRESS IS PREVALENT

Models of health care that restore human interaction are desperately needed. Clinicians today are overwhelmed by performance assessments that are based on length of stay, use of evidence-based medication regimens, and morbidity and mortality outcomes. Yet clinicians have few opportunities to establish more than cursory relationships with their patients—relationships that would permit better understanding of patients' emotional well-being and that would optimize the overall healing experience.

Shanafelt et al[1] surveyed 7,905 surgeons and found that clinician stress is pervasive: 64% indicated that their work schedule left inadequate time for their personal or family life, 40% reported burnout, and 30% screened positive for symptoms of depression. Another survey of 763 practicing physicians in California found that 53% reported moderate to severe levels of stress.[2] Nonphysician clinicians have significant levels of stress as well, with one survey of nurses finding that, of those who quit the profession, 26% cited stress as the cause.[3]

THE EFFECT OF CLINICIAN STRESS ON QUALITY OF CARE

In the Shanafelt et al study, high levels of emotional exhaustion correlated positively with major medical errors over the previous 3 months.[1] Nearly 9% of the surgeons surveyed reported making a stress-related major medical mistake in the past 3 months; among those surgeons with high levels of emotional exhaustion, that figure was nearly 15%. This study also found that every 1-point increase in the emotional exhaustion scale (range, 0 to 54) was associated with a 5% increase in the likelihood of reporting a medical error.[1]

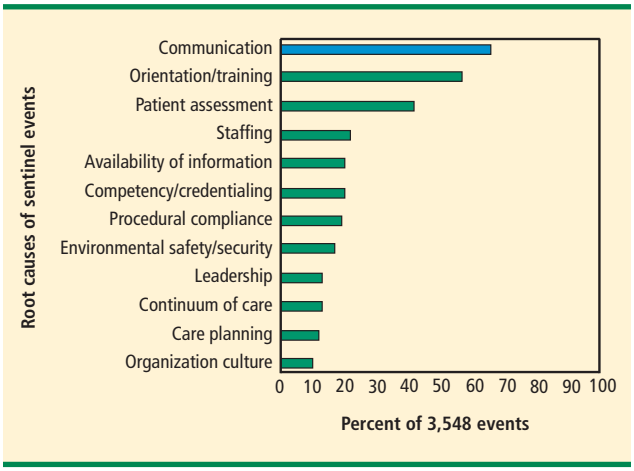

FIGURE. An analysis by the Agency for Healthcare Research and Quality concluded that communication was the most frequent contributor to 3,548 sentinel clinical events (eg, wrong-site surgery, medication errors) that occurred from 1995 through 2005.[6]

In a study of internal medicine residents, fatigue and distress were associated with medical errors, which were reported by 39% of respondents.[4]

STRESS AND COMMUNICATION

Stress can damage the physician-nurse relationship, with a significant impact not only on clinicians, but also on delivery of care. The associated breakdowns in communication can negatively affect several areas, including critical care transitions and timely delivery of care. Stress also affects morale, job satisfaction, and job retention.[5]

In an examination of sentinel events in US health care, the Agency for Healthcare Research and Quality determined that a communication breakdown was the most common root cause of sentinel events

in wrong-site surgery, delays in treatment, and medication errors, and the second most common cause (behind orientation/training) of adverse postoperative events.[6] When root causes of all clinical categories of sentinel events were tallied, communication was found to be the most frequent contributor (training, patient assessment, and staffing were next) **(Figure)**.[6] The quality of the communication among physicians and nurses is a major influence on overall patient satisfaction and a patient's willingness to recommend the hospital to others.

ADDRESSING THE IMPACT OF CLINICIAN STRESS

The traditional response to complaints registered by patients has been behavioral coaching, disruptive-behavior programs, and the punitive use of satisfaction metrics, which are incorporated into the physician's annual evaluation. These approaches do little to address the cause of the stress and can inculcate cynicism instead.

A more useful approach is to define and strive for an optimal working environment for clinicians, thereby promoting an enhanced patient experience. This approach attempts to restore balance to both the business and art of medicine and may incorporate biofeedback and other healing services to clinicians as tools to minimize and manage stress.

The business of medicine may be restored by enhancing the culture and climate of the hospital, improving communication and collaboration, reducing administrative tasks, restoring authority and autonomy, and eliminating punitive practices. The art of medicine may be restored by valuing the sacred relationship between clinician and patient, learning to listen more carefully to the patient, creating better healing environments, providing emotional support, and supporting caregivers.

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Biofeedback in the treatment of stress

By Richard N. Gevirtz, PhD

Traditionally, biofeedback was considered to be a stress management technique that targeted sympathetic nervous system (SNS) overdrive with an adrenal medullary system backup. Recent advances in autonomic physiology, however, have clarified that except in extreme situations, the SNS is not the key factor in day-to-day stress. Rather, the parasympathetic branch of the autonomic nervous system appears to be a more likely candidate for mediating routine stress because, unlike the SNS, which has slow-acting neurotransmitters (ie, catecholamines), the parasympathetic nervous system has the fast-acting transmitter acetylcholine.

VAGAL WITHDRAWAL: AN ALTERNATIVE TO SYMPATHETIC ACTIVATION

Porges[1] first proposed the concept of vagal withdrawal as an indicator of stress and stress vulnerability; this contrasts with the idea that the stress response is a consequence of sympathetic activation and the hypothalamic-pituitary-adrenal axis response. In the vagal withdrawal model, the response to stress is stabilization of the sympathetic system followed by termination of parasympathetic activity, manifested as cardiac acceleration.

Respiratory sinus arrhythmia (RSA), or the variability in heart rate as it synchronizes with breathing, is considered an index of parasympathetic tone. In the laboratory, slow atropine infusion produces a transient paradoxical vagomimetic effect characterized by an initial increase in RSA, followed by a flattening and then a rise in the heart rate.[2] This phenomenon has been measured in people during times of routine stress, such as when worrying about being late for an appointment. In such individuals, biofeedback training can result in recovery of normal RSA shortly after an episode of anxiety.

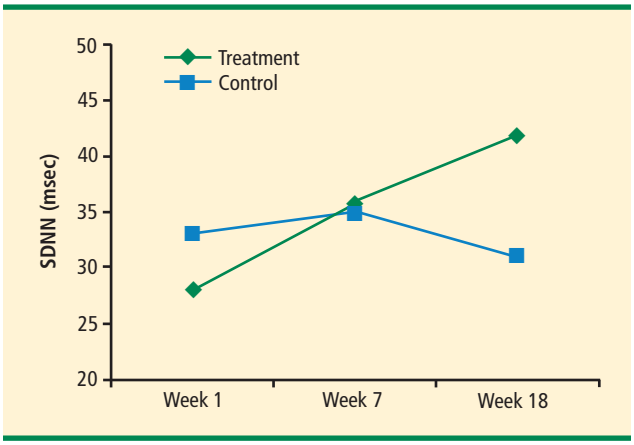

FIGURE. Patients who underwent heart-rate variability (HRV) biofeedback training achieved near-normal standard deviation of normal-to-normal QRS complexes (SDNN) after 18 weeks. The SDNN, which is the primary measure used to quantify a change in HRV, declined in patients in the control group.[3]

Historically, the focus of biofeedback was to cultivate low arousal, presumably reducing SNS activity, through the use of finger temperature, skin conductance training, and profound muscle relaxation. More sophisticated ways to look at both branches of the autonomic nervous system have since emerged that allow for sampling of the beat-by-beat changes in heart rate.

HEART RATE VARIABILITY BIOFEEDBACK

The concept of modifying the respiration rate (paced breathing) originated some 2,500 years ago as a component of meditation. It is being revisited today in the form of heart rate variability (HRV) biofeedback training, which is being used as a stress-management tool and a method to correct disorders in which autonomic regulation is thought to be important. HRV biofeedback involves training to increase the amplitude of HRV rhythms and thus improve autonomic homeostasis.

Normal HRV has a pattern of overlapping oscillatory frequency components, including:

- a high-frequency rhythm, 0.15 to 0.4 Hz, which is the RSA;
- a low-frequency rhythm, 0.05 to 0.15 Hz, associated with blood pressure oscillations; and
- a very-low-frequency rhythm, 0.005 to 0.05 Hz, which may regulate vascular tone and body temperature.

The goal of HRV biofeedback is to achieve respiratory rates at which resonance occurs between cardiac rhythms associated with respiration (RSA, or high-frequency oscillations) and those caused by baroreflex activity (low-frequency oscillations).

Spectral analysis has demonstrated that nearly all of the activity with HRV biofeedback occurs at a low-frequency band. The reason is that activity in the low-frequency band is related more to baroreflex activity than to HRV compared with other ranges of frequency. Breathing rates that correspond to baroreflex effects, called resonance frequency breathing, represent resonance in the cardiovascular system. Several devices are available whose mechanisms are based on the concept of achieving resonance frequency breathing. One such device is a slow-breathing monitor (Resp-e-rate) that has been approved by the US Food and Drug Administration for the adjunctive treatment of hypertension.

Biofeedback has demonstrated success in several clinical trials targeting populations with autonomically mediated disorders. Del Pozo et al[3] conducted a randomized study of HRV biofeedback in patients with coronary artery disease. Patients in the active intervention group underwent HRV biofeedback training that included breathing practice at home for 20 minutes per day. The standard deviation of normal-to-normal QRS complexes (SDNN), which is the primary measure used to quantify a change in HRV, improved from a mean of 28.0 msec to 42.0 msec after 18 weeks in the treatment group, and declined from a mean of 33.0 msec to 30.7 msec in the controls (**Figure**).

Improved HRV may suggest an improved risk status: Kleiger et al[4] found that the relative risk of mortality was 5.3 times greater for people with SDNN of less than 50 msec compared with those whose SDNN was greater than 100 msec. In Del Pozo's study, eight of 30 patients in the intervention group achieved an SDNN of greater than 50 msec (vs 0 at pretreatment) compared with three of 31 controls (vs two at pretreatment).[3] As an additional benefit of HRV biofeedback, patients in the intervention group who entered the study with hypertension all became normotensive.

In a meta-analysis, van Dixhoorn and White[5] found fewer cardiac events, fewer episodes of angina, and less occurrence of arrhythmia and exercise-induced ischemia from intensive supervised relaxation therapy in patients with ischemic heart disease. Improvements in scales of depression and anxiety were also observed with relaxation therapy.

Other studies have shown biofeedback to have beneficial effects based on the Posttraumatic Stress Disorder Checklist, the Hamilton Depression Rating Scale, and, in patients with mild to moderate heart failure, the 6-minute walk test.[6–8]

The proposed mechanism for the beneficial effects of biofeedback found in clinical trials is improvement in baroreflex function, producing greater reflex efficiency and improved modulation of autonomic activity.

CONCLUSION

A shift in emphasis to vagal withdrawal has led to new forms of biofeedback that probably potentiate many of the same mechanisms thought to be present in Eastern practices such as yoga and tai chi. Results from small-scale trials have been promising for HRV biofeedback as a means of modifying responses to stress and promoting homeostatic processes that reduce the intensity of symptoms and improve surrogate markers associated with a number of disorders.

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Biofeedback for extreme stress: Wounded warriors

By Carmen V. Russoniello, PhD

Posttraumatic stress disorder (PTSD) is a severe anxiety disorder whose symptoms emerge following exposure to extreme stress, such as those encountered in the battlefield or as a result of sexual abuse or natural disasters. The ability to employ coping mechanisms affects the disorder's presentation as well as the frequency, intensity, and duration of the symptoms. The "Wounded Warrior" program at East Carolina University (Greenville, NC) was developed to promote the functional independence of US Marines, including those with PTSD.

STRESS RESPONSE: INTERACTION OF THE BRAIN AND IMMUNE SYSTEM

Walter Cannon coined the "flight or fight" response to stress in the early 20th century, in which he emphasized the importance of the parasympathetic system.[1] In 1988, Folkow clarified the description as an immune response to stress.[2] The stress response is now understood to be a neuroendocrine function that includes a feedback loop between the hypothalamus and the pituitary and adrenal glands; stimulation of the hypothalamus promotes secretion of corticotropin-releasing hormone (CRH) into the hypophyseal portal system, which supplies the anterior pituitary with blood. CRH stimulates the secretion of adrenocorticotropic hormone into the bloodstream by the pituitary, prompting the adrenal glands to release the stress hormone cortisol.

Cortisol mobilizes the body's defenses to meet the challenge of an adverse situation. It modulates the stress response by inhibiting the further release of CRH by the hypothalamus. Cortisol thus protects healthy cells and tissues by inhibiting an overreaction from the immune system. Without this protective effect, the interaction between the brain and the immune system can become dysregulated, increasing the risk of immune disorders.

THE CENTRAL AUTONOMIC NETWORK

The central nervous system that regulates the overall balance of the autonomic nervous system (ANS) has been called the central autonomic network (CAN).[3] The CAN helps control executive, social, affective, attentional, and motivational functions. Therefore, the old paradigm of simply decreasing hyperarousal of the ANS to treat negative affective states and dispositions is inadequate. Instead, restoring the appropriate relationship between the ANS and the central nervous system is the aim behind interventions to treat PTSD.

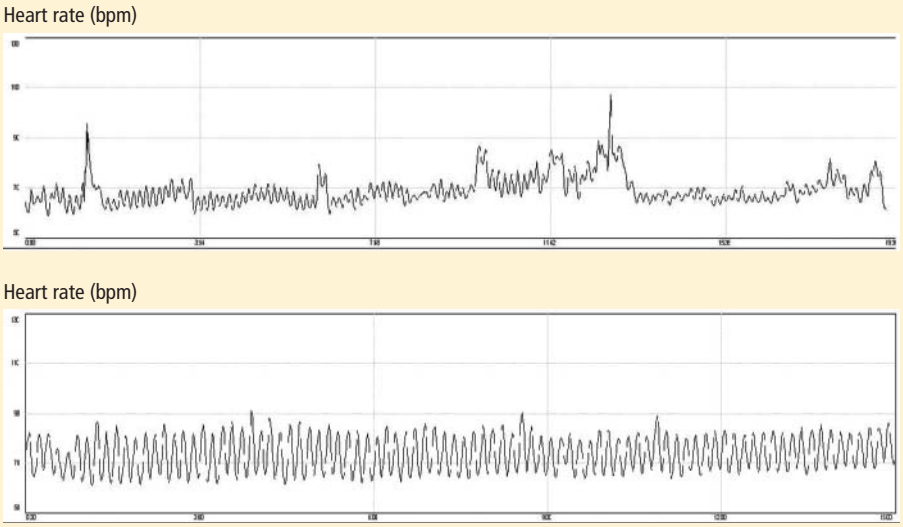

FIGURE. Before (top) and after (bottom) heart rate variability training training. The patient's heart rate after completing training has markedly less variation.

Autonomic, cognitive, and affective functions assist humans in maintaining balance when confronted with external challenges. The CAN controls inhibitory or negative processes that permit specific behavior and redeploy resources needed elsewhere. When negative circuits are compromised, positive circuits develop, resulting in hypervigilance, the symptoms of which can be devastating and, if not ameliorated, can develop into permanent conditions. In one study, Vietnam veterans with PTSD had an 8% reduction in the volume of their right hippocampus compared with veterans without PTSD. Another study calculated a 26% reduction in the left hippocampus and a 22% reduction in the right in veterans with the most severe PTSD compared with veterans who were in combat but had no PTSD symptoms.[4]

A common subcortical neural system regulates defensive behavior, including autonomic, emotional, and cognitive behavior. When the prefrontal cortex is taken "off line" for whatever reason, parasympathetic inhibitory action is withdrawn, and relative sympathetic dominance, associated with defense, occurs.

CONFRONTING HYPERAROUSAL

The question then arises of how to train the ANS to avoid hypervigilance. Growing evidence supports the use of heart rate variability as a predictor of hypervigilance and inefficient allocation of attentional and cognitive resources.

The overall objective of heart rate variability training is to decrease ANS hyperarousal and to improve its balance. "Wounded warriors" learn to control ANS responses to stress-producing stimuli (eg, thoughts, memories, and images associated with combat). The goal of training is to decrease arousal and maintain ANS balance for increasing lengths of time.

Once it was observed that alpha waves were dysfunctional in vulnerable populations, protocols were developed to train alpha and theta waves as a method of improving function. Peniston and colleagues[5–9] showed that increased alpha and theta brain wave production resulted in normalized personality measures and prolonged the period of time before relapse in alcoholics. This protocol has also shown efficacy as an intervention in depression and PTSD.

BIOFEEDBACK TRAINING PROGRAM

The US Department of Defense is studying a combination of central nervous system biofeedback with ANS biofeedback, with the goal of restoring and maintaining tone between the systems.

The training program used in the study lasts 1 month, and starts with a session for preassessment, 16 biofeedback sessions (four per week), a postprogram evaluation, and a 3-month followup. Each week, participants are exposed to stress-producing stimuli that increase in intensity:

- Week 1: Stroop Color Word Test, math stressor, talk stressor/everyday events
- Week 2: Talk stressor, combat experiences
- Week 3: Images and sounds of combat
- Week 4: Virtual Baghdad or Afghanistan (virtual reality exposure)

Each biofeedback session consists of 5 minutes of

baseline evaluation; 5 minutes in which the veteran is subjected to the weekly stressor; 20 minutes of heart rate variability and neurofeedback training; 5 more minutes of training with the weekly stressor; 20 more minutes of heart rate variability and neurofeedback training; and finally 5 minutes of recovery.

Preliminary clinical data indicate decreases in ANS hyperarousal and increases in parasympathetic activity (**Figure**). Reports on the Patient Health Questionnaire Short Form (PHQ SF-36) indicate positive changes in physical symptoms and decreases in symptoms of depression, panic, and anxiety.

Outcome measurements will include changes from heart rate variability training; the Posttraumatic Stress Checklist; PHQ SF-36; Profile of Mood States; salivary alpha-amylase changes; a behavioral questionnaire assessing nutrition habits and alcohol, drug, and nicotine use; and the Self-Satisfaction Inventory.

SUMMARY

Dysfunction in the balance of both the ANS and central nervous system is associated with symptoms of PTSD in combat veterans. Methods that are designed to restore balance in these systems are needed to ameliorate these symptoms. Biofeedback and neurofeedback are safe methods with which to achieve these goals.

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Panel discussion

Question from audience: Why does the Cleveland Clinic start its healing services program preoperatively rather than postoperatively?

Dr. Gillinov: We have a fairly well defined preoperative set of medical tests, and during this process nurses present patients with materials that explain the experience, and nurses and doctors make themselves available in special classes to answer patients' questions. In doing so, we have increasingly identified patients preoperatively who have stress or problems.

Last week I saw a woman who had a leaking mitral valve, but her symptoms were out of proportion to her disease. She had loss of energy and appetite, and she wasn't eating much. She was depressed and our team picked that up. She actually never had to undergo surgery. We referred her to a psychologist and, according to her son, she started to feel better. By starting preoperatively, we're sometimes able to pick out things that we should treat instead of heart disease.

We also provide guided imagery and massage preoperatively.

Dr. Duffy: Healing services is on standing preoperative orders at the hospital. The team goes in proactively and asks, "In addition to your open heart surgery on Wednesday, is there anything we can do to support your emotional and spiritual journey here today?"

Terminology also matters. The term "healing services" is a safe umbrella under which we include biofeedback as one of the services, but it encompasses pastoral care, hospice care, and palliative care. The way it's integrated into a care model is important. If it's reserved for end of life, it might be viewed as defective or as a death sentence, so we want the healing services team to be proactive.

Question from audience: How does the primary care physician fit into all of this? I believe that if the physicians in the hospital want to gain patient confidence, they'll show that they're communicating well with the primary care physician.

Dr. Gevirtz: The primary care physicians are incred-

ibly open to this idea. They have 12 minutes to deal with people with fibromyalgia, irritable bowel syndrome, chronic pain, noncardiac chest pain, etc. What are they going to do in 12 minutes? They're grateful if they have a handoff, especially if it's in the Clinic itself.

Question from audience: Are there any thoughts on making biofeedback part of general training rather than using it just for patients who've already experienced trauma?

Dr. Gevirtz: We did a study in which we showed that a biofeedback technician in the primary care setting saved the health maintenance system quite a lot of money, but the administration couldn't decide whose territory to take to give us an office, so it ended the program.

Dr. Russoniello: How we enable greater access to our intervention is an important question. I see people quit the program if they can't get access to biofeedback. In an effort to enhance compliance, we've incorporated biofeedback into video games, working with a couple of private companies to develop them. The idea is that persons playing the video game can accrue points to enhance their overall score if they perform paced breathing or some other form of biofeedback. Early indications from focus groups are that people will like this.

We have already shown in randomized controlled clinical studies of depression and anxiety that certain video games can improve mood and decrease stress. There is a big movement to get products in people's hands to help them manage their health.

Question from audience: How much overlap is there between biofeedback methodologies—enhancing heart rate variability, vagal withdrawal, neurofeedback, and electroencephalographic feedback—in the systems you're targeting and what are the unique contributions of each?

Dr. Gevirtz: We follow a stepped-care model. We start with the simplest and move on to the more complicated technologies. Two published studies with long-term followup showed the effectiveness of a learned breathing technique in alleviating noncardiac chest pain. Simple biofeedback wasn't even needed. Three years later, the patients were better than they were at the end of the actual training. If you can do it simply, then you do it, and if it doesn't work, then move on to more and more complicated techniques, with neurofeedback being the last resort.

Question from audience: Has anybody measured the physical impact of stimulating multiple systems on the study subject? In other words, can it be damaging to overstimulate these systems at the same time?

Dr. Gevirtz: We've been trying to do that. Recurrent abdominal pain or functional abdominal pain is the most common complaint to pediatric gastroenterologists. We have 1,800 patients a year who make it to the children's hospital level with this complaint. These are kids who are suffering with very great pain and we we're pretty sure it's an autonomically mediated kind of phenomenon. We're able to measure vagal activity in these kids in ambulatory settings at school and have found have very little vagal activity before treatment. After training, they were able to restore vagal activity, and it correlated at the level of 0.63 with a reduction of symptoms. I think it's important to try to tie the physiology to symptoms. It's not always easy to do but we're trying.

Question from audience: I'd like to pick up on two topics that Dr. Duffy raised: the business of medicine and the proposal for informed hope rather than an informed consent before surgery. Something that I see with patients and families at times is this magical expectation promoted by the business side that medicine can do these amazing and wonderful things and doesn't have any sort of weaknesses. I wonder what role unrealistic expectations promoted by the media, advertising, and others may play in the stress of patients, caregivers, and physicians who need to try to meet the expectations of infallible medicine?

Dr. Duffy: We've spun so far the other way with our advanced technology that we've lost the human side, especially the concept of a relationship and giving people hope even though they have a terminal condition. It's a balance between the art and the business of medicine. It's about setting realistic expectations and realistic hope.