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CNE Article

Outcomes of Guided Imagery in Patients Receiving Radiation Therapy for Breast Cancer

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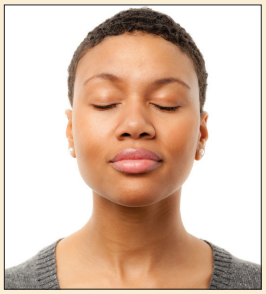

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Guided imagery is an established intervention in integrative oncology. This study was initiated to evaluate the impact of guided imagery on patients undergoing radiation therapy for breast cancer. Eligible patients receiving guided imagery sessions were monitored via biofeedback before and after each session. Monitored measures included blood pressure, respiration rate, pulse rate, and skin temperature. In addition, the EuroQoL Group's EQ-5D questionnaire was used for subjective assessment and patient feedback was collected at the end of radiation therapy through a satisfaction survey. Measured parameters revealed statistically significant improvement from baseline, with decreases noted in respiration rate and pulse rate as well as systolic and diastolic blood pressure. Skin temperature increased, indicating more peripheral capillary flow secondary to a decrease in the sympathetic response. Overall, 86% of participants described the guided imagery sessions as helpful, and 100% said they would recommend the intervention to others. The results of this study illustrate the positive impact of guided imagery as measured through subjective and objective parameters. Improving the overall care for patients with breast cancer supports the value of incorporating practices of integrative oncology into standard practice.

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The recognition of the importance of integrative medicine to cancer care is increasing. Guided imagery (GI) is one of the most useful tools of mind/body medicine and is a featured modality of the National Center for Complementary and Alternative Medicine practices. In the practice of mind/body techniques, GI involves the use of imagination to invoke one or more of the senses. GI leads an individual through experiences in the mind to access the physical, emotional, and spiritual dimensions that effect physiologic change, modulating the individual's response (Achterberg, 1985). The sensory components that modulate an individual's response are visual, auditory, olfactory, gustatory, and kinesthetic experiences (proprioceptive awareness). The response of an individual's sensory component will vary from person to person; a person's sensory response may be a single sense experience, such as a visual image of waves on a beach, or a combination of the senses, such as an auditory response like the sounds of the waves while visually experiencing the beach. The sensory responses are dependent on a person's memory—the conscious and unconscious thought patterns.

Various imagery techniques are applied to elicit calmness and a sense of space to alleviate anxiety and pain (Spiegel, 1993). GI could be a customized one-to-one session or provided through a generalized CD. A customized GI session is helpful in coaching an individual through his or her reflective thoughts and emotions. Another approach of GI is to assist a person toward positive goal outcomes (i.e., the mental rehearsing prior to diagnostic examinations and surgery).

The following concepts explain how GI assists an individual by focusing his or her mental attention to produce a desired physical response. Published data suggest that imagery outcomes may enhance immune function, decrease anxiety, improve sleep, and decrease cancer treatment-related side effects (Cameron, Booth, Schlatter, Ziginskas, & Harman, 2007; Fanning, 1994; Post-White, 1998).

The theory of self-regulation, introduced by Green, Walters, Green, and Murphy (1969), examines effects of cognitive processing of information on people's behavior. According to Green et al.'s (1969) theory, perception or imagery elicits mental and emotional responses that generate limbic, hypothalamic, and pituitary biochemical responses. Those responses then create limbic, hypothalamic, and pituitary biochemical reactions, which consequently produce physiologic changes. When a person becomes aware of these changes and then responds to them, this completes a cybernetic feedback loop.

> As a body/mind intervention helps a [patient] gain access to the raw material of his or her inner memories and internal healing recourses, these imagery patterns become blueprints that can be reinforced or reframed into patterns that may modulate positive changes of biochemical levels within the cells (Dossey, Keegan, Guzzetta, & Kolkmeier, 2000, p. 95).

The theory and study of psychoneuroimmunology is based on the multidirectional system between behavioral response, neuroendocrine response, and the immunologic adaptation (Ader, 1996). Psychoneuroimmunologic theories suggest that psychological response to GI may downregulate the hypothalamic-pituitary axis, resulting in a reduced stress response and creation of a state of well-being. Cognitive theory suggests that changing negative thought patterns leads to a reduction in the autonomic nervous system's arousal. Pickett and Clum (1982) hypothesized that the effects of GI may be from its action as a coping mechanism, giving an individual a greater sense of control and empowerment when dealing with a difficult situation.

Literature Review

Sodergren (1992) provided a literature review of research studies published from 1977–1989 and reported a reduction in the severity of symptoms such as pain, nausea, vomiting, depression, and phobias. However, no discussion about objective physiologic signs was reported (Giedt, 1997). Gruber et al. (1993) provided relaxation, GI, and biofeedback training to participants in an 18-month investigation of immune system response and psychological changes in women with stage I breast cancer after mastectomy. Thirteen women with negative lymph node were randomly assigned to either immediate treatment or the delayed treatment control group. At the end of the study, statistical analysis showed significant positive results in natural killer cell activity ($p < 0.017$), mixed lymphocyte responsiveness ($p < 0.001$), concanavalin A responsiveness ($p < 0.001$), and the number of peripheral blood lymphocytes ($p < 0.01$). No significant changes were noted in the psychological inventory scales in measuring anxiety. Gruber et al. (1993) concluded that the behavioral intervention of GI can support immune systems. Eller (1999) reviewed 46 studies on GI interventions and found that mind/body techniques were effective in the management of anxiety and depression and led to a reduction of symptoms of chemotherapy side effects. Yoo, Ahn, Kim, Kim, and Han (2005) conducted a study that demonstrated GI significantly reduced pre- and postchemotherapy nausea and vomiting and the negative emotions experienced by patients with breast cancer. Imagery outcomes included enhanced immune function, decreased anxiety, improved sleep, and a reduction in the side effects from traditional treatment.

Kolcaba and Fox (1999) conducted a randomized, controlled trial to study the ability of GI to enhance comfort levels in women (N = 53) aged 37–81 years with early-stage (I–II) breast cancer in a radiation oncology setting. The experimental group received GI via audiotape once per day for the duration of the study. Participants in the treatment group experienced an overall increase in the level of comfort over time. Eremin et al. (2009) reported on an investigation of 80 women undergoing multimodality treatment for locally advanced breast cancer who participated in a randomized, controlled trial to evaluate the immunomodulatory effects of relaxation training and GI. Participants in the intervention group were taught relaxation and GI after diagnosis and before the first cycle of chemotherapy. Significant between-group differences were found in the number of CD25+ (activated T cells) and CD56+ (lymphocyte-activated killer cells) subsets, and the number of CD3+ (mature) T cells was significantly higher following chemotherapy and radiotherapy in patients experiencing the relaxation and GI intervention (Eremin et al., 2009).

Radiation Treatment Overview

Radiation therapy to the breast is used after lumpectomy as an adjuvant treatment modality. Women typically are treated Monday through Friday, five days per week, for about 6.5 weeks—an average of 33 treatments.

Patients with stage I breast cancer also can be treated on a 15-day protocol regimen. Patients receiving breast radiation experience distress from a variety of factors, including prognosis

TABLE 1. Sample Characteristics

Characteristic	$\bar{X}$	Range
Age (years)	57	28–77
Characteristic	**n**	
Stage		
0	18	
I	24	
II	11	
III	9	
Local recurrences	4	
Adjuvant therapy		
Chemotherapy and hormones	13	
Chemotherapy only	9	
Hormones only	28	
None	16	
N = 66		

concerns, commuting to treatment, balancing busy work schedules, finding child care, and marital issues. In addition, waiting for treatment in the midst of other scheduled appointments creates an atmosphere of stress and anxiety. Women often tolerate radiation therapy well; however, by midtreatment, some may experience discomfort or pain in the local area of treatment with additional radiation skin reactions noted. Therefore, the purpose of this study was to evaluate the impact of GI in diminishing this distress, as evidenced by objective and subjective measures, as well as improving overall quality of life and patient satisfaction during the course of radiation therapy.

Materials and Methods

The convenience sample study to examine the biofeedback response to GI among patients receiving radiation for breast cancer was approved by the institutional review board at Continuum Cancer Centers of New York. Sixty-six women receiving radiation therapy for breast cancer were eligible to participate. Teaching was limited to those who understood English; therefore, patients who did not speak or read English could not participate.

Characteristics of the patients are shown in Table 1. Sixty-nine patients were screened and 66 consented to participate in the study. Most (64%) had early-stage disease and 76% received some form of adjuvant therapy.

Guided Imagery Intervention

Patients who consented to participate received GI instruction by an integrative oncology nurse in radiation oncology during the first 3–5 days of radiation treatment. GI services were provided in the radiation oncology suite, immediately prior to radiation treatment. Such timing maximized the likelihood that the intervention would facilitate relaxation during treatment. In addition, by scheduling the GI around the preplanned radiation treatment time, the additional stress of scheduling a separate appointment was avoided.

The method of the GI sessions started with systematic breath awareness. Patients were asked to focus on the pattern of their breath shifting from upper chest breathing to abdominal breaths. Once the relaxation process began, patients were asked to visualize a calming experience of a centering place—one where they felt most comfortable and safe. Examples of this customized image could be that of a favorite beach, park, or other location associated with tranquility. Patients were then asked to focus on the sensory components related to visual, olfactory, auditory, gustatory, or kinesthetic awareness of their image. Focusing on the sensory components reinforced the vividness of the image and enhanced concentration. The actual time for the entire session was about 30 minutes, with additional time available if needed. This time frame was sufficient for the integrative oncology nurse to record pre/post pulse, respiration, blood pressure, and thermal biofeedback readings. The difference in thermal skin readings monitored before and after relaxation exercise suggests the effectiveness of the relaxation response through peripheral vasodilatation. The actual time of the GI was about 20 minutes. However, added time of 10–15 minutes was available for the patient to talk about her experiences and feelings. A CD for home practice, created by the researchers, was provided, which reinforced the same sequence of breath awareness and reinforcement of the comfortable and safe image. Participants also received a GI diary that was reviewed weekly by the integrative oncology nurse. Ongoing reinforcement of GI techniques was provided by the integrative oncology nurse during the course of radiation treatment.

The study endpoints included evaluating response to GI sessions using objective clinical variables that measure the level of an individual's stress and anxiety. These variables included thermal biofeedback, blood pressure, respiration rate, and pulse rate, all taken before and after the GI session.

TABLE 2. Comparison of the EQ-5D Subscores at Guided Imagery Time 1 (First Session) and Time 2 (End of Treatment)

	Time 1 (N = 64)		Time 2 (N = 54)		
Variable	$\bar{X}$	SD	$\bar{X}$	SD	p
Mobility	1.14	0.35	1.09	0.29	0.37
Self-care	1.08	0.27	1.04	0.19	0.27
Usual activities	1.24	0.47	1.22	0.42	0.79
Pain and discomfort	1.29	0.5	1.67	0.48	< 0.001
Anxiety and depression	1.42	0.5	1.26	0.45	0.01
EQ-Index	0.88	0.12	0.86	0.1	0.13
EQ-VAS	75.77	20.81	78.15	20.04	0.47

EQ-VAS—EQ-5D visual analog score

Note. Higher scores indicate a lower level of quality of life.

Subjective Assessment Procedures

The EQ-5D (EuroQol Group, 1990) is a standardized instrument for use as a measure of current health states. It consists of five domains (mobility, self-care, usual activities, pain or discomfort, and anxiety or depression), with three response options per domain (no problem, some problems, or unable). These domains and responses are combined into the EQ-Index, which gives an overall assessment of a health state. A separate visual analog scale describing health state on a scale of 0–100 (with 100 meaning best health state) also is available as a subscore. Internal consistency is 0.7. Patients were given the EQ-5D prior to the start of the intervention to obtain baseline information and again at the end of their radiation therapy.

Exploration on the Go

Cancer and Complementary Medicine: Your Guide to Smart Choices in Symptom Management contains information on a variety of holistic treatments. To access, open a barcode scanner on your smartphone, take a photo of the code, and your phone will link automatically. Or, visit http://bit.ly/QSn9NP.

Patients also completed the National Comprehensive Cancer Network's (NCCN's) Distress Thermometer each week (Holland et al., 2010; Jacobsen et al., 2005), which assessed patients' overall level of distress and identified the sources of distress (emotional, physical, and practical concerns). The single-item Distress Thermometer correlates strongly with distress as measured by both the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) and the Brief Symptom Inventory-18 (Derogatis & Cleary, 1977). Patients' feedback on their overall satisfaction with radiation therapy also was collected at the end of radiation therapy treatment using a satisfaction with relaxation survey created specifically for this study. The survey consisted of one question rating distress at the beginning of treatment (based on a 0–10 range with 10 indicating extreme distress) plus 12 "yes or no" response questions dealing with satisfaction with specific aspects of the treatment (i.e., meditation, yoga, and GI), number of treatment sessions, number of home self-practices during the day, usefulness of the intervention, and improvement in quality of life. The survey also allowed patients to write in comments about the overall impact of the intervention.

Statistical Methods

Assuming anxiety and depression on the EQ-5D as the primary outcome, a previous study of GI in patients with breast cancer (Cameron et al., 2007) yielded an estimate of the effect size of d = 0.36. A minimum of 65 patients was estimated to be necessary to detect a pre/post difference of this magnitude, with power of 80% and alpha of 0.05. Normally distributed variables were described in terms of mean and standard deviation, whereas non-normal continuous variables were described in terms of median (minimum and maximum) for continuous variables and in frequencies (percent) for categorical variables. Normally distributed outcomes (e.g., systolic blood pressure, quality of life) were analyzed using a mixed-model regression. Generalized linear modeling (GLIM) was used to analyze changes over time in the case of non-normal outcomes (e.g., nervousness). Mixed-model regression and GLIM allowed for the inclusion of patients with missing data over time on the assumption that the data were missing at random. All analyses were carried out using SAS®, version 9.1. All statistical tests used a level of significance of 0.05 (two-sided).

Results

The median number of GI sessions that patients participated in with the integrative oncology nurse was four (range = 1–6). Overall, 86% described the GI sessions as helpful, and 100% said they would recommend this intervention to other patients receiving radiation therapy for breast cancer.

Health status, as measured by the EQ-5D, was assessed at the time of the first session (time 1) and at the very end of treatment (time 2). Paradoxically, patients reported a significant increase in pain and discomfort ($p < 0.001$) while coincidentally reporting lower levels of anxiety and depression ($p = 0.01$) (see Table 2). Patients often experienced temporary hyper pigmentation, tenderness, and a pruritic rash midtreatment, with the addition of dry and moist desquamation.

Table 3 shows the Distress Thermometer results measured over time. A significant decrease in global distress was noted between the first and last session ($p = 0.04$), mostly apparent in the significant decreases in the rates of patients reporting being sad ($p = 0.04$) and nervous ($p = 0.05$). Trends also were observed in the number of patients reporting a decrease in being worried ($p = 0.06$) and concerned for partners ($p = 0.053$).

TABLE 3. Results of the Distress Thermometer and Psychological Items From Guided Imagery Sessions

	Session 1 (N = 60)		Session 2 (N = 57)		Session 3 (N = 46)		Session 4 (N = 34)		Session 5 (N = 21)		Session 6 (N = 11)		
Variable	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	p
Distress Thermometer	2.95	2.75	2.74	2.51	2.3	2.42	2.55	2.45	2.29	2.15	1.91	2.21	0.04
Symptom	n	%	n	%	n	%	n	%	n	%	n	%	p
Worry	24	40	10	18	6	13	9	26	4	19	1	9	0.06
Fear	5	8	3	5	1	2	2	6	–	–	1	9	0.42
Sadness	9	15	9	16	4	9	2	6	3	10	–	–	0.04
Depression	6	10	5	9	3	7	2	6	2	14	–	–	0.61
Nervousness	12	20	6	11	4	9	5	15	1	5	–	–	0.05
Sleep	12	20	12	21	11	24	7	21	3	14	–	–	0.21
Pain	12	20	11	19	7	15	8	24	2	10	2	18	0.6
Fatigue	12	20	13	23	11	24	9	26	5	24	2	18	0.57
Concerned for partner	5	8	2	4	1	2	1	3	–	–	–	–	0.053

Note. Scores on the National Comprehensive Cancer Network's Distress Thermometer range from 0 (no distress) to 10 (extreme distress).

TABLE 4. Results of Clinical Assessments Before and After Guided Imagery Sessions

	Session 1 (N = 61)		Session 2 (N = 59)		Session 3 (N = 48)		Session 4 (N = 20)		Session 5 (N = 5)		
Variable	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	p
Respiration											< 0.001
Pre	21.61	9.26	21.01	8.88	19.68	1.9	20	1.41	19.33	1.15	
Post	19.29	9.39	19.09	8.71	18.05	1.36	18.47	0.87	17.33	1.15	
Systolic blood pressure											< 0.001
Pre	126.18	16.03	123.71	16.74	119.89	15.18	126.45	18.44	119	17.75	
Post	117.87	14.55	116.02	13.83	112.02	13.28	118.55	16.52	115.2	16.04	
Diastolic blood pressure											0.04
Pre	75.42	10.18	74.64	11.12	71.67	12.5	72.75	12.74	69	8.77	
Post	71.6	10.61	70.24	11.15	68.79	10.11	70.7	11.22	66.8	7.95	
Pulse											0.23
Pre	78.91	11.98	78.04	11.68	78.51	7.95	77.65	10.01	75.5	12.15	
Post	75.73	11.62	75.46	11.4	76.56	7.3	75.88	9.04	73.25	11.59	
Thermal biofeedback											0.69
Pre	83.06	6.63	84.31	7	83.87	6.05	82.96	6.22	84	0.26	
Post	88.47	6.06	88.19	6.59	88.56	5.09	88.7	4.23	89.02	1.63	

Note. Clinical assessments were not performed for Session 6.

Note. Respiration was measured in respirations per minute, systolic and diastolic blood pressure were measured in mmHG, pulse was measured in beats per minute, and thermal biofeedback was measured in degrees Fahrenheit.

The results of the clinical assessments are shown in Table 4. Systolic and diastolic blood pressure, pulse rate, and respiration all showed significant decreases between times 1 and 2. Thermal biofeedback showed a significant increase in temperature from time 1 to time 2. In addition, a cumulative effect of GI on lowering systolic blood pressure, diastolic blood pressure, and respiration was observed over time as noted by significant decreases between the first and last sessions. This suggests that more GI sessions had an added benefit.

Qualitative Data

The qualitative data reported positive feedback from many of the patients during the course of treatment. They stated that GI techniques were helpful and assisted in lowering overall distress related to daily living. An improvement in quality of life was captured by the satisfaction relaxation questionnaire at the end of treatment. Comments are listed in Figure 1.

Discussion

The results of the study illustrate the positive impact of GI. The overall global reduction in the systolic blood pressure reflects patients' positive response and incentive to learn. By the third integrative oncology nurse-guided session, patients self-regulated their autonomic response as noted through biofeedback. This allowed a shift from feelings of fear and apprehension to that of strength and calmness, likely surrogates for a feeling of empowerment. The reduction of the stress response is reflective of a measurable sympathetic physiologic response. This was determined by a noninvasive measurement, an advantage to both patients and clinicians. In addition, the positive objective outcomes of reductions in pulse and blood pressure, as well as an increase of the peripheral and capillary blood flow (thermal biofeedback), demonstrated the helpful nature of GI in the setting of radiotherapy. The results from the EQ-5D and the Symptom Distress Thermometer showed elevation in pain ratings attributed to the radiation-induced skin reactions and, not surprisingly, accompanied by a reduction in anxiety and depression, further supporting the use of GI. The current study showed the importance of treating not only the cancer, but the emotional, psychological, and spiritual components of having cancer.

Limitations

The study did not have a comparison arm. This prevented the comparison of changes that occur in quality of life over time without GI. The other challenges related to the number

Implications for Practice

- Guided imagery is a noninvasive modality that supports patients through radiation treatment and can be an effective tool in reducing patient anxiety and increasing patient satisfaction.
- Nurses would benefit from educational opportunities to learn guided imagery.
- Based on the results of this study, guided imagery should be considered as a standard course of treatment for patients with cancer and/or stress-induced life changing events.

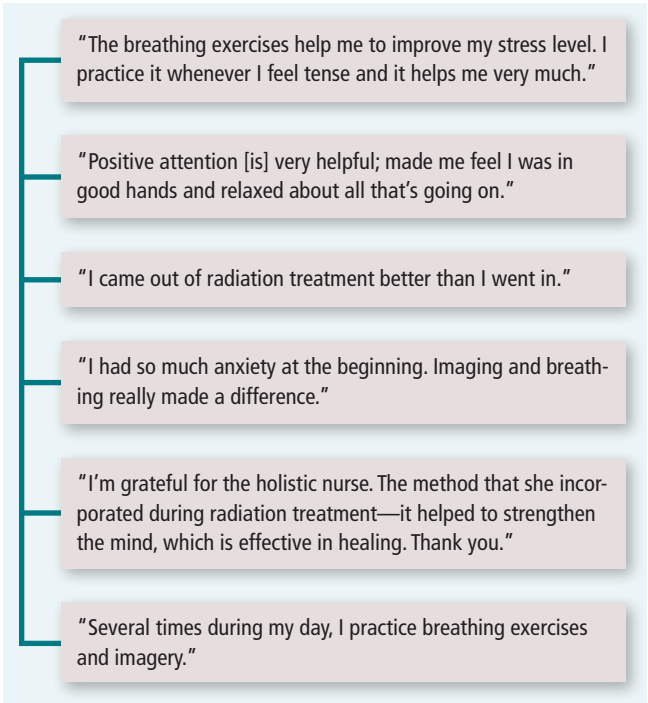

FIGURE 1. Participants' Subjective Responses

of interventional meetings, which averaged three to five sessions. A dose response may exist with more frequent meetings, increasing the ability of participants in mastering the self-regulation technique. Also, the individualized motivation of each participant in the use of home practice also would increase internalization of the new behavioral skill.

Conclusion

The goal of the GI study was to teach patients stress reduction in the midst of their radiation therapy treatment. The program began in the department of radiation oncology as a pilot program investigating the efficacy of holistic modalities for patients during treatment. The need for a holistic approach was based on initial observations of the integrative oncology nurse encountering many patients with breast cancer who expressed a lack of control regarding their diagnosis and treatments. The initial modality of GI was chosen because of its unique feature of self-empowerment, self-regulation, and effectiveness in reducing anxiety. The use of a simple thermal biofeedback device also was chosen because of its ability to give instant feedback to the patients. The patients were able to observe their initial level of tension. After the implementation of GI technique, the thermal biofeedback device assisted in the learning curve as an objective measurement and motivational tool. Both the quantitative and qualitative results demonstrated the usefulness of GI to reduce stress and anxiety and improve overall quality of life during radiation treatment. This pilot study demonstrated the need for additional research with a larger population using a control group.

Nurses have differentiated their professional role as attending the broader illness experience to complement medicine through a more focused role on the diagnosis and treatment of disease (Dossey et al., 2000; Marriner-Tomey, 1994). The conceptual model of Watson's Theory of Transpersonal Care focuses on addressing the needs of the body, mind, and spirit (i.e., addressing the patient holistically) (Parker & Smith, 2010). The modality of GI is synonymous with this holistic framework. The intervention is helpful in reducing stress and facilitating patients with an empowering tool for self-regulation. Findings from the current study may expand the growing body of knowledge in the area of integrative oncology and can improve the quality of medical care rendered. Such findings can serve as a model of care nationally, which enhances patient care. The results of this study may guide other institutions in adopting similar interventions that support patients during treatment.

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