

# Partner-Delivered Reflexology: Effects on Cancer Pain and Anxiety

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**Purpose/Objectives:** To compare the effects of partner-delivered foot reflexology and usual care plus attention on patients' perceived pain and anxiety.

**Design:** The experimental pretest/post-test design included patient-partner dyads randomly assigned to an experimental or control group.

**Setting:** Four hospitals in the southeastern United States.

**Sample:** 42 experimental and 44 control subjects comprised 86 dyads of patients with metastatic cancer and their partners, representing 16 different types of cancer; 23% of patients had lung cancer, followed by breast, colorectal, and head and neck cancer and lymphoma. The subjects had a mean age of 58.3 years, 51% were female, 66% had a high school education or less, and 58% were Caucasian, 40% were African American, and 1% were Filipino.

**Methods:** The intervention included a 15- to 30-minute teaching session on foot reflexology to the partner by a certified reflexologist, an optional 15- to 30-minute foot reflexology session for the partner, and a 30-minute, partner-delivered foot reflexology intervention for the patient. The control group received a 30-minute reading session from their partners.

**Main Research Variables:** Pain and anxiety.

**Findings:** Following the initial partner-delivered foot reflexology, patients experienced a significant decrease in pain intensity and anxiety.

**Conclusions:** A nurse reflexologist taught partners how to perform reflexology on patients with metastatic cancer pain in the hospital, resulting in an immediate decrease in pain intensity and anxiety; minimal changes were seen in the control group, who received usual care plus attention.

**Implications for Nursing:** Hospitals could have qualified professionals offer reflexology as a complementary therapy and teach interested partners the modality.

## Key Points . . .

- Partners can be taught by qualified professionals to perform foot reflexology on patients with metastases from cancer.
- Partners can be taught to observe patients for signs and symptoms of deep vein thrombosis and to avoid reflexology if signs and symptoms are noted.
- Study findings indicate that partner-delivered foot reflexology results in an immediate effect in decreasing pain and anxiety in patients with metastases.

parts of the body (Byers, 1983). Reflexology is an ancient practice; the earliest reported use was by the Chinese in 3000 BC. However, although reflexology is Eastern in origin and many Eastern theories explain its actions (Booth, 1994; Byers, 1983; Hang, 1991; Kunz & Kunz, 1999), the current use of reflexology for pain relief is based on the Western neuromatrix theory of pain (Loeser & Melzack, 1999; Melzack, 1999). The theory is an expansion of the Gate Control Theory (GCT) of pain that proposes that pain is a multidimensional experience involving three major psychological dimensions: sensory-discriminative, motivational-affective, and cognitive-evaluative.

The GCT describes pain as a noxious stimulus that could be increased or decreased by modulations in the gating mechanisms (Melzack & Wall, 1982). The sensory-discriminative dimension of pain is affected mainly by the rapidly conducting spinal system. The motivational-affective system is influenced by activities in the reticular and limbic areas of the brain and

In the United States, more than one million people are diagnosed with cancer every year, and as many as 91% of all patients with cancer have reported using at least one complementary and alternative therapy (Yates et al., 2005). Miaskowski et al. (2002) found that patients with bone metastases had inadequate pain control even with around-the-clock dosing of analgesics, suggesting that pain management is still an unmet need among patients. Complementary and alternative therapies are being used widely to assist with pain relief, even at centers such as Memorial Sloan-Kettering Cancer Center in New York, NY (Okie, 2000), sometimes for as many as 80% of patients (Bernstein & Grasso, 2001).

Deng and Cassileth (2005) recommended massage and reflexology for cancer pain and anxiety relief. Reflexology is defined by the International Institute of Reflexology as a manual technique based on the theory that reflex areas in the feet and hands correspond to all glands, organs, and

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the slowly conducting spinal system. The cognitive-evaluative component is in the higher brain center, which evaluates and controls the sensory-discriminative and motivational-affective systems (Melzack & Katz, 1994; Melzack & Wall). The neuromatrix theory proposes that pain is produced by neural patterns in the body-self matrix of the brain and that the three dimensions of pain perception overlap (Melzack, 1999). Byers (2001) proposed that reflexology relaxes tension and improves nerve and blood supply to organs and all parts of the body to restore homeostasis. Reflexology affects the complex inputs and processing in the neuromatrix of the brain (Stephenson & Dalton, 2003).

Although many studies of reflexology have been conducted on various conditions since the 1980s (Ashkenazi, 1993; Crowther, 1991; Dobbs, 1985; Frankel, 1997; Hang, 1991; Liang, 1996; Marquardt, 2000; Tiran, 1996), only recently have small pilot studies looked at reflexology's use for pain reduction in patients with cancer in the hospital. Stephenson, Weinrich, and Tavakoli (2000) conducted a study in an inpatient setting and found a significant decrease in pain among patients with breast cancer following foot reflexology ( $n = 11$ ,  $p = 0.048$ ). In addition, a significant decrease was measured by the Visual Analog Scale for Anxiety following foot reflexology in patients with breast cancer ( $n = 13$ ,  $p = 0.01$ ) and lung cancer ( $n = 10$ ,  $p = 0.02$ ). In another study, Stephenson, Dalton, and Carlson (2003) found that pain scores were lowered by 2.4 points on a 0–10 pain scale in the treatment group compared to the control group immediately postintervention ( $n = 36$ ,  $F [1,31] = 9.08$ ,  $p < 0.01$ ).

Other recent studies implemented foot reflexology and foot massage with hospitalized patients (Grealish, Lomasney, & Whiteman, 2000), reflexology with patients with advanced cancer (Hodgson, 2000; Ross et al., 2002), reflexology with combined therapies with patients with cancer (Kohara et al., 2004), and reflexology and quality of life in hospice patients (Milligan, Fanning, Hunter, Tadjali, & Stevens, 2002).

Grealish et al. (2000) measured the effect of two 10- to 15-minute foot massages on 87 patients (52 women and 35 men) with breast cancer, lung cancer, or Hodgkin lymphoma and found significant decreases in pain and nausea and an increase in relaxation using 0–100 mm visual analog scales for each symptom. Heart rate changes were small but significant. Patients served as their own controls, and the study did not control for analgesic or anxiolytic use.

Ross et al. (2002) studied 26 patients with advanced cancer; 14 patients received foot reflexology interventions, and 12 patients received foot massage interventions by trained reflexologists. Patients attended therapy sessions once weekly for six weeks. The Hospital Anxiety and Depression Scale and a 10-point rating scale for the severity of 10 common symptoms were used. The study did not show a greater effect of reflexology over simple foot massage and did not demonstrate a cumulative effect. Measurements were made prior to the first treatment and within 24 hours of the last treatment. Immediate postmeasurement was not recorded; the delay may have been the reason the study did not show immediate benefits for decreasing symptoms such as pain and nausea. Patients made positive comments and were relaxed.

In another study of patients with terminal cancer, reflexology was introduced with a more rigorous design, but with a smaller sample. Hodgson (2000) found a 40-minute reflexology intervention to be significantly better than placebo

reflexology on quality-of-life indexes on 12 participants split equally into reflexology and placebo reflexology groups. Placebo reflexology consisted of gentle foot massage that did not stimulate the reflexology points. Patients were blinded to the intervention. All patients reported being comforted in some way. In the reflexology group, one of the symptoms that improved significantly was patients' pain levels.

Kohara et al. (2004) used a combined intervention of aromatherapy, foot soak, and reflexology on 20 terminally ill patients. Fatigue was measured on the Cancer Fatigue Scale, a five-point, Likert-type, self-rating scale, one hour prior to therapy and at one and four hours following therapy. The combined aromatherapy and foot soak lasted 10 minutes. The time period for foot reflexology was not specified. Although the researchers reported that a durable effect was not seen, they suggested that in the future each intervention should be measured separately.

Milligan et al. (2002) surveyed 20 hospice patients and had a 100% response rate from 7 men and 13 women regarding satisfaction with reflexology interventions delivered by a palliative care nurse with six years of reflexology experience. Patients received three to five treatments over six weeks. Sleep was improved in patients, who also reported being more relaxed and calm. Quality of life among the patients was improved, but researchers could not verify that it was the result of reflexology; they suggested that the effects could be a result of therapeutic touch or the therapeutic relationship.

Evaluation of the studies suggested that, although a trend has been seen toward an increase in research with reflexology studies and patients with cancer, varying results were found. Thus, study of the characteristics of the intervener, dose of reflexology, and psychophysiologic outcomes is needed.

Although no literature is available on partner-delivered foot reflexology with patients with cancer, spouse-assisted coping skills training has been shown to decrease pain in patients with osteoarthritis (Keefe et al., 1996). An advantage of teaching partners to implement reflexology is that they are readily available when patients need an intervention and, unlike healthcare providers, partners do not require payment or reimbursement for therapy. Furthermore, patients could continue to receive therapy from partners after being discharged from the hospital. Partner-delivered reflexology provides opportunities for discussion and communication about pain assessment and decisions, mutual goal-setting, and control of pain relief strategies. Other research has shown evidence of success in teaching partners assistive care in home pain management for patients experiencing chronic pain (Keefe et al., 2005; Porter et al., 2002). The present study tested the effectiveness of reflexology for patients with cancer delivered by partners in the hospital or an outpatient unit.

## Methods

### Setting and Sample

Patients with metastatic cancer and their partners were selected from patients on an oncology unit in a 314-bed regional hospital and on an oncology unit in a 734-bed tertiary hospital in the southeastern United States. The goal was recruitment of 100 dyads. At the end of the first year of the study, two other sites were added to increase recruitment: a 135-bed community hospital and a 207-bed community hospital in the same area.

Patient selection criteria included the presence of any type of metastatic cancer and a pain score of 2 or higher on the 0–10 pain scale during the current hospitalization. Additional criteria for the patient-partner dyad were being 21 years of age or older; living together as spouses or domestic partners, family members, or friends; English speaking; living within a 75- to 100-mile radius of the hospital; partner availability for 30 minutes from 2–10 pm; and willingness to participate as evidenced by verbalizing understanding and signing an informed consent form.

Patients were excluded if they had had surgery in the previous six weeks or had open skin wounds on the feet, foot tumors or foot metastases, radiation to the feet, radiation to the site of pain, or more than 50% loss of feeling because of peripheral neuropathy. Patients with symptoms of deep vein thrombosis required a medical consultation prior to study participation or prior to continuation in the study if symptoms developed during the study.

## Intervention

The primary author was trained and certified as a reflexologist at the International Institute of Reflexology, which uses the original Ingham method. Before patients were enrolled in the study, reflexology was described to them through a written protocol. They then received a form that illustrated which areas of the foot would be reflexed (i.e., areas on the foot corresponding to a body part or organ that are stimulated by pressure of the reflexologist's thumb or forefinger) (Stephenson, 1997). The reflexology intervention was conducted following signing informed consent in the hospital.

Ten minutes of the 30-minute reflexology session were spent in relaxing techniques that were administered at the beginning of the session; five minutes of the relaxing techniques were administered at the end of the session. The relaxing techniques consisted of a back and forth movement of the reflexologist's palms on the outer edges of the patient's metatarsals and an ankle-loosening technique in which the reflexologist's palms were used to reflex the outer edges of the patient's ankles. Fifteen minutes were then spent reflexing the areas of the feet corresponding to the areas of patients' self-reported pain and organs or body parts where cancer sites or pain were located. Helper areas—defined by Byers (1983) as those that, when reflexed, may have a direct effect on the affected areas and are used for reinforcements—were reflexed to aid specific cancer sites or areas of pain. Helper areas reflexed included those corresponding to the pituitary, thyroid, and adrenal glands, areas that can be boosted to increase the immune response to stress (Byers, 1983). If a patient had difficulty relaxing, areas of the feet corresponding to the solar plexus were reflexed on patients as part of the relaxing techniques. The final five minutes of the session were devoted to reflexing the entire area of the feet, to ensure that all of the body was covered. Hospital-brand lotion was applied to the feet at the end of the session, as was done by Stephenson et al. (2000). Questionnaire completion took 5–10 minutes at the beginning of the session and less than one minute at the end of the reflexology session.

## Procedure for Teaching Partners

The primary author taught the partners in the hospital and provided additional written materials, including a reflexology documentation form, a reflexology protocol, and a list

of signs and symptoms of deep vein thrombosis. During the teaching session, partners learned the technique and practiced on the primary author or patient; feedback on the technique was provided to the partner. The primary author also offered to do reflexology on the partner. Signs and symptoms of deep vein thrombosis were reviewed to alert partners to avoid foot reflexology and to call the investigator if the condition was noted in patients.

## Control Group

Patients in the control group received usual care plus special attention to the patient for 30 minutes (Smith, Kemp, Hemphill, & Vojir, 2002). Special attention consisted of partners reading a selection of patients' choice to patients. At completion of data collection, a reflexology treatment was offered to patients in the control group.

## Instruments

The **Brief Pain Inventory (BPI)** (short form) was used to measure pain. The BPI contains a 0–10 pain scale recommended by the Joint Commission on Accreditation of Healthcare Organizations for measuring pain and was familiar to patients because they had been asked by hospital staff to rate their pain on the same scale. The 0–10 pain scale in the BPI rates pain as its worst, best, average, and "right now" (Daut, Cleeland, & Flanery, 1983). The BPI includes a diagram for indicating the location of the pain and the amount of relief from medications in the past 24 hours. Other items relate to how pain has interfered with patients' general activity, mood, walking ability, work, relations with others, sleep, and enjoyment of life, using a 0–10 scale, with "does not interfere" at 0 and "completely interferes" at 10. The BPI has a total of 16 items. Reliability has been documented for brief time periods (worst,  $r = 0.93$ ; usual,  $r = 0.78$ ; now,  $r = 0.59$ ) and over time (worst,  $r = 0.34$ ; usual,  $r = 0.24$ ; now,  $r = 0.22$ ). Validity was established with patients experiencing malignant pain and nonmalignant pain (Cleeland & Ryan, 1994; Lipman et al., 2000). The BPI is advantageous for use in patients with cancer and has the sensitivity to measure treatment-related improvements (Lipman et al.).

The **Short-Form McGill Pain Questionnaire (SF-MPQ)** (Melzack, 1987) also was used to measure pain. The SF-MPQ was derived from the McGill Pain Questionnaire developed by Melzack (1975). The multidimensional features of the SF-MPQ parallel the sensory, affective, and cognitive components of the GCT (Melzack, 1987; Melzack & Wall, 1982; Paice & Cohen, 1997). On the SF-MPQ, descriptor words (throbbing, shooting, stabbing, sharp, cramping, gnawing, hot-burning, aching, heavy, tender, and splitting) represent the sensory dimension of the pain experience. The descriptor words tiring-exhausting, sickening, fearful, and punishing-cruel depict the affective dimension. The words were ranked on intensity from 0–3, representing none, mild, moderate, or severe, respectively (Melzack, 1987). Intensity scores for pain were derived by replacing the Present Pain Intensity of the SF-MPQ with the 0–10 pain scale, as recommended by Joint Commission on Accreditation of Healthcare Organizations and by the Visual Analog Scale for Pain on the SF-MPQ. The Visual Analog Scale for Pain is a horizontal, 10 cm line with "no pain" at one end and "worst possible pain" at the other end (Melzack, 1987).

The SF-MPQ takes only two to five minutes to administer and correlates highly with the sensory, affective, and total

indexes of the longer McGill Pain Questionnaire. Correlations between the long and short forms were 0.81–0.97 (Melzack, 1987). The SF-MPQ is sensitive to therapies such as analgesic drugs, epidural blocks, and transcutaneous electrical neural stimulation (Melzack, 1987). Validity and reliability of the SF-MPQ have been established with patients with chronic cancer pain (Dudgeon, Raubertas, & Rosenthal, 1993).

The **Visual Analog Scale for Anxiety** is a 10 cm vertical line with verbal anchors at each end stating “not anxious at all” and “extremely anxious” (Cline, Herman, Shaw, & Morton, 1992; McGuire, 1988). Visual analog scales usually are found to be valid and reliable measures (Dalton & McNaull, 1998).

## Demographics

Demographic data, obtained from a patient questionnaire or medical records, included age, gender, race, education, and income. Other pertinent information included diagnoses (specific type of cancer, metastasis site, and diagnoses other than cancer) and narcotic medications taken in the previous 24 hours. Equianalgesic dosing for 24 hours prior to the interventions was calculated using the opioid conversion calculator (Cynergy Group, Poulsbo, WA).

## Statistical Analyses

Following 21 months of data collection, data were analyzed using SPSS® Version 13.0 (SPSS Inc., Chicago, IL). Demographic comparisons between the experimental and control groups were compared with t tests and chi-square tests. One-way, between-groups analysis of covariance was used to compare postintervention pain and anxiety mean scores using the preintervention scores on pain and anxiety as covariates. Effect sizes were estimated with the eta-squared statistic, and statistical significance was evaluated for p values  $\leq 0.05$ .

## Results

Three patients in the experimental group were unable to receive the intervention because they were too ill. One control group patient was able to participate in the reading but was unable to answer the preintervention visual analog scale and was too agitated to answer any postintervention questions. Thus, complete measurements were obtained

from 86 patients: 42 subjects in the experimental group and 44 in the control group. Because only one experimental and one control patient were taught in the outpatient clinic at the hospital agency, those patients were included as part of the agency group.

Table 1 highlights the baseline characteristics of the patients. No statistically significant differences were found between the experimental and control subjects with regard to age, gender, ethnicity, education level, income level, or morphine equianalgesic dose. The 86 study patients represented 16 different types of metastatic cancer. The most prevalent types of cancer were lung (23%), breast (17%), colorectal (12%), head and neck (11%), and lymphoma (9%). No significant baseline differences were found between the groups regarding length of time since diagnosis of cancer, pain medication dose, pain level, or anxiety level.

Table 2 shows the mean pain and anxiety scores at baseline (time 1) and postintervention (time 2), the covariate-adjusted postintervention mean scores, and the baseline to postintervention mean change scores for the total experimental and control groups and for the subgroups based on moderate to severe pain scores (scores  $\geq 5$ ) and anxiety scores (scores  $\geq 5$ ). After adjusting for preintervention pain, significant differences were found on postintervention pain between the total intervention and control groups ( $F [1, 83] = 11.74$ ,  $p = 0.001$ , eta squared = 0.12, a moderate effect) and on the experimental and control subgroups with moderate to severe preintervention pain ( $F [1, 29] = 8.41$ ,  $p = 0.007$ , eta squared = 0.23, a large effect). The total experimental group had a 34% reduction in pain from baseline to postintervention compared to only a 2% reduction in the control group. For the total group, 19% of the experimental group and 11% of the control group experienced pain reduction of two or more scale points on the 10-point pain scale. The intervention effect was maintained when comparing pain change scores for the moderate to severe pain subgroups, with the intervention group experiencing a 37% reduction, compared to a 6% reduction in the control subgroup. In the moderate to severe pain subgroups, 50% of the experimental subgroup and 20% of the control subgroup experienced pain reduction of two or more scale points on the 10-point pain scale.

The reflexology intervention had an even stronger effect on total group anxiety, with the experimental group experiencing

**Table 1. Baseline Characteristics of Participants**

Characteristic	Experimental (N = 42)				Control (N = 44)			
	$\bar{X}$	SD	n	%	$\bar{X}$	SD	n	%
Age	60.5	12.1	—	—	56.1	24.4	—	—
Months with cancer	45.9	82.6	—	—	24.5	30.4	—	—
Morphine equianalgesic dose (mg)	82.3	125.7	—	—	82.5	127.0	—	—
Pain (1–10 scale)	3.2	3.1	—	—	4.5	3.4	—	—
Anxiety (1–10 scale)	5.0	3.5	—	—	5.6	3.5	—	—
Female	—	—	24	57	—	—	20	46
Ethnicity	—	—	—	—	—	—	—	—
Caucasian	—	—	26	62	—	—	25	57
African American	—	—	16	38	—	—	18	41
Filipino	—	—	—	—	—	—	1	2
High school or less	—	—	24	57	—	—	33	75
Annual income less than \$20,000	—	—	19	45	—	—	24	55

**Table 2. Mean Pain and Anxiety Scores Before and After Intervention**

Variable	Group	n	Time 1	Time 2	Adjusted Time 2	Change in Score <sup>a</sup> (Decrease)
Pain $\geq 2$	Experimental	42	3.2	2.1	2.1	1.1
	Control	44	4.5	4.4	4.4	0.1
Anxiety $\geq 0$	Experimental	42	5.0	1.9	2.1	3.1
	Control	44	5.6	4.3	4.1	1.3
Pain $\geq 5$	Experimental	12	7.3	4.6	4.7	2.7
	Control	20	7.7	7.2	7.1	0.5
Anxiety $\geq 5$	Experimental	23	7.9	2.9	2.9	5.0
	Control	27	8.0	5.5	5.5	2.5

<sup>a</sup> Time 1–Time 2

a 62% decrease in anxiety from baseline to postintervention, compared to 23% for the control group. The reduction in anxiety also was observed in the subgroup of patients with moderate to severe anxiety, with the experimental subgroup experiencing a 63% reduction compared to 31% in the control subgroup. After adjusting for preintervention anxiety, significant differences were found on postintervention anxiety between the total intervention and control groups ( $F [1, 83] = 12.27$ ,  $p = 0.001$ ,  $\eta^2 = 0.13$ , a moderate effect) and on the experimental and control subgroups with moderate to severe preintervention anxiety ( $F [1, 47] = 8.16$ ,  $p = 0.006$ ,  $\eta^2 = 0.15$ , a moderate effect). For the total group, 48% of the intervention group and 32% of the control group experienced an anxiety score reduction of two or more scale points. In the moderate to severe anxiety subgroups, 74% of the experimental group experienced an anxiety score reduction of two or more points, compared to 44% in the control subgroup.

In the control group, patients who read religious materials (the Bible or Bible-related materials) were compared to patients who read lay materials (newspaper, magazine, novel, or job-related materials) on pain and anxiety reduction. No significant differences were found between the two reading groups on pain reduction ( $\bar{X} = 0.31$  versus 0.0 for lay and religious reading groups, respectively) or anxiety ( $\bar{X} = 1.2$  versus 1.5 for lay and religious reading groups, respectively).

## Discussion

Preintervention, the experimental and control groups were similar in age, length of time living with cancer, use of narcotic medication, and measures of pain intensity and anxiety. Partners learned foot reflexology specific to patients in a short period of time. After partners gave patients a 30-minute foot reflexology intervention, the intervention group reported significantly less pain and anxiety compared to the control group. The intervention effect was strongest for the subgroup of patients with moderate to severe levels of pain and anxiety. Considering that the total experimental group, including patients with moderate to severe pain, experienced more than a 30% reduction in pain from a nonpharmacologic intervention, the reflexology intervention used in the present study showed substantial pain control in patients with metastatic disease. However, additional research is needed to describe the duration of pain relief and whether repeated reflexology interventions would have the same effect on pain reduction.

The reflexology intervention had an even stronger effect on preintervention anxiety, with more than a 60% reduction observed in the total experimental group and in the subgroup with moderate to severe anxiety. The observation is clinically important because anxiety often intensifies the pain experience. Once again, more research is needed to document the duration of the reduced anxiety and whether additional applications of reflexology would maintain the lowered level of anxiety or reduce any increased anxiety.

In addition to pain and anxiety relief, some of the reflexology partners reported that the experience had social benefits as well. One wife, whose husband died from metastatic melanoma, commented that her husband liked the foot reflexology because it gave them time together during the final three weeks of his life. Another wife commented, months after the death of her husband, "I'm glad that my husband decided to take part in the study. I think it really helped him. I felt so helpless. [Foot reflexology] was one thing that I could do [for him]."

A major limitation in the current study was that the study's primary author provided the reflexology instruction to partners and administered the pain and anxiety scales to patients. Every effort was made to minimize any bias in data collection, but lack of total objectivity cannot be ruled out. Although the study was designed to evaluate the reflexology intervention in patients' homes after discharge from the hospital, attrition was so severe that the longitudinal portion of the study had to be dropped. Future studies need to consider strategies for patient compliance after returning home from the hospital.

Today, many patients desire to take more control of and responsibility for their care. Hospitals and other agencies could incorporate qualified massage therapists and other providers to administer reflexology to patients or teach caregivers (Corbin, 2005; Deng, Cassileth, & Yeung, 2004; Vestraci, 2004). If family members or other caregivers show an interest and if time allows, sessions could be offered to teach the complementary modalities so that the therapy could be continued in the home. Few side effects from reflexology have been noted to the present point, but more research is needed. Future research is planned for the inclusion of physiologic measures, reinforcement of teaching, and follow-up in the home.

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