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# NADA Ear Acupuncture for Breast Cancer Treatment–Related Hot Flashes and Night Sweats: An Observational Study

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## ABSTRACT

**Background:** Hot flashes and night sweats (HF&NS) are major side-effects of adjuvant hormonal treatments for breast cancer.
**Objective:** The aim of this study was to evaluate the feasibility of the National Acupuncture Detoxification Association (NADA) five-point ear acupuncture protocol to reduce HF&NS and improve physical and emotional well-being for women receiving adjuvant treatments for breast cancer.
**Design:** This trial was a single-arm observational study that used before-and-after measurements.
**Setting:** The trial was conducted at a National Health Service cancer treatment center in southern England.
**Patients:** The subjects included women with early breast cancer, $\geq 35$ years old, $\geq 6$ months post–active cancer treatment, receiving tamoxifen $\geq 6$ months, and self-reporting $\geq 4$ HF&NS incidents/24-hours for $\geq 3$ months.
**Intervention:** Fifty participants completed weekly NADA treatment for 8 weeks in small groups of $\leq 5$ patients.
**Main Outcome Measures:** The factors examined were changes in scores at end of treatment over baseline for HF&NS frequency, physical, and emotional well-being, and perception of HF&NS as a problem.
**Results**: Mean HF&NS frequency was reduced by 35.9% (95% confidence interval: 25.4–45.4, $p < 0.0001$, $n = 47$). Statistical and clinical improvements were recorded for Anxiety/Fears, Depressed Mood, Memory/Concentration, Sleep Problems, Somatic Symptoms, and Vasomotor Symptoms. Perceptions of HF&NS as a problem were reduced by 2.2 points (standard deviation = 2.23, $n = 48$, $t = 7.22$, $p < 0.0001$).
**Conclusions:** NADA ear acupuncture may be a simple nonpharmacological method of managing breast-cancer treatment–related HF&NS.

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Prior abstract publications include:
de Valois B, Young T, Robinson N, McCourt C, Maher EJ. Using acupuncture to manage menopausal symptoms in women taking adjuvant hormonal treatment for early breast cancer. Psychooncology 2007;16:262–274.
de Valois B, Young T, Robinson N, McCourt C, Maher EJ. Evaluating the effects of the NADA protocol on physical and emotional wellbeing in women undergoing adjuvant treatment for early breast cancer. Focus Altern Complement Med 2005;10(suppl1):14.
de Valois B, Young T, Robinson N, McCourt C, Ashford R, Maher EJ Using the NADA protocol to manage menopausal side-effects in women with early breast cancer. Focus Altern Complement Ther 2003;9(suppl1):9–10.
This work was also presented at the 20th Annual National Acupuncture Detoxification Association (NADA) Conference, in New York, NY, 2005; the NADA U.K. Conference, London, UK, 2005; and the NADA Euro Conference, Helsinki, Finland, 2007.
A qualitative study associated with this research was published in Walker G, de Valois B, Davies R, Young T, Maher EJ. Ear acupuncture for hot flushes—the perceptions of women with breast cancer. Complement Ther Clin Pract 2007;13(4):250–257.

**Key Words:** Acupuncture, Ear Acupuncture, Auriculotherapy, National Acupuncture Detoxification Association (NADA), Breast Cancer, Hot Flashes, Night Sweats, Menopausal Symptoms, Adjuvant Hormonal Treatments, Tamoxifen

## INTRODUCTION

Hot flashes and night sweats (HF&NS) are a major side-effect of adjuvant hormonal treatments for breast cancer; these symptoms are reported by up to 80% of women taking tamoxifen and are also associated with aromatase inhibitors.[1,2] An essential component of the treatment regimen for early breast cancer, adjuvant hormonal treatment can help prevent cancer recurrence.[3] Although not life-threatening, HF&NS cause significant physical and psychological discomfort that leads many women to stop taking their medications, with potential consequences for survival.[4]

In a previous study, the current authors reported promising results of using a semistandardized traditional acupuncture protocol to manage tamoxifen-related HF&NS.[5–8] The aim was to integrate acupuncture into the National Health Service (NHS) as a treatment option for patients with breast cancer who were experiencing the side-effects of adjuvant treatment. To achieve this, it was necessary to find a mode of acupuncture that could work within the constraints of the NHS. The objective was to develop an approach that was quick, easy, and simple to deliver; required minimal training; and had the capacity to accommodate potentially large numbers of patients for potentially long periods of time (1 in 8 women are diagnosed with breast cancer;[9] the majority of these women are prescribed hormonal adjuvant treatment for up to 5 years[10]). Resources are another important consideration: Funding for new NHS services is increasingly difficult to obtain. As HF&NS are neither life-threatening nor priorities for treatment, a new service needs to be inexpensive if the aim of widespread implementation is to be realized.

### Rationale

The five-point ear acupuncture protocol developed by the National Acupuncture Detoxification Association (NADA) was an approach that seemed to meet these criteria.[11] This simple, standardized treatment requires no diagnosis, and, in the United Kingdom, can be administered by health care professionals who are nonacupuncturists after a brief period of training, as well as by fully qualified acupuncturists. Delivery in a group setting has the potential to enable 1 acupuncturist to treat up to 20 patients in an hour and a half.*

Although developed and initially used as an adjunct to conventional therapy in substance-misuse detoxification, anecdotal evidence suggested that this protocol reduced the sweats associated with drug withdrawal, as well as promoting relaxation and reducing anxiety, agitation, and insomnia.[12,13] Similar symptoms were reported by the women in the current authors' previous study. In addition, the NADA protocol's action of promoting homeostasis to improve an individual's endocrine and autonomic function[14] suggested that patients with breast cancer who were undergoing adjuvant hormonal treatment could benefit from improved general well-being, as well as from reduced HF&NS.

As in the current authors' previous HF&NS research, the purpose of this study was to measure the effects systematically in both the short- and longer-term, obtain a first measure of this approach, and test the suitability of the delivery. The main research questions were:

1. Can the NADA protocol be used to manage HF&NS that are side-effects of adjuvant hormonal treatments for early breast cancer?
2. Does the NADA protocol affect the overall physical and emotional well-being of the recipients?
3. How do the results of the NADA treatment compare with the results of the current authors' previous traditional acupuncture study?

It was also of interest to assess whether or not British women would find treatment in a group clinic acceptable (reported elsewhere.)[15]

The current authors' hypothesis was that using the NADA protocol could reduce the frequency of HF&NS by 33% at the end of eight treatments in one third of the participants, and that participants would have overall improvements in physical and emotional well-being. In reporting the study, this article adheres to the 2010 *St*andards for *R*eporting *I*nterventions in *C*linical *T*rials of *A*cupuncture (STRICTA).[16]

## METHODS

### Approval and Setting

The West Hertfordshire Hospitals NHS Trust Local Research ethics committee granted ethical approval, and the study took place at the Lynda Jackson Macmillan Centre, a cancer drop-in and information center associated with the Mount Vernon Cancer Centre in Northwood, Middlesex, England. Participants were recruited and treated from September 2003 through December 2004.

### Participants

This study was open to women treated for early breast cancer at the Mount Vernon Cancer Centre, who were

*Peckham R. *The Role and the Impact of the NADA Protocol (Daily Group Acupuncture Treatment Used in Addiction): Explanatory Case Studies* [MSc thesis]. London: University of Westminster; 2005.

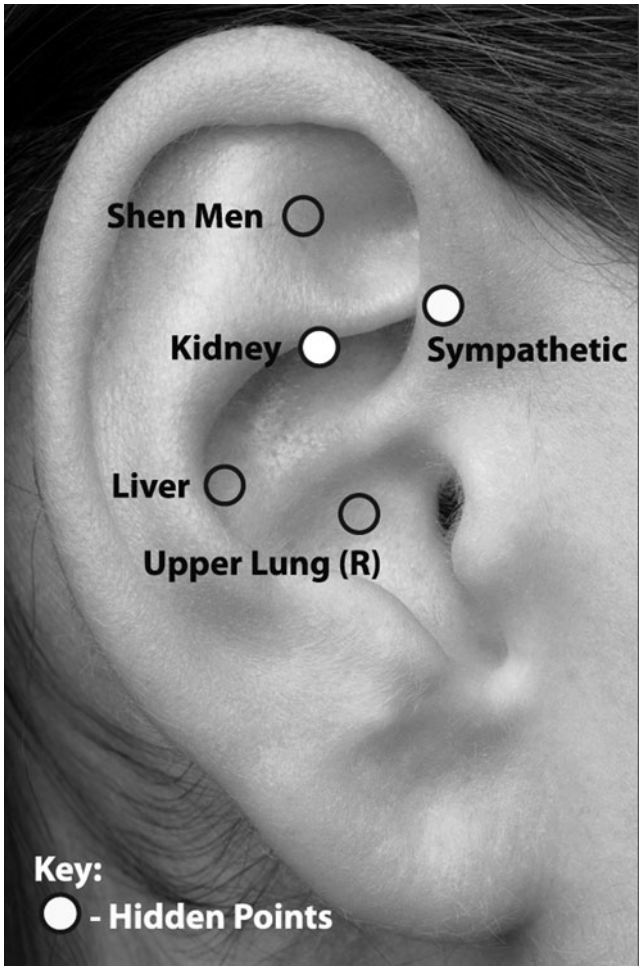


**FIG. 1.** The National Acupuncture Detoxification Association (NADA), protocol—right ear. (Photograph courtesy of NADA, UK.)

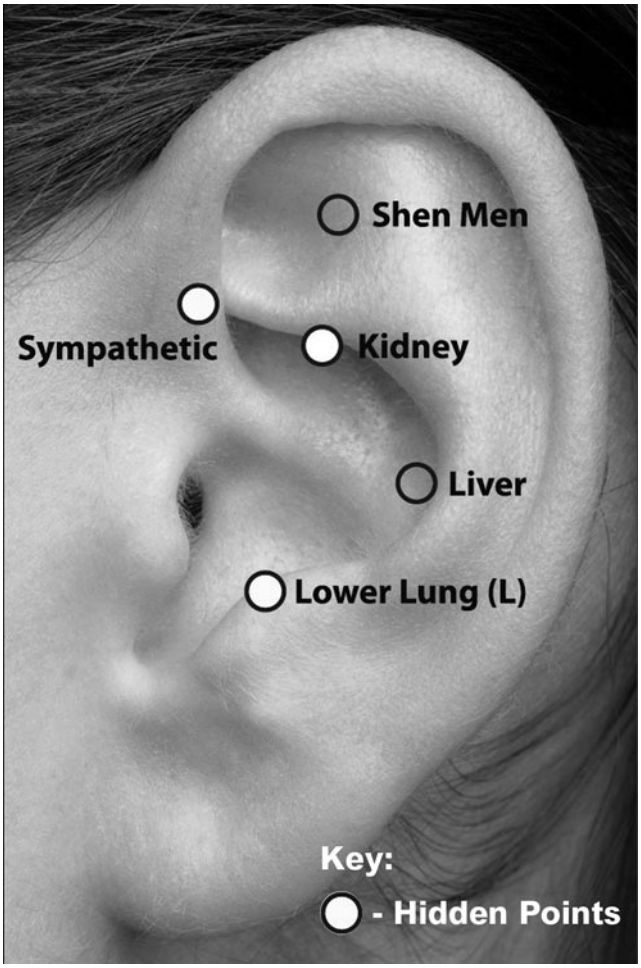


**FIG. 2.** The National Acupuncture Detoxification Association (NADA) protocol—left ear. (Photograph courtesy of NADA, UK.)

taking tamoxifen or aromatase inhibitors. Patients were referred by their oncology consultants or breast-care nurses, or could self-refer via the Cancer Centre's drop-in center.

Eligibility criteria included patients with breast cancer who were: age $\geq 35$; $\geq 6$ months post–active cancer treatment (surgery, chemotherapy, radiotherapy); without relapse or metastatic disease; receiving adjuvant hormonal treatment for $\geq 6$ months; experiencing HF&NS for $\geq 3$ months; and self-reporting an average of four or more HF&NS/24-hour periods; able to speak, read, and understand English; and able to complete a course of eight NADA treatments in a maximum of 10 weeks. Concomitant preparations for relieving HF&NS, whether prescription or over-the-counter, were allowed, providing the participant had taken them for at $\geq 3$ months before joining the study and intended to continue taking the medications for the duration of their involvement in the study. Women with advanced disease were excluded.

The research acupuncturist (author B. deV.) who worked with the participants had 4 years of experience as a licensed acupuncturist, was a member of the British Acupuncture Council, was a NADA U.K. Detoxification Specialist, and was enrolled as a doctoral candidate at the time this study was performed.

The research acupuncturist screened referrals by telephone, sent eligible women a participant information sheet explaining the study, and met prospective participants at an intake interview. Once a patient understood the intervention and study, she signed a consent form, and the research acupuncturist administered the baseline questionnaires (including baseline medical and sociodemographic details), set up future appointments, and gave the participant a Hot Flush Diary on which to record all HF&NS occurrences until the first treatment 2 weeks later. The research acupuncturist also took a case history to gain insight into each participant's symptoms and overall well-being. This case history focused on the experience of having hot flashes and on sleep, appetite, bowel and urinary habits, somatic symptoms (such as headaches, general aches and pains), energy levels, emotional state, and any other issues the participant wished to discuss. The acupuncturist asked each woman to prioritize three main

symptoms that she would like to have reduced as a result of treatment.

## Acupuncture

All participants received weekly acupuncture treatment for eight sessions using the NADA protocol. Needles were inserted bilaterally into the five auricular acupuncture points and retained for 40 minutes. The points used were Auricular Sympathetic, *Shen Men*, Kidney, and Liver on both ears, with Upper Lung on the right ear (Fig. 1), and Lower Lung on the left (Fig. 2). Single-use, sterile, stainless-steel needles, 0.22 mm in diameter and 7 mm long, manufactured by Vinco, and packaged for detoxification protocols (10 needles per pack) were used. Needles were inserted perpendicular to the skin, with a swift single-handed motion rotating 180° clockwise to ensure smooth insertion, until the needle tip was supported in the cartilage (~1–2 mm). No stimulation was used.

The clinic sessions took place on Tuesday and Friday mornings, with ≤5 participants per clinic (the number that could be accommodated comfortably in the center's largest clinical spaces). Each participant spent a few minutes with the research acupuncturist in private, to discuss any issues and have the needles inserted. The research acupuncturist escorted these participants to the adjacent room, where other participants sat, for 40 minutes, until it was time to have the needles removed. The research acupuncturist accompanied the participants back to the treatment room when it was time to remove the needles. It was decided to depart from the usual NADA procedure of needling *in situ*. Typically, in detoxification settings, patients are enrolled in a supportive multicomponent program, of which NADA is one option.[11,17] The participants with breast cancer had no structured supportive program, and the current authors felt that it was important for participants to have private opportunities to discuss aspects of their cancer, HF&NS, or experience of acupuncture.

This arrangement also allowed the research acupuncturist to offer the participants lifestyle advice, which was the only co-intervention. This was tailored to each individual's specific needs, and could include advice on dietary habits (usually regarding eating breakfast and regular meals), exercise, rest, managing stress, or referral to other services, such as counseling. The acupuncturist aimed to keep one-to-one contact time to a minimum, attempting to adhere to the average time spent per general practitioner consultation in the NHS (~7 minutes). She applied this flexibly according to the needs of the individual participants.

## Study Design

This prospective, single-arm observational study, using before-and-after measurements, accords with the Medical Research Council's guidelines for developing and evaluating complex interventions.[18,19] Participants received eight NADA treatments and were treated once per week. The patients were monitored for a total of 30 weeks, during which there were five measurement points, as shown in Figure 3: (1) 2 weeks before treatment commenced (baseline); (2) after the fourth acupuncture treatment (mid-treatment); (3) at the end of treatment (EOT); (4) 4 weeks after EOT (post-treatment 4); and (5) 18 weeks after EOT (post-treatment 18). This enabled measurement of any short- and longer-term effects; however, the primary outcome measurement point was EOT.

## Study Outcomes

HF&NS frequency was the primary outcome measure. Data on this were collected via paper-based Hot Flush Diaries that had been designed in-house. The Hot Flush Diary was a small booklet that enabled participants to engage in 24 hour-a-day recording over a 14-day period. Participants were instructed to record every HF&NS incident, ideally, at the time that the incident occurred.

Physical and emotional well-being were measured using the validated Women's Health Questionnaire (WHQ), a self-administered health-related quality of life (QoL) measure, designed to assess well-being in women who were in the natural menopausal transition.[20] For the WHQ, respondents indicate their level of agreement with 36 statements, which are divided into 9 domains or subscales (as shown in Table 1), using a 4-point Likert scale. Calculating the responses as instructed in the *WHQ Women's Health Questionnaire User Guide* results in scores on a 10-point scale from 0.00 to 1.00, with lower scores indicating better QoL.[21] Test–retest is reliable across a 2-week time interval, and a change of 0.10 on a subscale is considered to be clinically significant.[20]

The Problem Rating Score (PRS) derives from the validated Hot Flushes and Night Sweats Questionnaire (HFNSQ) and is a more reliable indicator than hot flash frequency of how ''bothersome'' women find their HF&NS.[2,22] It is the mean of the sum of three 10-point scales (problem factors) on the HFNSQ, on which women rate how problematic and distressing they find their HF&NS and how much they interfere with daily life. Test–retest reliability is high across a 2–3-week interval,[22] and a change of 2 points on a 10-point scale is clinically significant.

Figure 3 illustrates the frequency of measurements. Three other semistructured questionnaires, designed to elicit written feedback from participants about their experience of having acupuncture and participating in the study, were administered at EOT, and at 4 and 18 weeks after EOT (post-treatment 4 and post-treatment 18).[5]

## Sample Size and Statistical Methodology

The current authors' previous traditional acupuncture study was emulated, with the aim of obtaining data from 50 participants completing a course of eight treatments. This facilitated testing the feasibility of recruitment, retention,

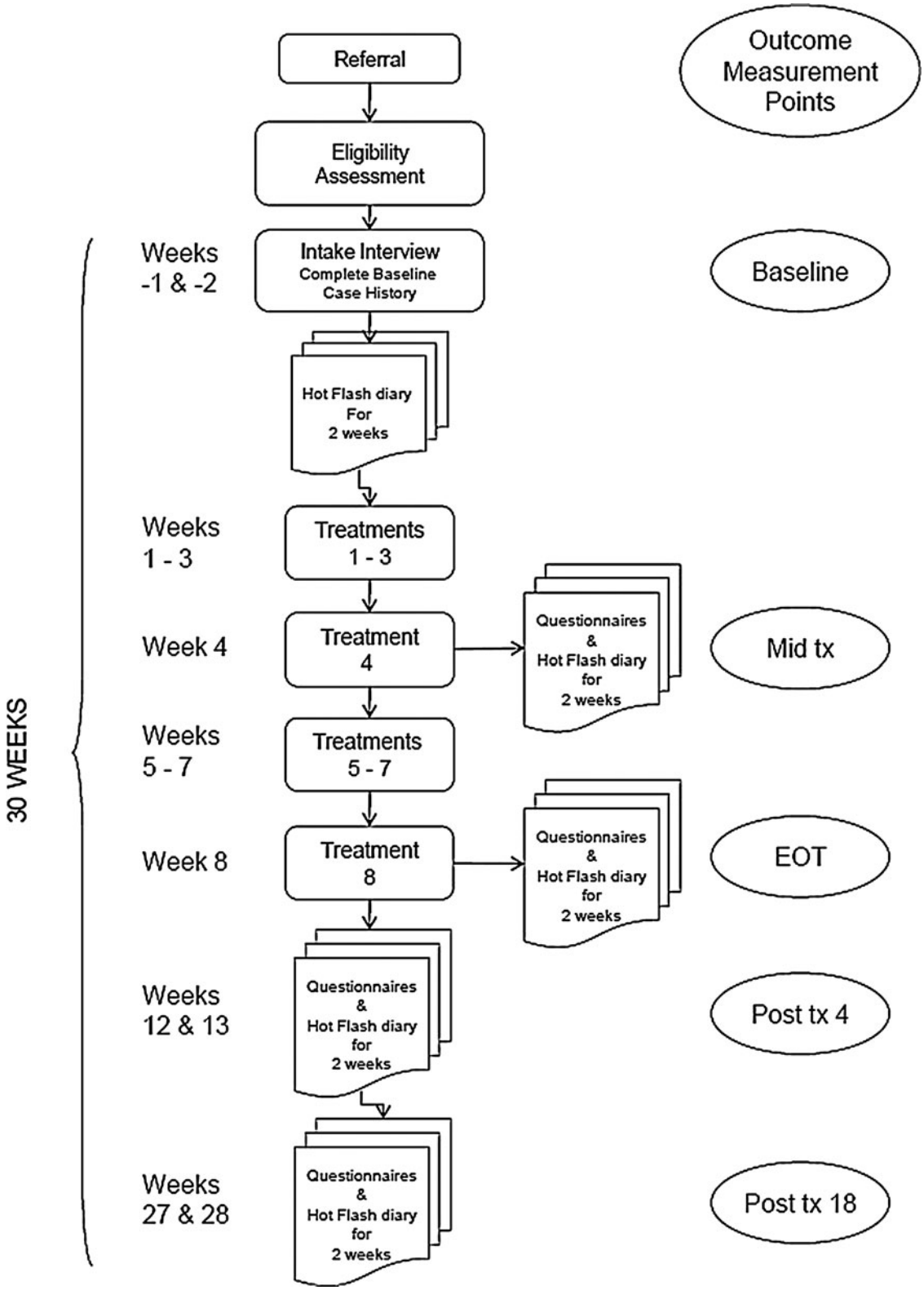


**FIG. 3.** Flow diagram showing measurement points. tx; treatment; EOT, end of treatment.

Table 1. Women's Health Questionnaire (WHQ) Results for the Primary Endpoint, EOT over Baseline

| | *Baseline* | | | *EOT* | | | *Paired differences (baseline–EOT)* | | | | | *Paired samples t-tests* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | *95% CI* | | | | |
| *WHQ scale* | *Mean* | *SD* | *N* | *Mean* | *SD* | *N* | *Mean* | *SD* | *N* | *LL* | *UL* | *t* | *df* | *p** |
| ANX | 0.30 | (0.27) | 51 | 0.19 | (0.21) | 48 | 0.10 | (0.24) | 47 | 0.03 | 0.17 | 2.86 | 46 | **0.006**[†] |
| ATT | 0.54 | (0.32) | 50 | 0.52 | (0.33) | 47 | 0.06 | (0.31) | 45 | −0.04 | 0.15 | 1.22 | 44 | 0.229 |
| DEP | 0.24 | (0.22) | 51 | 0.09 | (0.12) | 48 | 0.15 | (0.24) | 47 | 0.08 | 0.22 | 4.12 | 46 | **0.0001** |
| MEM | 0.63 | (0.33) | 52 | 0.49 | (0.39) | 47 | 0.12 | (0.35) | 47 | 0.02 | 0.22 | 2.36 | 46 | **0.023** |
| MEN | 0.29 | (0.22) | 52 | 0.25 | (0.24) | 48 | 0.06 | (0.20) | 48 | −0.001 | 0.12 | 1.97 | 47 | 0.055 |
| SEX | 0.47 | (0.34) | 37 | 0.43 | (0.33) | 36 | 0.08 | (0.26) | 34 | −0.01 | 0.17 | 1.76 | 33 | 0.088 |
| SLE | 0.63 | (0.30) | 52 | 0.41 | (0.37) | 48 | 0.22 | (0.32) | 48 | 0.10 | 0.31 | 4.85 | 47 | **0.0001** |
| SOM | 0.45 | (0.22) | 51 | 0.34 | (0.22) | 48 | 0.12 | (0.23) | 47 | 0.06 | 0.19 | 3.68 | 46 | **0.001** |
| VAS | 0.98 | (0.10) | 51 | 0.74 | (0.36) | 48 | 0.23 | (0.36) | 46 | 0.12 | 0.34 | 4.29 | 45 | **0.0001** |

*Significance (2-tailed).

[†]Boldface indicates statistically significant results.

*WHQ domains:* ANX, Anxiety/Fears; ATT, Attractiveness; DEP, Depressed Mood, MEM, Memory/Concentration; MEN, Menstrual Symptoms; SEX, Sexual Behavior; SLE, Sleep Problems; SOM, Somatic Symptoms; VAS, Vasomotor Symptoms.

EOT, end of treatment; SD, standard deviation; CI, confidence interval; LL, lower limit; UL, upper limit; *df*, degrees of freedom.

and questionnaire completion, as well as the acceptability of group clinics.[18,19]

Quantitative data were entered into SPSS version 13. Using data recorded over 14 days in the Hot Flush Diaries, the mean and the median numbers of HF&NS per day were calculated for each participant at each measurement point. Missing data were imputed when at least 50% of the data had been collected and the data appeared to be missing at random.[23] The individual participant means were not normally distributed, showing a positive skew. Thus, for descriptive purposes, the median data were used, and the mean and median were then calculated for all participants. As in the previous traditional acupuncture study, log transformation of the means for each participant produced a normal distribution, allowing parametric *t*-tests to be used for comparison with baseline scores.[5,24,25] Data from the WHQ and HFNSQ were analyzed using Student's *t*-tests.

## RESULTS

The primary measure was the change in HF&NS frequency at EOT over baseline. Both short- and long-term effects were of interest, and this article presents HF&NS data from all measurement points. WHQ and HFNSQ data at baseline and at EOT are also presented. The data from the remaining measurement points are detailed elsewhere.[5]

### Recruitment, Compliance, and Questionnaire Return

Table 2 shows the numbers for recruitment, compliance and questionnaire return.[26] A total of 59 women were recruited, of whom 54 were prescribed tamoxifen, and 5 were

Table 2. Recruitment, Compliance, and Questionnaire Returns*

| | | *Questionnaires returned* | |
|---|---|---|---|
| *Stage* | *Number of participants* | *Hot Flush Diary* | *WHQ & HFNSQ* |
| Recruitment | 59 | n/a | n/a |
| Baseline (2 weeks prior to first-tx) | 54[1] | 51 | 52 |
| First-tx | 52[2] | | |
| Mid-tx (Treatment 4) | 51[3] | 51 | 49 |
| EOT (Treatment 8) | 50[4] | 48 | 48 |
| Post-tx 4 (4 weeks after EOT) | 50 | 46 | 46 |
| Post-tx 18 (18 weeks after EOT) | 50 | 40 | 40 |
| *Comparison of NADA & TA—full sets of data at baseline and:* | | | |
| Mid-tx | | 50 | 49 |
| EOT | | 47 | 48 |
| Post-tx 4 | | 45 | 46 |
| Post-tx 18 | | 38 | 40 |

**Reductions and rationales:*

[1]5 participants who were receiving the aromatase inhibitor anastrozole (Arimidex®) were removed from analysis because too few were using this medication.

[2]2 participants discontinued after consent and before commencing treatment.

[3]1 participant withdrew after 1 treatment (stating that ''acupuncture is not the answer'').

[4]1 participant withdrew after 5 treatments (because of liver metastases).

WHQ, Women's Health Questionnaire; HFNSQ, Hot Flashes and Night Sweats Questionnaire; n/a, not applicable; tx, treatment; EOT, end of treatment; NADA, National Acupuncture Detoxification Association; TA, traditional acupuncture.

Table 3. Demographic and Clinical Characteristics at Baseline

| | |
|---|---|
| *Demographic characteristics* | |
| Marital status | |
| Single (never married) | 3 (6) |
| Married (first marriage) | 36 (70) |
| Remarried | 3 (6) |
| Living with partner | 1 (2) |
| Divorced | 6 (12) |
| Widowed | 3 (6) |
| Educational qualifications | |
| Less than compulsory school education | 4 (8) |
| Compulsory school education (e.g., school certificate, GCSEs) | 18 (35) |
| Post compulsory school education below university level | 11 (21) |
| University level | 12 (23) |
| Postgraduate level | 7 (14) |
| Current employment status | |
| Retired | 11 (21) |
| Not working at present | 16 (31) |
| Working part-time | 16 (31) |
| Working full-time | 9 (17) |
| Ethnic background | |
| White British | 48 (92) |
| White other | 3 (6) |
| Indian | 1 (2) |
| *Clinical characteristics* | |
| Cancer treatment history | |
| Breast surgery | 52 (100) |
| Radiotherapy | 47 (90) |
| Chemotherapy | 35 (67) |
| Time receiving tamoxifen | |
| 6–12 months | 23 (44) |
| 1–2 years | 13 (25) |
| 3–4 years | 13 (25) |
| >4 years | 3 (6) |
| Menopause status* | |
| Perimenopause (last period within previous year) | 4 (14) |
| Menopause (no period within previous 1–5 years) | 27 (52) |
| Postmenopause (no period in ≥5 years) | 15 (30) |
| Missing data | 3 (6) |
| Participants using preparations to manage HF&NS | |
| Pharmaceutical (including clonidine, SSRIs) | 7 (14) |
| OTC (including evening primrose oil, black cohosh, red clover†) | 14 (28) |
| Participants with a history of: | |
| Receiving HRT | 34 (65) |
| Hysterectomy | 10 (19) |

*Based on the STRAW staging system (Soules MR, Sherman S, Parrott E, et al. Executive summary: Stages of Reproductive Aging workshop (STRAW). *Climacteric* 2001;4:267–272.)

†Latin binomials are evening primrose oil, *Oenthera biennis*; black cohosh, *Cimicifuga racemosa*; red clover, *Trifolium pratense*.

GCSEs, general certificate of secondary education; HF&NS, hot flashes and night sweats; SSRIs, selective serotonin reuptake inhibitors; OTC, over the counter; HRT, hormone replacement therapy.

Table 4. HF&NS Frequency per Day over the 14-Day Measurement Periods

| *Variable* | *Baseline (N=47)* | *EOT (N=47)* |
|---|---|---|
| Mean (standard deviation) | 10.7 (4.8) | 7.7 (4.7) |
| 95% CI | 9.4–12.1 | 6.3–9.1 |
| Median (interquartile range) | 10 (7.0) | 6.5 (6.0) |
| Minimum mean score | 3.8 | 1.0 |
| Maximum mean score | 22.4 | 19.0 |
| Range | 18.6 | 18.0 |

HF&NS, hot flashes and night sweats; EOT, end of treatment; CI, confidence interval.

receiving the aromatase inhibitor anastrozole (Arimidex®). Because of the low number of participants receiving anastrozole, these patients were excluded from the analysis. Thus, the final analysis focused on 50 women who were receiving tamoxifen and who completed a course of eight NADA treatments. To obtain this number, 54 women receiving tamoxifen were recruited. Reasons for the loss of 4 participants included 1 woman choosing not to continue beyond the intake interview without a reason; another patient had repeated bouts of ill health and could not participate after giving consent; and 2 withdrew after starting treatment (1 said, ''acupuncture was not the answer,'' after her first treatment and 1 withdrew after five treatments after she was diagnosed with liver metastases).

Return of questionnaires diminished as the study progressed. Fifty-two participants commenced treatment, of which 1 failed to return a Hot Flush Diary at baseline. All participants returned mid-treatment questionnaires, resulting in 51 returns. Questionnaire returns decreased by 2 at EOT and again at post-treatment 4, and a further 6 at post-treatment 18. These numbers are reflected in the results presented in Table 2.

## Study Participant Characteristics

Table 3 displays the demographic and clinical data for the 52 women completing sociodemographic and clinical questionnaires at baseline. The mean age at baseline was 54.8 years (standard deviation [SD] = 7.2, range 38–73). The mean time since breast cancer diagnosis was 2.2 years (SD = 1.2, range 0.8–5.1), and, since starting tamoxifen, the mean time was 1.7 years (SD = 1.2, range 0.4–4.4).

## Safety

Generally, NADA acupuncture was well-tolerated, with no serious adverse effects reported or observed. There was occasional bleeding at the needle sites. However, some participants found the needling uncomfortable or painful; 1 participant found the Lung points so uncomfortable that she refused to have them needled. Some participants experienced tiredness after treatment, especially in the early

Table 5. Mean Reductions in HF&NS Frequency, Calculated Using Log-Transformed Data

| | | | 95% CI | | | |
|---|---|---|---|---|---|---|
| *Time period* | *N* | *Mean % reduction* | *Lower* | *Upper* | *t* | *p* < * |
| Baseline to mid-tx | 50 | 23.6% | 15.3% | 31.5% | 5.1 | 0.0001 |
| **Baseline to EOT** | **47** | **35.9%** | **25.4%** | **45.4%** | **5.8** | **0.0001** |
| Baseline to post-tx 4 | 45 | 37.5% | 25.4% | 47.6% | 5.3 | 0.0001 |
| Baseline to post-tx 18 | 38 | 37.1% | 24.8% | 47.4% | 5.3 | 0.0001 |

*Significance (2-tailed).

Data from baseline to EOT are highlighted in bold.

HF&NS, hot flashes and night sweats; tx-treatment; CI, confidence interval; EOT, end of treatment.

stages of treatment.[5,16,27] These effects are consistent with the findings of a large acupuncture safety study.[28]

## Hot Flash and Night Sweat Frequency

Table 4 shows the mean, medians, and ranges of HF&NS per day over the 14 days at baseline and EOT for the 47 participants returning diaries at both of these measurement points.

As discussed above, using log transformations to normalize the data enabled the percentage change in HF&NS frequency to be calculated. Table 5 shows the results for all four measurement periods, compared with baseline frequencies. Data for the primary endpoint (the change at EOT over baseline) are highlighted.

The hypothesis for this study was a reduction in HF&NS frequency of 33% in one third of participants at EOT. To test this, the percentage change was calculated for each participant using log transformed data, and these were ranked. This showed that 51.1% (24) participants reported a reduction of $\geq 33\%$, 31.9% (15) reported a reduction of $< 50\%$, and 17.0% (8) showed no improvement.[5]

## WHQ Measurements at EOT

Table 1 shows the results for the nine domains of the WHQ at baseline and EOT, and the paired differences show the changes at EOT over baseline. Paired samples *t*-tests indicate that, at EOT, there was a significant change for six WHQ domains, including Anxiety/Fears, Depressed Mood, Memory/Concentration, Sleep Problems, Somatic Symptoms, and Vasomotor Symptoms. These were also clinically significant, as the mean changes were 0.10, 0.15, 0.12, 0.22, 0.12, and 0.23, respectively.

## Problem Rating Score (PRS)

The mean difference in the PRS at EOT over baseline was 2.15 ($SD = 2.06$, $n = 48$, $t = 7.22$, $p < 0.0001$).

## Comparison of NADA Results with Previous Traditional Acupuncture Results

It was of interest to assess how the NADA outcomes compared with the results of the previous study,[5–8] using a semistandardized traditional acupuncture protocol. The null hypothesis was that the means of the two groups at EOT would not be significantly different.

Using *chi*-square tests, it was established that there was no significant difference in the baseline medical data, age, cancer treatment, or menopausal status between the two groups at baseline.[5] Comparisons of the log transformed

Table 6. HF&NS Comparing Log Change Data for TA and NADA Studies, from Baseline to Each Measurement Point

| | | *Group statistics* | | | *Independent samples test* | | |
|---|---|---|---|---|---|---|---|
| *Baseline to:* | *Study* | *N* | *Mean* | *SD* | *t* | *df* | *p** |
| Mid-tx | TA | 48 | 0.525 | 0.528 | 2.716 | 96 | **0.008**† |
| | NADA | 50 | 0.273 | 0.379 | | | |
| EOT | TA | 48 | 0.678 | 0.538 | 2.104 | 93 | **0.038** |
| | NADA | 47 | 0.447 | 0.529 | | | |
| Post-tx-4 | TA | 47 | 0.530 | 0.533 | 0.517 | 90 | 0.606 |
| | NADA | 45 | 0.470 | 0.591 | | | |
| Post-tx-18 | TA | 47 | 0.513 | 0.583 | 0.388 | 83 | 0.699 |
| | NADA | 38 | 0.465 | 0.545 | | | |

*Significance (2-tailed).

†Boldface indicates statistically significant results.

HF&NS, hot flashes and night sweats; TA, traditional acupuncture; NADA, National Acupuncture Detoxification Association; SD, standard deviation; tx, treatment; EOT, end of treatment.

Table 7. Comparison of TA and NADA WHQ and PRS Scores from Baseline to EOT

| *WHQ baseline to EOT* | | *Group statistics* | | | *Independent samples test* | | |
|---|---|---|---|---|---|---|---|
| *WHQ domain* | *Study* | *N* | *Mean* | *SD* | *t* | *df* | *p** |
| Anxiety/fears (ANX) | TA | 47 | 0.17 | 0.25 | 1.25 | 92 | 0.21 |
| | NADA | 47 | 0.10 | 0.24 | | | |
| Attractiveness (ATT) | TA | 47 | 0.09 | 0.37 | 0.42 | 90 | 0.68 |
| | NADA | 45 | 0.06 | 0.31 | | | |
| Depressed mood (DEP) | TA | 47 | 0.06 | 0.20 | −1.85 | 92 | 0.07 |
| | NADA | 47 | 0.15 | 0.24 | | | |
| Memory/concentration (MEM) | TA | 47 | 0.24 | 0.35 | 1.66 | 92 | 0.10 |
| | NADA | 47 | 0.12 | 0.35 | | | |
| Menstrual symptoms (MEN) | TA | 48 | 0.15 | 0.18 | 2.38 | 94 | **0.02**[†] |
| | NADA | 48 | 0.06 | 0.20 | | | |
| Sexual behavior (SEX) | TA | 38 | 0.14 | 0.31 | 0.92 | 70 | 0.36 |
| | NADA | 34 | 0.08 | 0.26 | | | |
| Sleep problems (SLE) | TA | 47 | 0.25 | 0.37 | 0.39 | 93 | 0.70 |
| | NADA | 48 | 0.22 | 0.32 | | | |
| Somatic symptoms (SOM) | TA | 48 | 0.15 | 0.22 | 0.67 | 93 | 0.51 |
| | NADA | 47 | 0.12 | 0.23 | | | |
| Vasomotor symptoms (VAS) | TA | 48 | 0.17 | 0.26 | −0.95 | 92 | 0.34 |
| | NADA | 46 | 0.23 | 0.36 | | | |
| | | *Group statistics* | | | *Independent samples test* | | |
| *PRS baseline–EOT* | *Study* | *N* | *Mean* | *SD* | t | df | p* |
| | TA | 48 | 2.21 | 2.15 | 0.17 | 94 | 0.87 |
| | NADA | 48 | 2.15 | 2.06 | | | |

*Significance (2-tailed).

[†]Bold face represents statistically significant results.

TA, traditional acupuncture; NADA, National Acupuncture Detoxification Association; WHQ, Women's Health Questionnaire; PRS, Problem Rating Score; EOT, end of treatment; SD, standard deviation.

data for hot flash frequency at baseline established that there was no significant difference between groups.

Hot flash frequency data were analyzed using independent *t*-tests for all participants who had completed baseline and EOT data (see Table 2). There was a significant difference between the groups, in favor of traditional acupuncture ($t = 2.104$, $p = 0.038$, $n = 47$) as shown in Table 6. This table also presents the comparative results at each measurement stage. There was a significant difference at mid-treatment, but there were no significant differences between the two groups at 4 and 18 weeks post-treatment.

A similar analysis of WHQ results at EOT showed no significant differences in any of the domains except Menstrual Symptoms; likewise, there was no significant difference in PRS results (see Table 7).

## DISCUSSION

The aims of this single-arm observational study were to explore if the NADA protocol could be used to manage adjuvant hormonal treatment–related HF&NS in women with early breast cancer, and to assess the NADA protocol's effect on physical and emotional well-being. The data provide promising results with a mean reduction in frequency of HF&NS of 35.9% at the end of eight treatments and with 83% of participants experiencing some degree of reduction. These data also indicate a longer-term benefit, with reduction in HF&NS frequency rising slightly to 37% at 4 weeks after EOT and maintaining that level at 18 weeks after EOT.

The WHQ data indicate that participants experienced improvements in a range of aspects of emotional and physical well-being. Statistical and clinically significant changes were reported for six of the nine WHQ subscales at EOT. The 2.1-point reduction in the PRS indicates that participants found their HF&NS significantly less "bothersome."

Comparing the NADA results with the data from the previous traditional acupuncture study[5–8] suggests that NADA may be less effective for reducing HF&NS than a semi-individualized traditional acupuncture protocol, after four and eight treatments. However, there were no significant differences for HF&NS between the 2 groups at 4 and 18 weeks after EOT.[5] Nor were there significant differences between the two approaches at EOT for changes in physical and emotional well-being (apart from

Menstrual Symptoms) or in the perception of HF&NS being ''bothersome.''

This study has a number of strengths. It is the first study to the current authors' knowledge to measure systematically the application of the NADA protocol to pharmaceutically induced menopausal symptoms in women with early breast cancer. In the last decade, there have been numerous studies leading to systematic reviews of acupuncture for managing HF&NS associated with natural menopause[29–31]; as well as recent studies[32,33] and systematic reviews[34] for HF&NS associated with breast-cancer treatment. There is also increasing interest in exploring acupuncture's role in managing HF&NS related to prostate cancer.[35–37] Of all these studies, Harding et al. were the only other researchers to investigate the NADA protocol.[37] In addition to reporting significant reductions in HF&NS and improved well-being in 60 men treated with androgen-deprivation therapy for advanced prostate cancer, this study demonstrated that group treatment with NADA is less expensive than pharmacological treatment for HF&NS for these patients.

Apart from this, the majority of NADA-related research focuses on its efficacy in substance detoxification. It is only recently that Carter et al.[17] and Peckham and Mangold[38] have published articles reporting symptom-related outcomes. Thus, to the current authors' knowledge, the present study is the first to examine systematically NADA's effects on wider physical and emotional symptoms, particularly those associated with breast-cancer treatment–related HF&NS.

As well as providing a first measure of NADA's effects on HF&NS and well-being, this study showed that is possible to recruit women who have had invasive treatments for breast cancer to acupuncture studies. Compliance with the NADA treatment suggests that, despite comments about pain, women found the intervention acceptable and, of the 54 women recruited, 50 completed the course of eight treatments. However, compared with the previous study,[5–8] participants in the current study were less diligent about completing and returning questionnaires, especially at the 18-week follow-up.

This was the second of the current authors' early stage observational studies to evaluate acupuncture as a complex intervention and to assess the feasibility of this approach for a future randomized controlled trial (RCT).[18] The current study's single-arm design did not control for placebo effects. The challenges of designing appropriate placebo controls for acupuncture research are well-documented, with increasing recognition that ''sham'' acupuncture interventions (ranging from specially designed nonpenetrating needles to using nonacupuncture points) appear to generate physiological effects, and are not truly inert.[39–43] A recent White Paper by the Society of Acupuncture Research (SAR) discussed the complex factors underlying the paradox that many well-designed clinical trials demonstrate true acupuncture to be superior to usual care, but not to sham acupuncture[44] (although a recent synthesis of pooled data from high-quality randomized controlled trials suggests that acupuncture is more effective than placebo for managing chronic pain).[45] Among these is the difficulty of designing an appropriate sham intervention when the mechanism of acupuncture is not yet understood. For this reason, many acupuncture researchers advocate the pragmatic RCT as a valid contribution to the evidence base for acupuncture. This compares acupuncture treatment with the best usual treatment for a condition and retains the authenticity of practice and the complexity of the therapeutic intervention, while maintaining scientific rigor.[46,47] In addition, there is an increasing focus on the importance of comparative effectiveness research (CER).[48,49] This is a kind of research in which clinical effectiveness of care is compared among alternative treatment options available for a given medical condition. The key characteristics of CER include study of effectiveness (effect in the real world) rather than efficacy (ideal effect) and comparison among alternative strategies.

Similarly, the ''nonspecific effects'' of the practitioner–patient relationship are often cited as confounders in acupuncture studies. In this current study, an attempt was made to minimize this by reducing the treatment time spent with the acupuncturist to $\sim$7 minutes. However, there may be ''nonspecific effects'' resulting from the group effect. Although participants were encouraged to relax quietly when sitting in the group with the needles retained, the different groups were permitted to form their own dynamics. The women found this a rare opportunity to discuss their experience of cancer and HF&NS with other patients who also had cancer. These participants, like those receiving NADA in recovery programs,[38] found the group setting supportive and an important aspect of the treatment.[15] As in the current authors' previous study, the aim was to assess acupuncture practice as a complex intervention, and it was not the intention to separate the individual components of NADA treatment.[42,50]

This study was conducted in a single acupuncture clinic, which served a mainly white British patient group. The subjects were treated by a single research acupuncturist (B. de V.) who was also the investigator. Thus, generalizability of the study results to the wider population of women with early breast cancer may be limited. Furthermore, recruitment of sufficient numbers of women receiving aromatase inhibitors was not possible, and meaningful data could not be provided. At the time of the current study, tamoxifen was the criterion standard for preventing breast-cancer recurrence, and aromatase inhibitors were just being introduced as an alternative treatment in the United Kingdom. Thus, there were few women receiving this new treatment; however, the levels of interest suggest that HF&NS were a ''bothersome'' side-effect for some women.

Establishing the optimum dose is also an ongoing issue. It is recognized that, in many research studies, the acupuncture treatments are less than optimal, resulting in decreased therapeutic effects.[44] In substance-misuse detoxification, NADA treatments are usually delivered several times per week—usually a minimum of twice weekly—but often as

frequently as daily.[17,38] Offering the treatment more frequently than once weekly may enhance the effect of treatment; however, the majority of women in the current study were working or had other family or social commitments, and found committing to treatment once weekly was sufficiently challenging. Optimal dosage may also vary according to the stage of a patient's breast cancer. The current study focussed on women who had completed their active cancer treatment at least 6 months prior to joining the study; different treatment regimens may be desirable for patients undergoing radiotherapy, chemotherapy, or palliative care, or for those with many comorbidities.[43]

There is a question if the NADA ear points are the best choice of acupuncture points for treating HF&NS. Comparing the results of the NADA group with the previous traditional acupuncture study[5–8] provided some indications of relative effect. However, there are limitations in the comparison of results from the two studies. Although the current authors have sought to ensure that there were no differences between the groups, the retrospective comparison was only an indicator of the results of the two studies, and further research could compare the two approaches concurrently. Nevertheless, it is interesting to see from these results that NADA appears to need a longer time to take effect. This may be a useful finding for managing expectations in clinics or a rationale for intensifying treatment in the first 4 weeks of treatment. Furthermore, our choice of investigating the NADA protocol's appropriateness for managing breast-cancer treatment–related HF&NS relied, in part, on the protocol's characteristics as a package of care. These included the NADA protocol's long history of use internationally in detoxification settings, the anecdotal evidence of the protocol's effect on HF&NS, the existing training structure for nonacupuncturist health professionals in the United Kingdom, the simplicity of the protocol and its ease of application, and the opportunity for using the protocol in group clinics. Furthermore, women did not need to remove clothing for the treatment, and using ear points avoided any considerations necessary for avoiding the arm(s) with, or at risk for, breast-cancer treatment–related lymphedema.

Despite the limitations, this exploratory study of the NADA protocol's effectiveness for managing HF&NS provides a benchmark. The results compare well with some nonhormonal treatment options for HF&NS in women with breast cancer. An RCT of oral clonidine produced a 38% reduction in hot flashes, compared with 24% placebo after 8 weeks of treatment,[51] while a study of transdermal clonidine produced only a moderate (20%) reduction.[52] In both studies, participants reported side-effects, including difficulty sleeping, mouth dryness, constipation, and drowsiness. In the current study, 14% of participants were using pharmaceutical products to manage tamoxifen side-effects and were still experiencing sufficient discomfort to seek additional means of managing their HF&NS.

## CONCLUSIONS

This single-arm observational study suggests that the NADA protocol may offer an option for managing breast-cancer treatment–related HF&NS. The protocol has few side-effects, appears to improve physical and emotional well-being, and reduces the extent to which women find their HF&NS ''bothersome.'' Furthermore, most women found treatment in small groups to be acceptable, and even supportive for coping with their experience of having breast cancer. The potential for treating numerous women in one clinical session makes the NADA protocol a potentially effective approach, and, while the NADA protocol a may not be as effective as traditional acupuncture, the protocol's ''resource efficiency'' may be a positive factor in decision making about service provision. In fact, as a result of this study, the Lynda Jackson Macmillan Centre has established regular clinics for HF&NS. NADA-trained health care professionals who are nonacupuncturists administer the treatments, and there is now a database of >150 service users. A large-scale RCT is necessary to obtain further results; and it would be especially interesting to use a design comparing the NADA protocol with traditional acupuncture.

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## DISCLOSURE STATEMENT

No competing financial interests exist for any of the authors.

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