

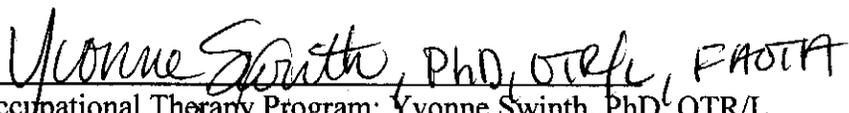
Current Practices, Protocols, and Rationales of Diathermy Use by Occupational Therapists  
in Skilled Nursing Facilities

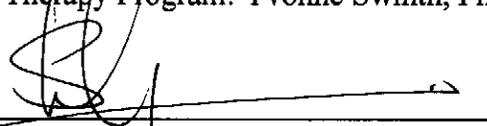
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This research, submitted by Grace Faucett and Erin Keeley, has been approved and accepted  
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Master of Science of Occupational Therapy from the University of Puget Sound.

  
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### Abstract

The purpose of this study was to determine the patterns of use of diathermy by occupational therapists in skilled nursing facilities (SNF) and its purported effectiveness. A survey was completed by 90 occupational therapists (response rate of 36%) who were members of the American Occupational Therapy Association, were listed in the practice area of SNF/long-term care (LTC) facility, and who had experience working in a SNF. Results showed that 54% of the participants had experience using diathermy in SNFs nationwide. The majority of participants with diathermy experience (94%) indicated that they typically implemented diathermy as a preparatory treatment before a functional activity and most participants (80%) administered diathermy for 16 to 30 minutes. The most common objectives when using diathermy were reducing pain (96%) and increasing range of motion (83%). The findings indicated that diathermy was being used for a wide range of diagnoses and symptoms, and that there were discrepancies in how and why occupational therapists administered diathermy in a SNF setting. Although occupational therapists with diathermy experience most frequently (48%) reported “usually” (i.e., 61-80% of the time) seeing a positive effect, many did not know the technicalities of administering diathermy, including the frequency (MHz) used (44%) and how the modality was reimbursed (11%). Additionally, there were conflicting results in diathermy being used for diagnoses and/or symptoms for which it is contraindicated. Due to a lack of research on diathermy use within occupational therapy literature, experimental studies to determine the effectiveness of diathermy would greatly benefit the field of occupational therapy in its effort to be an evidence-based practice.

Current Practices, Protocols, and Rationales of Diathermy Use by Occupational Therapists  
in Skilled Nursing Facilities

Diathermy, a physical agent modality (PAM), is currently being used by physical therapists, athletic trainers and occupational therapists in practice (Bracciano, 2008; Cameron, 2009; Draper, Miner, Knight, & Ricard, 2002); however, the efficacy of diathermy is debatable. Due to conflicting study results, even systematic reviews do not draw conclusive evidence on the outcomes of diathermy use for particular diagnoses when compared to other treatment methods (Marks, Ghassemi, Duarte, & Van Nguyen, 1997; von der Heyde, 2011). In addition, only limited research has been conducted on the uses of diathermy and the vast majority of existing published research stems from healthcare fields other than occupational therapy, despite PAMS having been approved for use by the American Occupational Therapy Association (AOTA) in 1991 when it is used in preparation for meeting functional outcomes (AOTA, 1991).

Although diathermy is currently used by occupational therapists in skilled nursing facilities (SNFs) (e.g., Brook Stone Living Center, n.d.; Gateway Care and Rehabilitation Center, 2010), the published evidence may not yet be sufficient enough to thoroughly justify its use in helping to meet functional outcomes. This lack of research on diathermy use within occupational therapy creates a gap between the use of diathermy by occupational therapists and the aims of the profession to be an evidence-based practice. In order to fill this gap, a preliminary descriptive study is needed to discover the most common diagnoses for which diathermy is being used. This preliminary research will help guide future experimental studies to investigate the potential differential effects by diagnosis, and help give credence to the efficacy and use of diathermy in occupational therapy.

## Background

**Defining diathermy.** Diathermy operates by applying high-frequency electromagnetic energy into body tissues (Prentice & Draper, 2002). Resistance to the energy transferring across tissue generates thermal effects; however, nonthermal effects may occur when the modality is applied in a pulsed mode (Cameron, 2009; Prentice & Draper, 2002). Diathermy has been used for a variety of therapeutic purposes, including reducing edema, lymphedema, and pain (e.g. Foley-Nolan et al., 1992; Mayrovitz, Sims, & Macdonald, 2002; Pilla, 1999); and increasing range of motion and flexibility (e.g., Cesare et al., 2008; Draper, Castel, & Castel, 2004).

Diathermy devices are available as shortwave or microwave modalities. Shortwave diathermy (SWD) operates within the radio frequency range of 1.8 to 30 MHz, and microwave diathermy (MWD) operates within 300 MHz to 300 GHz (Cameron, 2009). Both SWD and MWD can be applied in a continuous or pulsed mode of operation (Bracciano, 2008; Cameron, 2009). Pulsed SWD is also known as pulsed radio-frequency (PRF), pulsed electromagnetic field (PEMF), or pulsed electromagnetic energy (PEME) (Cameron, 2009). For purposes of this article, the general term of diathermy is used.

Unlike superficial heating PAMs, such as heat packs that penetrate heat up to two centimeters, diathermy can penetrate heat through tissue up to five centimeters deep (Bracciano, 2008). Diathermy treatment is similar to ultrasound as a deep heating agent; however, some studies have found diathermy to be advantageous over ultrasound in healthy college-aged students (Bracciano, 2008; Draper, Knight, Fujiwara, & Castel, 1999; Garrett, Draper, & Knight, 2000). The major advantage of diathermy over ultrasound is the larger surface area of the applicator drum, with the standard drum being 25 times larger than a typical ultrasound head

(Bracciano, 2008; Draper et al., 1999). Garrett et al. (2000) also found diathermy retains residual heat in muscle tissue more than three times longer than ultrasound.

**Existing diathermy literature.** Several studies support the use of diathermy to reduce edema and lymphedema (Mayrovitz et al., 2002; Pennington, Danley, Sumko, Bucknell, & Nelson, 1993; Pilla, 1999; Strauch, Herman, Dabb, Ignarro, & Pilla, 2009). In a double blind study, Pennington et al. (1993) found that diathermy was able to reduce swelling in sprained ankles after just one treatment. In a larger double blind study, Pilla (1999) found diathermy was effective in reducing both the volume and the rate of edema in patients with sprained ankles. Mayrovitz et al. (2002) found in a pilot study that diathermy was effective in reducing lymphedema in patients' arms postmastectomy; however, no placebo control was used in the study.

Findings for the ability of diathermy to help reduce neck pain are conflicting (Dziedzic et al., 2005; Foley-Nolan, Barry, Coughlan, O'Connor, & Roden, 1990; Foley-Nolan et al., 1992). Foley-Nolan et al. (1990) found in a double blind study that diathermy was effective in reducing pain for patients with persistent neck pain. Foley-Nolan et al. (1992) also found diathermy was effective in reducing pain for patients with acute whiplash injuries. In contrast, Dziedzic et al. (2005) found diathermy showed no significant benefit in pain reduction for patients with nonspecific neck pain. However, further research of the effectiveness of diathermy for nonspecific neck pain is needed, as this study did not include blinded participants or standard protocols for treatment.

Similar to findings for neck pain, studies for the effectiveness of diathermy in treatment for osteoarthritic knees are contradictory (Marks et al., 1997). Jan, Chai, Wang, Lin, and Tsai (2006) found that diathermy was effective in reducing knee pain and synovial sac thickness. In

contrast, several other studies found diathermy had no significant effect on knee pain for patients with osteoarthritis (Adegoke & Gbeminiyi, 2004; Akyol et al., 2010; Klaber Moffett, Richardson, Frost, & Osborn, 1996). Furthermore, Akyol et al. (2010) found that diathermy had no significant benefit over the control group for patients with osteoarthritic knees in treatment outcomes for depression, which is commonly linked to chronic pain (Asghari, Julaeiha, & Godarsi, 2008), muscle strength, quality of life, and walking distance. In addition, Marks et al. (1997) completed a systematic review of 11 articles on the use of diathermy in patients with osteoarthritic knees and found that no conclusion on the effectiveness of diathermy could be drawn, largely due to poor methodology and conflicting results.

Diathermy has also been implemented in treatment for increasing joint and muscle flexibility (Cesare et al., 2008; Draper et al., 2004; Draper et al., 2002). Draper et al. (2002) studied the use of diathermy in increasing hamstring flexibility in healthy college students; no significant effects were found. In a single case study, however, Draper et al. (2004) found that diathermy was effective in increasing range of motion in a patient's elbow after a traumatic injury when prior treatment of superficial heat, ultrasound, and exercise had failed. This study was also unique because it is thought to be the first published case on the use of diathermy over metal implants, which is a contraindication for diathermy (Draper et al., 2004). Still, further research needs to be done as this study only included one participant and no controls were used for comparison.

Disorders of the shoulder region have also been treated with diathermy; however, the diagnoses differed between studies. Akyol et al. (2011) used the outcome measurements of depression, muscle strength, quality of life, and walking distance in a separate study for patients with subacromial impingement syndrome and found no significant difference in results with the

use of diathermy when compared to a placebo. In contrast, diathermy was found to be effective in reducing pain, increasing range of motion, and diminishing calcification for patients with calcific tendinopathy of the rotator cuff (Cesare et al., 2008).

Due to the conflicting results of diathermy use, it is possible that the effectiveness of the modality is dependent upon the diagnosis for which it is being used. Because the number of studies completed for diathermy is limited, only a few diagnoses, such as osteoarthritic knees, have been investigated by separate researchers. In addition, methodology and outcome measurements often differ among studies, thus creating a need for validation studies using the same study design.

**Links between occupational therapy and diathermy.** The diagnoses of edema, lymphedema, neck pain, joint and muscle inflexibility, calcific tendinopathy, shoulder impingement, and osteoarthritic knees are all diagnoses occupational therapists may treat. The focus of treatment for clients with edema and lymphedema involves reducing swelling, increasing range of motion, increasing quality of life, providing patient education, and oftentimes, pain management (Dennis, 1993). In addition to edema and lymphedema, pain is also associated with the previously mentioned diagnoses of calcific tendinopathy, shoulder impingement, and osteoarthritic knees (Akyol et al., 2010; Akyol et al., 2011; Cesare et al., 2008). Because pain can be a debilitating symptom hindering participation in life activities (Binder & McKenna, 2001), occupational therapists are involved in creating strategies to reduce and avoid invoking pain. As previously mentioned, diathermy may be one strategy used to reduce pain in clients (e.g., Foley-Nolan et al., 1992, Jan et al., 2006).

Other areas in which occupational therapists may specialize include the treatment of client factors of joint mobility and muscle tone (AOTA, 2008). Limited joint mobility and degree

of muscle tone can hinder a client's ability to participate in daily activities, thereby potentially decreasing independence and well-being (Hocking, 2009). Because occupational therapists strive to increase independence and maximize function, they work to lessen the impact of edema, pain, and loss of flexibility, which are all symptoms indicative of diathermy use. Therefore, diathermy has potential utility as a modality that can be used as a preparatory method prior to giving skilled instruction in activities of daily living (ADL), which is defined by AOTA as "activities that are oriented toward taking care of one's own body" (AOTA, 2008, p. 631).

**Defining skilled nursing facilities.** SNFs are defined as facilities where adults who require medical attention and are unable to live independently are admitted for short-term to extended and even permanent stays (AOTA, 2012; Centers for Disease Control and Prevention (CDC), 2010). There is a lack of agreement in terminology on what constitutes a SNF, so for purposes of this paper the term SNF will be used to include long-term care (LTC) facilities and nursing homes. In a 2004 survey, the CDC identified 16,100 nursing homes in the United States, with an estimated 1.5 million current residents (CDC, 2012). An overview of the survey by Jones, Dwyer, Bercovitz, & Straham (2009) determined an estimated 88.3% of the population in nursing homes were over the age of 65, and 45.2% were over the age of 85. Overall, only 1.6% of the residents received no assistance in any ADL, while 51.1% received assistance for all five ADL of bathing, toileting, dressing, transferring, and eating (Jones et. al, 2009). The study also found that 22.7% of residents reported pain in the seven days prior to the interview (Jones et. al, 2009). Due to the large percentage of patients requiring assistance in ADL and the large numbers of patients reporting pain, occupational therapy services are traditionally provided in SNFs (Washkowiak et. al, 2012). Occupational therapy's involvement in SNFs typically revolves

around increasing independence in clients' ADL, which includes bathing, dressing, eating, transferring, and grooming (Washkowiak et. al, 2012).

**Aims of occupational therapy.** Although the application of diathermy for treatment of various diagnoses and outcomes has been studied within physical therapy and athletic training, no publications on the topic could be found in occupational therapy research literature. This lack of research on diathermy use in occupational therapy creates a gap between the use of diathermy by occupational therapists and the aims of the profession. AOTA strives to ensure that occupational therapy is recognized as an evidence-based profession and that its practicing members are cognizant of patient safety throughout treatment (AOTA, 2007; AOTA, 2010a). In 2003, AOTA implemented the *Centennial Vision* as a means to guide the future of the profession and instill the goal of promoting occupational therapy as a valuable and respected resource for improving people's occupational functioning (AOTA, 2007). It states, in part, "that occupational therapy is a powerful, widely recognized, science-driven, and evidence-based profession" (AOTA, 2007, p. 614).

Evidence-based practice can be described as the "conscientious, explicit, and judicious use of current best evidence in making decisions" regarding patient care (Sackett, Rosenberg, Gray, & Haynes, 1996, p. 71). Occupational therapists must not only base their use of diathermy on their own experiences of treatment outcomes, but must also be able to cite scientific evidence to support their justification for its use (Holm, 2000). Although some evidence does exist to support the use of diathermy for diagnoses such as edema and lymphedema (Mayrovitz et al., 2002; Pennington et al., 1993; Pilla, 1999; Strauch et al., 2009), this research stems from professions other than occupational therapy. The treatment perspectives and outcome goals of other professions will differ from those of occupational therapists, creating a potential

complication of transference if occupational therapists are using diathermy based on evidence from other professions.

In addition to the professional objectives of the *Centennial Vision*, AOTA also has several official documents, including the *Occupational Therapy Code of Ethics and Ethics Standards* and *Standards of Practice for Occupational Therapy*, as well as accreditation standards for occupational therapy education programs set forth by the Accreditation Council for Occupational Therapy Education (ACOTE). Together, these documents outline strict professional requirements demanding a need for evidence-based practice (ACOTE, 2006; AOTA, 2010a; AOTA, 2010b). The *Occupational Therapy Code of Ethics and Ethics Standards* states seven principles occupational therapists must abide by, including “beneficence” and “autonomy and confidentiality” (AOTA, 2010a). The principle of beneficence states that “occupational therapy personnel shall use, to the extent possible, evaluation, planning, intervention techniques, and therapeutic equipment that are evidence-based and within the recognized scope of occupational therapy practice” (AOTA, 2010a, p. 3). When this principle is applied to the use of diathermy as therapeutic equipment, it provides a direct rationale for the need to determine best practices within occupational therapy. Additionally, the principle of autonomy and confidentiality asserts that occupational therapists have a duty to provide “full disclosure of the benefits, risks, and potential outcomes of any intervention” in order for clients to make an educated decision about accepting services proposed by the occupational therapist (AOTA, 2010a, p. 5). To provide full disclosure, a therapist needs to be informed about the outcomes of previous research for similar populations and diagnoses as the client being treated. Because the current research on diathermy is sparse and conflicting, professionals would struggle to provide clients with ample information on all possible benefits, risks, and outcomes of its use.

**Intention of the study.** Since occupational therapists are currently using diathermy in SNFs, and the field of occupational therapy strives to be an evidence-based practice, it is imperative that occupational therapists base their diathermy treatment on conclusive research within the field of occupational therapy. It is also important to ensure that occupational therapists are being discriminative enough in their treatment methods that they only use diathermy for diagnoses for which there is evidence suggesting it is a beneficial treatment modality for working toward outcome goals. However, in order for experimental studies to be designed to give rise to the efficacy of diathermy, it must first be established what the current practice of the modality is within occupational therapy. Thus, the purpose of this study was to determine the patterns of use of diathermy by occupational therapists in SNFs and its purported effectiveness. Specifically, this investigation attempted to determine (1) the various diagnoses and symptoms diathermy is being used for in SNFs, (2) the protocols therapists use for duration and frequency in application of the modality, (3) what rationales occupational therapists are using to justify the use of diathermy, and (4) the functional goals and objectives the modality is being used towards.

## **Method**

### **Research Design**

A survey by mail was conducted in order to meet the aims of this preliminary descriptive study (see Appendix). A survey allowed for a large, widespread, and random collection of data and allowed participants to respond at their convenience within a given time frame. Also, due to the constraints of time and resources, a survey was the most efficient option for accessing individuals nationwide. Validity and transferability, which are limitations of a survey, were increased by collecting data from a random sample. However, due to the survey being

administered to a subset of individuals, caution was made in generalizing to all occupational therapists using diathermy.

### **Participants**

The ideal population of interest for this study was all occupational therapists in the United States with experience working in SNFs who have or have had access to diathermy. The accessible population was members of (AOTA) listed in the practice area of SNF/LTC. Participants were chosen via a systematic random sample conducted by AOTA. To be included in the study, participants must have been registered occupational therapists but did not have to be currently practicing. Participants must have had experience working as an occupational therapist in SNFs to be included in the study. Given the budget and time constraints, 250 surveys were distributed.

### **Instrumentation**

In order to meet the specific aims of this study, an original survey was drafted. To keep the survey comprehensive but convenient in length, it was composed of close-ended questions (e.g., multiple choice and check-all-that-apply) with space at the end for participants to include additional comments. The content of the questions included demographics, work setting and experience, and general use of diathermy including procedures; diagnoses, symptoms, and goals diathermy was used for; frequency of use; and outcomes as reported by occupational therapists and their clients.

One limitation of this survey was the inability of the respondents to ask questions for purposes of clarification. In order to increase validity and minimize respondents' confusion, pilot surveys were administered to three occupational therapist faculty at the university. Feedback from these therapists was used to edit the survey to ensure questions were not leading and were

written clearly and accurately. Another limitation of this study was having close-ended questions with response options that did not coincide with how the respondent answered. One way to alleviate this incongruence was having an answer option of “Other” with space provided for respondents to provide their own answers.

The validity of this survey was increased because the survey respondents were informed of the confidentiality of their responses. This created a safe platform for respondents to answer questions without fear of disclosure. In addition, because the data were self-reported and the questions uniform, researcher bias in data collection was diminished. Therefore, the inter-rater reliability of the study was high.

### **Procedures**

An original survey was created by the researchers in collaboration with the research committee members. The survey format was based on recommendations from Salant and Dillman (1994). Survey questions and content were developed via group discussions and addressed participant demographics, work settings and experience, and information related to all four components of the purpose of the study. The researchers obtained approval from the university IRB before administering the survey.

Prior to sending the survey to study participants, a pilot survey was given to three occupational therapists. This group included two occupational therapists who had used diathermy in their treatments sessions, as well as one occupational therapist who was not familiar with any type of diathermy. Including a pilot participant who was unfamiliar with diathermy helped determine if the survey was appropriately formatted and structured for potential survey participants who had never used diathermy. In addition to completing the survey, pilot participants were also asked to provide feedback on the format of the survey, the clarity of the

questions, the time it took to complete, and if there were any leading questions. The format and content of the survey was modified based on the feedback provided by the pilot participants.

The finalized survey was mailed in a survey packet to the 250 AOTA members whose contact information was provided by AOTA. The survey packet also included a cover letter explaining the purpose of the study, that returning the survey indicated consent to participate, and a request that the survey be completed and returned within two weeks. Participants were also supplied a pre-addressed and pre-paid return envelope (coded for purposes of tracking while maintaining confidentiality). Participants whose surveys were not received by the stated deadline were sent a second survey packet. Surveys not received by the stated deadline of the second mailing were excluded from the study. All survey packets were addressed by the researchers and any identifying information of the respondent that was returned with the survey was either destroyed (e.g., shredded and thrown away) or disassociated from the survey (e.g., securely filed independently of the survey and in a random order).

After completed surveys were returned, both researchers recorded and analyzed data simultaneously to improve inter-rater reliability. Researchers worked together to enter data into SPSS, working side-by-side to ensure accessibility of each other in case any questions or unforeseen circumstances arose. Any differences in interpretation of survey data were resolved through thorough discussion between the researchers.

### **Data Analysis**

Survey data were entered and analyzed using SPSS version 19.0. Percentage graphs and frequency distributions were created from the data to establish demographic information of all study participants. Frequency distributions were also used to determine the types of diagnoses and symptoms for which the surveyed occupational therapists were using diathermy, the

functional goals diathermy was being used towards, and how much and how often diathermy was being applied. Independent t-tests of significance were run to investigate potential differences in demographics between participants with and without diathermy experience (e.g., years of experience, years of experience working in SNFs). Pearson correlation tests were run to examine if there was a correlation between the positive effects reported by occupational therapists and the positive effects reported by the clients when using diathermy. Chi Square analyses were used to investigate potential differences in distributions between categorical data (e.g. regions, training, knowledge of reimbursement). Compiling the results of these statistical procedures provided a better understanding of the uses, protocols, and rationales of diathermy as used by occupational therapists in SNFs.

## **Results**

### **Response Rate**

Of the 250 survey recipients, a total of 61 surveys were received after the first mailing, one of which was returned as undeliverable. A second mailing was conducted, which yielded an additional 32 surveys, for a total of 92 respondents. Of the 92 respondents, two were not registered and/or licensed occupational therapists with experience working as an occupational therapist in a SNF and, therefore, did not meet the inclusion criteria. This yielded a response rate of 36%.

### **Demographics of Participants**

Participants' years of experience working as an occupational therapist ranged from three months to 40 years, with a mean of 16 years (see Figure 1a). Participants' years of experience working as an occupational therapist in a SNF ranged from three months to 29 years, with a mean of 10 years (see Figure 1a).

Participants most frequently reported working in only one or two SNFs for greater than three months during their career ( $n = 33, 37\%$ ), as shown in Figure 1b. The second most common response was having worked in seven or more SNFs for greater than three months ( $n = 26, 29\%$ ). Of the participants who had experience using diathermy, the majority had used diathermy in one or two SNFs ( $n = 34, 69\%$ ), indicating that diathermy is not being used at all facilities in which participants have worked.

The regions in which participants most frequently reported spending most of their career working were the Northeast ( $n = 27, 30\%$ ) and Midwest ( $n = 27, 30\%$ ) regions, as shown in Figure 1c. The least frequently reported region was the Northwest region ( $n = 8, 9\%$ ). Fifteen participants (17%) worked mostly in the Southeast region and 13 participants (14%) worked mostly in the Southwest region.

There was no significant difference in the mean years of experience between participants with experience using diathermy ( $M = 14.318$ ) and participants without experience using diathermy ( $M = 18.704$ ) ( $t = -1.877, df = 86, p = 0.064$ ). There was no significant difference in the mean years of experience working in SNFs between participants with experience using diathermy ( $M = 9.818$ ) and those without ( $M = 10.704$ ) ( $t = -.576, df = 86, p = 0.566$ ). There was also no association found between diathermy use and the regions in which occupational therapists have worked,  $X^2(4, n = 90) = 4.574, p > .05$ .

### **Diathermy Education and Training**

The majority of all participants ( $n = 72, 80\%$ ) did not have diathermy incorporated into their curricula (Figure 2a); however, 68% ( $n = 61$ ) of all participants thought diathermy should be included (Figure 2b). Of the occupational therapists with diathermy experience, 8% ( $n = 4$ )

had diathermy included in the curricula and 85% ( $n = 42$ ) thought diathermy should be included as part of the occupational therapy curricula.

Approximately half of all participants had used formal resources to specifically search the uses and/or effectiveness of diathermy ( $n = 41$ , 46%). Of those who had used formal resources, 78% ( $n = 65$ ) were occupational therapists with diathermy experience. The most common formal resources used were online research databases ( $n = 20$ , 49%) and/or resources from the manufacturers of the diathermy machine ( $n = 16$ , 39%). Other resources used were AOTA documents (e.g., *OT Practice* magazine and American Journal of Occupational Therapy) ( $n = 12$ , 29%) and textbooks from occupational therapy school curricula ( $n = 9$ , 22%).

All but one occupational therapist with diathermy experience had received training on the use of diathermy before administering diathermy on clients ( $n = 48$ , 98%). The most prevalent forms of training were provided directly from the manufacturer of the diathermy machine being used ( $n = 27$ , 56%) and/or in a class or continuing education workshop as part of their employment ( $n = 21$ , 44%). Other forms of training included one-on-one instruction from a colleague, peer, or supervisor on-site ( $n = 9$ , 19%) and in a class or continuing education workshop outside the realm of their employment ( $n = 9$ , 19%).

### **Diathermy Patterns of Use**

Of the participants who met the inclusion criteria, slightly over half ( $n = 49$ , 54%) responded that they had current or past experience using diathermy. The most common reasons reported for participants not having experience using diathermy were that diathermy was not available in the facilities where they worked ( $n = 29$ , 71%) and/or they did not know how to use, apply, or administer diathermy ( $n = 23$ , 56%) (see Table 1).

Approximately half of participants with diathermy experience had administered diathermy within the last month ( $n = 26, 53\%$ ), and 25% had administered diathermy more than 12 months ago ( $n = 12$ ). When these participants were asked why they had not administered diathermy within the last 12 months, the majority of participants responded that it was because diathermy was not available at the facilities where they had worked ( $n = 10, 83\%$ ); eight percent said it was because they prefer to use physical agent modalities other than diathermy ( $n = 2$ ); no participants said it was because they did not think diathermy was a beneficial and/or efficient treatment method for the clients they had treated in the last 12 months (see Table 2).

### **Diagnoses and Symptoms for which Diathermy was Used**

The most commonly reported diagnoses on the therapists' caseloads were osteoarthritis ( $n = 48, 42\%$ ) and fractured bones ( $n = 48, 28\%$ ). Participants reported administering diathermy on patients with osteoarthritis 40% ( $n = 47$ ) of the time and on fractured bones 26% ( $n = 47$ ) of the time. Figure 3 represents the percent of typical diagnoses on participants' caseloads and compares them to the percent that diathermy was administered per diagnosis.

Participants most frequently (48%) reported "usually" seeing a positive effect when administering diathermy for pain, spasms, edema, and soft tissue tightness, with "usually" being classified as 61-80% of the time. Participants also reported that their clients "usually" report a positive effect when receiving diathermy for those same symptoms (see Figure 4). There was a significant positive high correlation between the positive effect of diathermy application as seen by the occupational therapists and the positive effect reported by clients for pain, spasms, edema, soft tissue healing, and wound healing ( $r = 0.68, p < 0.05$ ), that is, positive effects seen by occupational therapists tend to be associated with positive effects reported by the client.

### **Protocols Used in Administering Diathermy**

When asked who administers diathermy most often to clients, slightly over half of participants said the occupational therapists (OTR) and occupational therapy assistants (COTA) administer diathermy equally ( $n = 27$ , 55%), and 25% responded that the OTR administers diathermy more than the COTA ( $n = 12$ ). Fourteen percent ( $n = 7$ ) reported that only the OTR administers diathermy, and 4% ( $n = 2$ ) reported the COTA uses diathermy more than the OTR.

The majority of participants reported administering diathermy an average of three to four times per week on a client ( $n = 30$ ) and 80% of participants stated the average length of time they administer diathermy is 16-30 minutes ( $n = 38$ ) (see Figures 5a and 5b, respectively).

Participants most commonly reported not knowing what frequency (MHz) they used to administer diathermy ( $n = 20$ ), and nine participants indicated they used a frequency preset by the manufacturer (see Figure 5c). Slightly over half of the participants ( $n = 25$ ) reported they devoted 1 to 25% of the treatment session to administering diathermy, and 18 participants reported they devote 26 to 50% of the treatment session to administering diathermy (see Figure 5d).

Forty of the participants (82%) with diathermy experience provided information regarding what form of diathermy they used in relation to particular diagnoses, as depicted in Table 3. The most commonly used forms of diathermy were continuous SWD and pulsed SWD. When administering continuous SWD, participants used it most commonly for osteoarthritis ( $n = 23$ , 58%) and cerebral vascular accident (CVA) ( $n = 17$ , 43%), and when administering pulsed SWD, participants also used it most commonly for osteoarthritis ( $n = 24$ , 60%) and CVA ( $n = 16$ , 40%). Five of the 40 participants (13%) reported using MWD, again, mostly for osteoarthritis ( $n = 3$ , 60%) and CVA ( $n = 3$ , 60%). No other forms of diathermy were reported as being used.

When considering various symptoms, continuous SWD was used most often for soft tissue tightness ( $n = 29, 74\%$ ) and pain ( $n = 24, 60\%$ ), and pulsed SWD was used most often for pain ( $n = 26, 65\%$ ) and edema ( $n = 25, 64\%$ ). MWD was used mostly for pain ( $n = 4, 80\%$ ) and soft tissue tightness ( $n = 4, 80\%$ ). When a different form of diathermy was used depending on the diagnosis, participants most often reported the difference being attributed to medical precautions ( $n = 35, 81\%$ ) and/or diathermy being contraindicated for the particular diagnosis ( $n = 31, 72\%$ ). Other reasons for using a different form of diathermy were due to policies of the employer or facility ( $n = 7, 16\%$ ) and “Other” ( $n = 3, 7\%$ ), such as the client’s symptoms and the company protocols. Two participants (5%) did not know the reasons for using different forms of diathermy.

Diathermy was reported as typically being implemented into treatment sessions mostly as a preparatory treatment before functional activities were performed ( $n = 45, 94\%$ ), and being implemented concurrently with other types of therapy ( $n = 32, 67\%$ ). Diathermy was also implemented into treatment at the end of the session ( $n = 6, 13\%$ ), alone with no other treatment ( $n = 2, 4\%$ ) and/or “Other” ( $n = 1, 2\%$ ), for example, diathermy being administered while completing paperwork since it is not a timed treatment. Of the participants who applied diathermy concurrently with other types of therapy, the most common types of concurrent therapy were client or caregiver education, and functional activity(ies) using the limb(s) not receiving diathermy, both at 81% ( $n = 26$ ). An additional 69% of participants ( $n = 22$ ) reported using diathermy concurrently with active and/or passive range of motion. Two participants (6%) wrote “Other,” such as cognitive tasks and contracture management.

Participants were also asked questions regarding the types of treatment sessions that would likely be reimbursed when administering diathermy. The most commonly reported types

of treatment sessions were when using diathermy as a preparatory modality before functional activities ( $n = 33, 70\%$ ) and when using diathermy concurrently with other types of therapy ( $n = 32, 68\%$ ). Thirteen percent of participants ( $n = 6$ ) reported diathermy as being reimbursable when used alone with no other treatment and one participant noted that they thought diathermy was not reimbursable. Five participants (11%) thought diathermy was reimbursable at the end of the session, and another five participants (11%) stated that they did not know how diathermy was reimbursed. Of those five participants, two (40%) had used diathermy within the last month and one had used diathermy over 12 months ago. Thirteen percent ( $n = 6$ ) reported “Other” and wrote in responses such as diathermy not being a timed treatment, only the setup time being considered skill treatment, and being dependent on the payer source. There was no association between formal training and knowledge of reimbursement,  $X^2 (1, n = 47) = 0.122, p > .05$ .

### **Rationales for Using Diathermy**

When participants were asked about the main determining factor(s) in deciding to initiate the use of diathermy for a particular client, the most common response ( $n = 45, 94\%$ ) was the particular symptoms of the client being treated. Twenty-five percent of participants ( $n = 12$ ) indicated that the use of diathermy was based on research literature supporting its use for a particular diagnosis, 19% ( $n = 9$ ) used it because it was a convenient and readily-available treatment method, 6% ( $n = 3$ ) used it based on the treatment principles of their employer or facility, and 6% ( $n = 3$ ) wrote in “Other,” for example, having seen excellent results in the past, using diathermy when all other forms of pain and edema management have failed, and allowing concentration in one specific area.

### **Functional Goals and Objectives for which Diathermy was Used**

When considering clients' goals regarding areas of occupation, a majority of participants used diathermy for dressing ( $n = 41$ , 85%), functional mobility ( $n = 35$ , 73%), and personal hygiene and grooming ( $n = 32$ , 67%). Other goals reported were eating/feeding ( $n = 30$ , 63%), bathing and showering ( $n = 27$ , 56%), toileting ( $n = 24$ , 50%), instrumental ADL ( $n = 20$ , 42%), rest and sleep ( $n = 19$ , 40%), play and leisure ( $n = 12$ , 25%), and "Other" ( $n = 8$ , 16%), such as contracture reduction, wound healing, and joint integrity. The most commonly reported objectives for participants using diathermy were to reduce pain ( $n = 46$ , 96%) and increase range of motion ( $n = 40$ , 83%), followed by reducing edema ( $n = 33$ , 69%). Fifty-four percent ( $n = 26$ ) reported using diathermy to prevent soft tissue tightening, and 16% ( $n = 8$ ) reported "Other" objectives (e.g., increase activity tolerance, contracture management, and wound healing).

### **Additional Responses**

The end of the survey included a space for participants to provide additional comments or feedback. Six participants provided positive feedback regarding the efficacy of diathermy, including seeing "great," "excellent," and "amazing" results. One participant noted that diathermy was the "most effective modality" being used in his/her treatment sessions. One participant opposed the use of diathermy, stating he/she had achieved the same or greater results "using other modalities that are more accessible." Another participant noted that "80% of residents prefer hot packs rather than diathermy due to being able to 'feel' the heat effects." This same participant also said diathermy was useful in facilities where it was available. Two participants mentioned that many facilities without diathermy could not afford the cost of renting a diathermy machine, and two others stated that diathermy was used only by physical therapists at the facilities where they had worked.

## **Discussion**

### **Demographics of Participants**

Given that the results showed no significant difference in the mean years of experience between those with diathermy experience and those without, it appears that participants' years of experience does not influence the knowledge and decision to use diathermy. One factor that does appear to influence the usage of diathermy in SNFs is the availability of the machine. The number of SNFs in which all participants had worked varied widely, and those participants with diathermy experience reported using diathermy in fewer facilities than the total number of SNFs in which they had worked. The fact that occupational therapists had not used diathermy in all of the facilities in which they had worked may be attributed to a variety of reasons, including not being in a role that included administering diathermy, and/or the cost of owning or renting a diathermy machine being too great to warrant the facility using it.

Since no correlation was found between the demographic regions of participants and the frequency of diathermy usage, it can be determined that diathermy usage was not region specific for this sample. This finding supports information found on SNFs websites that state diathermy is a nationally used physical agent modality administered by occupational therapists in SNFs (e.g., Brook Stone Living Center, n.d.; Gateway Care and Rehabilitation Center, 2010).

### **Diathermy Education and Training**

The majority of participants did not have diathermy included in their occupational therapy school curricula ( $n = 72, 80\%$ ), regardless of whether or not they were diathermy users. Interestingly, some participants who did not have experience using diathermy still thought it should be included in the curricula. This indicates a gap in the profession of providing

occupational therapy students with information and exposure to all PAMs that may be available for them to use in their future careers.

Almost half of all participants had used formal resources to research diathermy, with the most common resources being online databases and/or information provided by the manufacturer. Interestingly, 22% ( $n = 9$ ) of participants who had not used diathermy indicated they had used formal resources to look up information, indicating there is interest in learning about the modality for purposes other than researching it prior to use. This shows a need for resources to be made more available to a general audience of occupational therapists, not just to those who have experience using diathermy. The fact that one of the most common resources used is provided by the manufacturer of the diathermy machine is a concern as they may provide biased resources and information.

As was hoped, almost all participants with diathermy experience had formal training before administering diathermy. Although only two percent of participants had no formal training before administering diathermy, it is still a concern that an occupational therapist would administer the modality without formal training, especially considering that several states require training and continuing education to administer any physical agent modality (e.g., Department of Consumer Affairs, 2013; Office of the Secretary of State, n.d.; South Dakota Legislature, 2013; Tennessee Board of Occupational Therapy, 2007).

### **Diathermy Patterns of Use**

Given the lack of research and evidence-based data on diathermy usage by occupational therapists, this study found a surprising number of participants with experience using diathermy ( $n = 49$ , 54%). For the 46% ( $n = 41$ ) of participants who had not used diathermy, the most common reasons for non-use were lack of availability of diathermy machines in facilities where

they had worked and not knowing how to administer diathermy. Interestingly, only two participants who had not used diathermy responded they did not use diathermy because they thought it was not a beneficial and/or efficient treatment method. These results suggest that the availability of diathermy machines and knowledge of how to administer diathermy are more indicative than the perceived effectiveness of diathermy in determining its use.

Approximately half of participants had administered diathermy in the last month, signifying that having experience using diathermy does not necessarily mean therapists have recently used it. However, for the participants who had not used diathermy in the last year, the most common reason was because the facility(ies) in which they were most recently employed did not have diathermy available. Interestingly, no participants stated that the reason for not having used diathermy in the last year was due to thinking it was not effective or beneficial for their clients. This indicates that for the occupational therapists with diathermy experience in SNFs, their decision to use diathermy was more affected by the resources available to them than by a belief that diathermy was not an effective treatment modality.

### **Diagnoses and Symptoms for which Diathermy was Used**

Results of the current study found that osteoarthritis and fractured bones are the most common diagnoses diathermy is being used to treat when used by occupational therapists in SNFs. However, when working with people with those diagnoses, occupational therapists only applied diathermy for clients with osteoarthritis an average of 40% of the time ( $n = 47$ ), and fractured bones 26% of the time ( $n = 47$ ). These results indicate that the decision to use diathermy on a client is not based solely on the diagnosis.

When administering diathermy to treat the symptoms of pain, spasms, edema, and soft tissue tightness, participants most frequently reported that diathermy “usually” (i.e., 61-80% of

the time) showed positive effects according to their observations and the report of the client. As expected, the degree to which positive effects of diathermy were reported by occupational therapists were relatively the same as that seen by clients, suggesting that a placebo effect does not appear to affect the client's perspective.

Existing literature is not in agreement with the effectiveness of diathermy, but this study seems to be in support of using diathermy for managing pain and edema. For example, occupational therapists in this study who reported seeing a positive effect of diathermy application for general use towards pain agree with the previous literature for neck pain (Foley-Nolan et al., 1990; Foley-Nolan et al., 1992), osteoarthritic knee pain (Jan et al., 2006) and shoulder pain (Cesare et al., 2008). In addition, occupational therapists in this study who reported seeing a positive effect of diathermy application for general use towards edema is in agreement with previous literature for reducing edema in sprained ankles (Pennington et al., 1993; Pilla, 1999) and postmastectomy (Mayrovitz et al., 2002).

### **Protocols Used in Application of Diathermy**

Slightly over half of participants with diathermy experience ( $n = 27$ , 55%) reported that, from their experience, the OTRs and COTAs have administered diathermy equally, and 25% ( $n = 12$ ) reported that OTRs administer diathermy more than COTAs. Knowing that both OTRs and COTAs are involved in the administration of diathermy is important because OTRs should be able to provide modality training and resources for COTAs under their supervision (AOTA, 2010a).

Participants most frequently reported administering diathermy three to four times per week, indicating that when an occupational therapist decided the modality was a proper treatment method, it was used during most days of the week. A large majority of participants ( $n$

= 38, 80%) stated that they used diathermy for an average of 16 to 30 minutes, with 93% ( $n = 43$ ) of participants devoting 1 to 50% of the treatment session to diathermy use. These results seem reasonable, as diathermy is used mainly as a treatment component to prepare the client for functional activities, rather than as a primary treatment method. No conclusion could be made on the most common frequency (MHz) setting therapists use when administering diathermy, as most therapists did not know the answer or used preset settings provided by manufacturer.

The most common forms of diathermy used in this study were pulsed SWD and continuous SWD. All forms of diathermy listed on the survey (i.e., MWD, continuous SWD, pulsed SWD) were used most often for the diagnoses of osteoarthritis and CVA. As expected, however, discrepancies in symptoms treated by diathermy were found. Both MWD and continuous SWD were most frequently used for the symptoms of pain and soft tissue tightness, while pulsed SWD was most frequently used for the symptoms of pain and edema. Due to the nature of continuous SWD and MWD having thermal effects (Cameron, 2009; Prentice & Draper, 2002), it is expected that they would not be used for edema. That being said, there were 14 participants (36%) who reported having used continuous SWD for edema and three participants (8%) who used MWD for edema. If in fact these numbers are accurate and not simply an error when completing the survey, a concerning number of occupational therapists are incorrectly applying the modality. Interestingly, when participants were asked to justify why the type of diathermy they used was different depending on the diagnosis, the most common reasons were medical precautions and/or contraindications for particular diagnoses. This implies that occupational therapists have either not received correct instruction on medical precautions and contraindications or they have forgotten how to properly administer the modality.

Results of this study found that diathermy was almost always ( $n = 45$ , 94% of the time) implemented into treatment before a functional activity, which is in agreement with AOTA's approved guidelines for use of PAMs (AOTA, 1991) and would be expected given occupational therapy's foundation in using functional activities for rehabilitation. Sixty-seven percent of participants responded they implemented diathermy concurrently with other forms of treatment. The majority of other forms of treatment were defined as client and/or caregiver training and/or functional activities using the limb(s) not being treated with diathermy.

The majority of participants reported diathermy was reimbursable when used in a preparatory manner before functional activities and/or concurrently with other types of therapy. Eleven percent ( $n = 5$ ) of the participants did not know how diathermy was reimbursed, with a surprising number of those participants ( $n = 2$ , 40%) having administered the modality within the last month. Occupational therapists may be in violation of AOTA's *Standard of Practice* if they are using diathermy without being aware of the current regulations surrounding reimbursement issues and how that affects occupational therapy practice (AOTA, 2010b).

### **Rationales for Using Diathermy**

As expected, the main determining factor for deciding to initiate the use of diathermy was most frequently found to be the symptoms of the client being treated ( $n = 45$ , 94%). Only 25% ( $n = 12$ ) percent of participants said they decided to initiate the use of diathermy based on previous literature. As mentioned earlier, the potential problem of basing the use of diathermy on previous literature is the fact that, at the time of this study, there had been no prior research on the use of diathermy within occupational therapy.

### **Functional Goals and Objectives for which Diathermy was Used**

This study found that the most frequent functional goals participants used diathermy towards were the areas of occupation of dressing and functional mobility. A consistent agreement was found among participants in that the main objectives when administering diathermy were to reduce pain and increase range of motion, which is supported by previous research (e.g., Cesare et al., 2008; Draper et al., 2004; Foley-Nolan et al., 1992). Because research has shown that over 51% of residents in SNFs receive assistance for all five ADL of bathing, toileting, dressing, transferring, and eating, and 23% have recently reported pain (Jones et al, 2009), it is not surprising that participants reported using diathermy toward ADL, pain reduction, and increasing mobility. This indicates diathermy may be a viable option for occupational therapists to incorporate into their treatment sessions.

### **Implications for OT and Future Research**

This study shows there is indeed a gap between occupational therapists in SNFs implementing diathermy into their treatment sessions and AOTA's *Centennial Vision* of occupational therapy being an evidence-based practice (AOTA, 2007), as evidenced by diathermy not being included in most participants' school curricula and nearly a quarter of participants not using formal resources to research diathermy prior to administering the modality. In order for occupational therapists to contribute to AOTA's future vision of the field of occupational therapy and to maintain high standards of practice, they need to begin to delve deeper into their reasoning for using diathermy. Before this can happen, research must be done to investigate the efficacy of diathermy as it is being used within occupational therapy.

It is essential for future studies to scientifically determine the potential differential effects by diagnosis or symptom, and confirm or deny a significant benefit of using diathermy. This

research can then be used for occupational therapists to consider when determining how, why, and when to use diathermy and whether or not there is a significant difference in the benefits of using diathermy instead of other modalities that may be more accessible, less cumbersome to apply, and less expensive to maintain.

With a surprising number of occupational therapists not having had diathermy included in their occupational therapy school curricula, it is important to begin to include evidence-based information into curricula in order to inform occupational therapy students about all physical agent modalities that may be available for them to use in their future work settings. Perhaps even more important than fulfilling evidence-based practice protocols, is the need to comply with the ACOTE standards, which specify the inclusion of education on deep thermal modalities in occupational therapy Master's program curricula (ACOTE, 2006). In addition, the fact that occupational therapists may be using continuous SWD and MWD incorrectly by administering it for edema indicates that more comprehensive education and training needs to occur in the field after therapists have left school. By conducting more research in the use of diathermy as used within occupational therapy practice and, subsequently, increasing awareness and knowledge of diathermy by incorporating it into school curricula and providing more comprehensive training, occupational therapists will be more capable of meeting the standards and expectations set forth by AOTA's *Centennial Vision* and *Standards of Practice* (AOTA, 2007; AOTA, 2010b).

### **Limitations**

This study faced limitations that should be taken into consideration when analyzing the results. The selected sample used may not have been an accurate representation of occupational therapists working in SNFs, as not all occupational therapists are AOTA members. Additionally, those who are AOTA members with experience working in SNFs may not be registered as

working in SNF/LTC facilities and, therefore, would not have been captured in the random sample. When asked how many SNFs participants had worked in, it was not made clear whether participants were answering the question in relation to the number of facilities they have worked in or the number of employers they have worked for. Because one employer may own several facilities, the answers to this question may be misleading.

One-quarter of the participants had not used diathermy within the last 12 months and may have answered questions based on inaccurately recalled memory. In addition, one survey question asked how often clients see a positive effect, but this was answered by the occupational therapists rather than directly by the clients. Therefore, caution should be taken when comparing the frequency of positive results as reported by the occupational therapist with positive results seen by the client. Furthermore, because approximately half of participants reported that the occupational therapist and the occupational therapy assistant administer diathermy equally, participants may have been answering questions on behalf of the occupational therapy assistant.

Participants were asked which frequency (MHz) setting they most often use to administer diathermy. Participants who answered that they use a frequency preset by the manufacturer should have been categorized as “don’t know.” This answer, however, may be misleading as some participants may have been following reliable protocols of the manufacturer that do not denote the frequency for each machine setting, while others may have been guessing about the frequency they used.

Additionally, it proved difficult to obtain specific information regarding the protocols of diathermy use because several participants indicated that it depended on the client’s needs. The survey did not allow for additional information to be sought and participants did not provide additional comments to clarify which specific client needs would warrant diathermy use. The

survey was also not structured in a way that allowed participants to specify the length or frequency of diathermy use per diagnosis or symptom.

Given the conflicting prior research on diathermy, no final conclusion can be made about whether this study supports or disagrees with prior research, though it does add to the body of knowledge regarding therapists' perspectives of diathermy use. It should also be recognized that this study was a descriptive research study and not an outcome study. Caution should be taken when comparing the subjective responses of this survey with the findings of previous experimental studies, especially considering diagnoses were not necessarily the same for all studies.

### **Conclusion**

This study appears to be the first within the field of occupational therapy to document the use of diathermy among occupational therapists. This preliminary study determined that occupational therapists working in SNFs are using diathermy nationwide and are typically administering the modality from 16 to 30 minutes per treatment session. They are also using it as a preparatory method preceding functional activities, to decrease pain and to increase range of motion. A large majority of all participants reported not having diathermy included in their occupational therapy curricula, although most thought it should be included. Due to discrepancies and inconsistencies between survey responses, many specifics regarding the protocols and usage of diathermy among occupational therapists working in SNFs are still unclear. The fact that occupational therapists may be using diathermy incorrectly, as is the case with edema, and that many do not know the frequency (MHz) at which they use diathermy, indicates a strong need for further research to examine the efficacy of diathermy use and how it can be administered in the most beneficial way. Future research will allow for more judicious use

of diathermy and continued progression towards AOTA's goal of occupational therapy being a truly evidence-based practice.

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## Appendix

**Survey: Occupational Therapists' Use of Diathermy in Skilled Nursing Facilities**

This survey has questions regarding how and why occupational therapists use diathermy in skilled nursing facilities, in addition to questions about the education and training received in the use of diathermy. Diathermy is a physical agent modality that operates by applying high-frequency electromagnetic energy into body tissues using a large applicator drum. Diathermy may also be defined as pulsed radio-frequency (PRF), pulsed electromagnetic field (PEMF) or pulsed electromagnetic energy (PEME). For purposes of this survey, the term “diathermy” is used. Also, the term “skilled nursing facility (SNF)” will be used to include long-term care facilities and nursing homes.

**General Information:**

**Please mark the box next to the most suitable answer item(s) and/or fill in blanks as appropriate.  
Unless otherwise specified, please mark only one answer per question.**

1. Are you a registered and/or licensed occupational therapist who has current or prior experience working as an occupational therapist in a SNF?
  - Yes (Please continue to question 2.)
  - No (Please **stop** and return your survey for purposes of recording response rates. Thank you for your time and willingness to complete the survey.)
  
2. How many years have you been working as a registered and/or licensed occupational therapist? \_\_\_\_\_
  
3. In what demographic region has most of your career as an occupational therapist been completed?
  - Northwest (AK, CO, HI, ID, MT, OR, UT, WA, WY)
  - Southwest (AZ, CA, NM, NV, OK, TX)
  - Midwest (IA, IL, IN, KS, MI, MO, MN, ND, NE, OH, SD, WI)
  - Northeast (CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT)
  - Southeast (AL, AR, DC, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV)
  
4. How many years (collectively) have you practiced as an occupational therapist in a SNF? \_\_\_\_\_
  
5. How many SNFs you have worked in for greater than 3 months during your career?
  - 1-2                       3-4                       5-6                       7 or more
  
6. What was your entry-level degree when you first started working as an occupational therapist?
 

<input type="checkbox"/> Bachelor of Arts of Occupational Therapy	<input type="checkbox"/> Master of Occupational Therapy
<input type="checkbox"/> Bachelor of Science of Occupational Therapy	<input type="checkbox"/> Master of Science of Occupational Therapy
<input type="checkbox"/> Clinical Doctorate of Occupational Therapy	<input type="checkbox"/> Other, please specify: _____
  
7. Was diathermy incorporated into your curriculum at the occupational therapy school where you received your entry-level degree?
  - Yes                       No                       Do not remember
  
8. Do you think diathermy should be included as part of the occupational therapy curriculum?
  - Yes                       No                       Undecided
  
9. Do you (or have you) used any formal resources (e.g. textbook, website, AOTA publication) to specifically search the uses and/or effectiveness of diathermy?
  - Yes                       No                       Do not remember

10. If you answered yes to question 9, what resources do/have you used?
- Textbooks from occupational therapy school curriculum
  - Online research databases
  - OT Practice magazine or the American Journal of Occupational Therapy
  - Other, please specify: \_\_\_\_\_
11. Do you have current or past experience working with diathermy while being employed at a SNF?
- Yes (Please continue to question 13)
  - No (Please continue to question 12)
12. Why have you **not** used diathermy in the facilities where you work or have worked? Check all that apply.
- I do not think diathermy is a beneficial and/or efficient treatment method.
  - I do not know how to use/apply/administer diathermy.
  - I prefer to use physical agent modalities other than diathermy.
  - I do not use any physical agent modalities in my treatments.
  - Diathermy is not available at the facilities where I have worked.
  - Other, please specify: \_\_\_\_\_
- Please **stop** and return your survey for purposes of recording response rates. Thank you for your willingness to complete this survey.
13. Of the SNFs you have worked in for greater than 3 months during your career, how many different SNFs have you used diathermy in?
- 1-2
  - 3-4
  - 5-6
  - 7 or more
14. From your experience, who most often administers diathermy to clients?
- OTR only
  - OTR more often than COTA
  - Both equally
  - Other, please specify: \_\_\_\_\_
  - COTA only
  - COTA more often than OTR
  - I do not know
- Please answer the remaining questions, regardless of whether you administer diathermy directly or supervise a COTA in administering diathermy.***
15. Did you complete any training specific to the use of diathermy prior to administering diathermy on clients?
- Yes
  - No
  - Do not remember
16. If you answered “Yes” to question 15, how and/or where was training provided?
- Directly from the manufacturer of the diathermy unit being used
  - One-on-one instruction from a colleague, peer, or supervisor on-site
  - In a class or continuing education workshop as part of my employment
  - In a class or continuing education workshop outside the realm of my employment
  - Other, please specify: \_\_\_\_\_
17. How recently have you used diathermy with your clients?
- Within the last month
  - Within the last 3 months
  - Within the last 6 months
  - Within the last 12 months
  - More than 12 months ago

18. If you responded "More than 12 months ago" to question 17, for what reason(s) have you not used diathermy within the last 12 months? Check all that apply.
- I do not think diathermy is a beneficial and/or efficient treatment method for the clients I have treated in the past 12 or more months.
  - I prefer to use physical agent modalities other than diathermy.
  - Diathermy is not available at the facilities where I have worked in the past 12 months.
  - Other, please specify: \_\_\_\_\_
19. On average, how often do/would you typically use diathermy on an individual client?
- Less than once per week
  - 1-2 times per week
  - 3-4 times per week
  - 5-6 times per week
  - 7 or more times per week
  - Other/varies, please specify: \_\_\_\_\_
20. What frequency do you most often use to apply diathermy?
- 13 megahertz
  - 27 megahertz
  - 41 megahertz
  - Other, please specify: \_\_\_\_\_
  - 915 megahertz
  - 2456 megahertz
  - Don't know
21. What is the average length of time you apply diathermy in one treatment session?
- 1-15 minutes
  - 16-30 minutes
  - 31-45 minutes
  - More than 45 minutes
22. When using diathermy as part of a client's treatment, what percent of time, on average, is devoted for diathermy use in a typical treatment session?
- 1-25%
  - 26-50%
  - 51-75%
  - 76-100%
23. Given your average caseload, what percentage of your clients present with the diagnoses listed below? This will not necessarily add up to 100% if clients present with concurrent diagnoses.
- CVA: \_\_\_\_\_%
  - TBI: \_\_\_\_\_%
  - Fracture/Broken bone: \_\_\_\_\_%
  - Sprains: \_\_\_\_\_%
  - Osteoarthritis: \_\_\_\_\_%
  - Other, please specify: \_\_\_\_\_: \_\_\_\_\_%
24. For clients with the diagnoses listed below, what percent of those clients do you typically use diathermy on?
- CVA: \_\_\_\_\_%
  - TBI: \_\_\_\_\_%
  - Fracture/Broken bone: \_\_\_\_\_%
  - Sprains: \_\_\_\_\_%
  - Osteoarthritis: \_\_\_\_\_%
  - Other, please specify: \_\_\_\_\_: \_\_\_\_\_%

25. What are your objectives when using diathermy? Check all that apply.

- Increase range of motion
- Prevent soft tissue tightening/shortening
- Reduce pain
- Reduce edema
- Other, please specify: \_\_\_\_\_

26. When considering clients’ goals, what areas of occupation do you typically use diathermy for? Check all that apply.

- Bathing/Showering
- Dressing
- Eating/Feeding
- Personal hygiene and grooming
- Toileting
- Rest and sleep
- IADLs
- Other, please specify: \_\_\_\_\_
- Functional mobility
- Play/Leisure
- None

27. The table below lists different types of diathermy application, as well as particular **diagnoses** each type of diathermy application may be used for. Please indicate which type of diathermy application you use for each diagnosis by placing an “X” in the appropriate box. Mark all that apply.

Type of Diathermy Application	Diagnosis					
	CV A	TBI	Broken/fractured bone(s)	Osteoarthritis	Other (please specify):	Other (please specify):
Microwave						
Shortwave Continuous						
Shortwave Pulsed						
Other (please specify):						

28. If the form of diathermy used is different depending upon the diagnosis, please indicate why you would not use the same form of diathermy for each diagnosis. Check all that apply.

- Some forms of diathermy are contraindicated for particular diagnoses.
- Some clients’ medical precautions do not allow the use of some forms of diathermy.
- The policy of my employer/facility does not allow the use of certain types of diathermy for particular diagnoses.
- Other, please specify: \_\_\_\_\_
- I do not know.

29. The table below lists different types of diathermy application, as well as particular **symptoms** each type of diathermy may be used for. Please indicate which type of diathermy application you use for each symptom by placing an “X” in the appropriate box. Mark all that apply.

Type of Diathermy Application	Symptom					
	Pain	Spasms	Edema	Soft Tissue Tightness	Other (please specify):	Other (please specify):
Microwave						
Shortwave Continuous						
Shortwave Pulsed						
Other (please specify):						

30. What is the main determining factor for deciding to initiate the use of diathermy for a particular client?

- Particular symptoms of the client being treated
- Treatment principles of employer or facility
- Research literature supporting the use of diathermy
- Diathermy is convenient and a readily available treatment method
- Other, please specify: \_\_\_\_\_

31. For each symptom listed below, please indicate what percent of cases **you** typically **see** a positive effect from administering diathermy by placing an “X” in the appropriate box.

Symptom	Never/Rarely (0-20%)	Sometimes (21-40%)	Occasionally (41-60%)	Usually (61-80%)	Almost Always (81-100%)
Pain					
Spasms					
Edema					
Soft Tissue Tightness					
Other (please specify):					
Other (please specify):					

32. For each symptom listed below, please indicate what percent **clients** typically **report** positive effects from diathermy by placing an “X” in the appropriate box.

Symptom	Never/Rarely (0-20%)	Sometimes (21-40%)	Occasionally (41-60%)	Usually (61-80%)	Almost Always (81-100%)
Pain					
Spasms					
Edema					
Soft Tissue Tightness					
Other (please specify):					
Other (please specify):					

33. How is diathermy typically implemented into a treatment session? Check all that apply.

- Concurrently with other types of therapy
- Preparatory before functional activities
- At the end of session
- Alone with no other treatment
- I don't know
- Other, please specify: \_\_\_\_\_

34. If you responded “Concurrently with other types of therapy” to question 33, what other types of therapy are typically being performed?

- Active and/or passive range of motion
- Client/caregiver education
- Functional activity using limb not under the diathermy modality
- Other, please specify: \_\_\_\_\_

35. When administering diathermy, what type(s) of treatment sessions are likely to be reimbursed? Check all that apply.

- Concurrently with other types of therapy
- Preparatory before functional activities
- At the end of session
- Alone with no other treatment
- I don't know
- Other, please specify: \_\_\_\_\_

If you have an additional comments or feedback please comment below:

**Please put your survey into the business reply envelope and return to the Occupational Therapy Department at University of Puget Sound 1500 N Warner St, Ste 1070, Tacoma, WA 98406-9980. Please return this survey by March 7<sup>th</sup>.**

**Thank you for completing this survey, your time and consideration is greatly appreciated!**

Table 1

*Reasons Occupational Therapists Have Not Used Diathermy in SNFs*

Reason(s) Reported	Number of Respondents (%) ( <i>n</i> = 41)
Diathermy is not available at the facilities where I have worked	29 (70.7)
I do not know how to use/apply/administer diathermy	23 (56.1)
I do not use any physical agent modalities in my treatments	6 (14.6)
Other	4 (9.7)
I prefer to use physical agent modalities other than diathermy	3 (7.3)
I do not think diathermy is a beneficial and/or efficient treatment method	2 (4.9)

*Note.* Respondents may have reported more than one reason for not having used diathermy.

Table 2

*Reasons Occupational Therapists Have Not Used Diathermy in SNFs Within the Last 12 Months*

Reason(s) Reported	Number of Respondents (%) ( <i>n</i> = 41)
Diathermy is not available at the facilities where I have worked in the past 12 months	10 (83.3)
I prefer to use physical agent modalities other than diathermy	1 (8.3)
Other	1 (8.3)
I do not think diathermy is a beneficial and/or efficient treatment method for the clients I have treated in the past 12 or more months	0 (0)

*Note.* Respondents may have reported more than one reason for not having used diathermy.

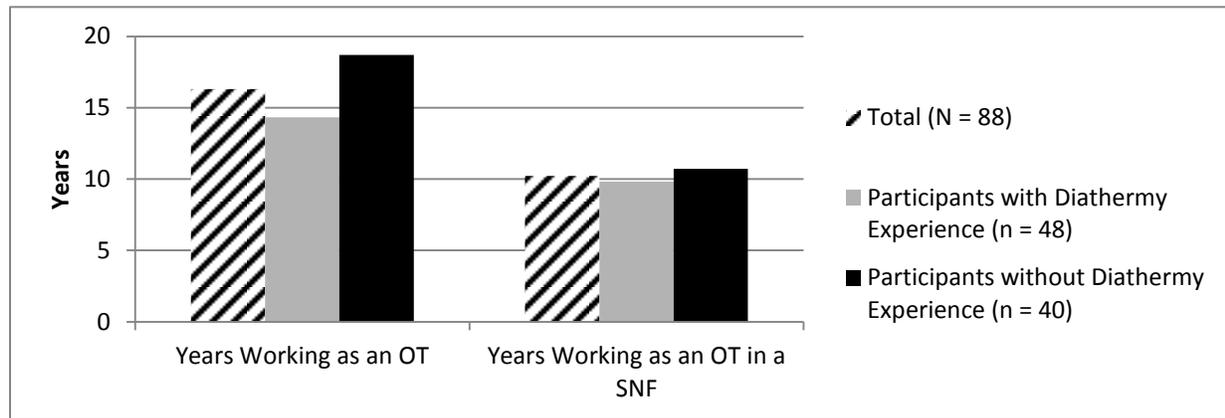
Table 3

*Frequency of Types of Diathermy Used for Various Diagnoses and Symptoms*

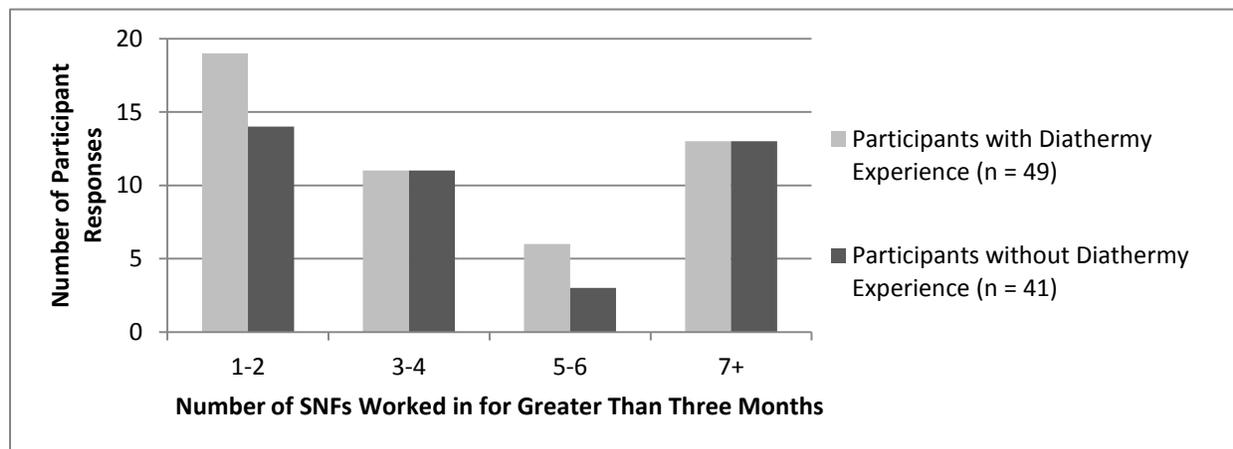
	Type of Diathermy		
	Microwave	Continuous Shortwave	Pulsed Shortwave
<b>Diagnosis</b>			
Osteoarthritis	7.5	57.5	60.0
CVA	7.5	42.5	40.0
Broken/fractured bone	2.5	32.5	37.5
TBI	2.5	12.5	7.5
Other	2.5	0.0	5.0
<b>Symptom</b>			
Soft tissue tightness	10.3	74.4	41.0
Pain	10.3	60.0	65.0
Edema	7.7	35.9	64.1
Spasms	2.6	35.9	35.9
Other	0.0	0.0	5.4

*Note.* All numbers listed in table are percentages. Participants may have reported using more than one type of diathermy for a particular diagnosis or symptom.

A)



B)



C)

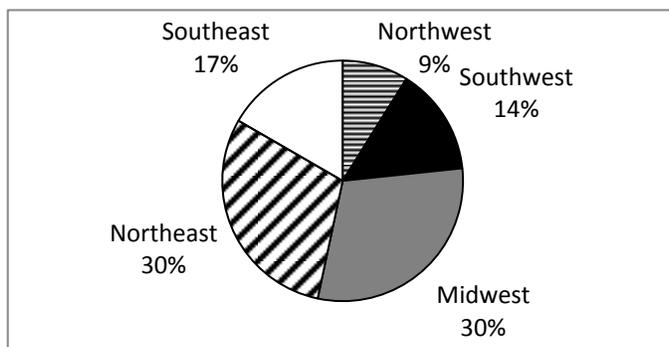
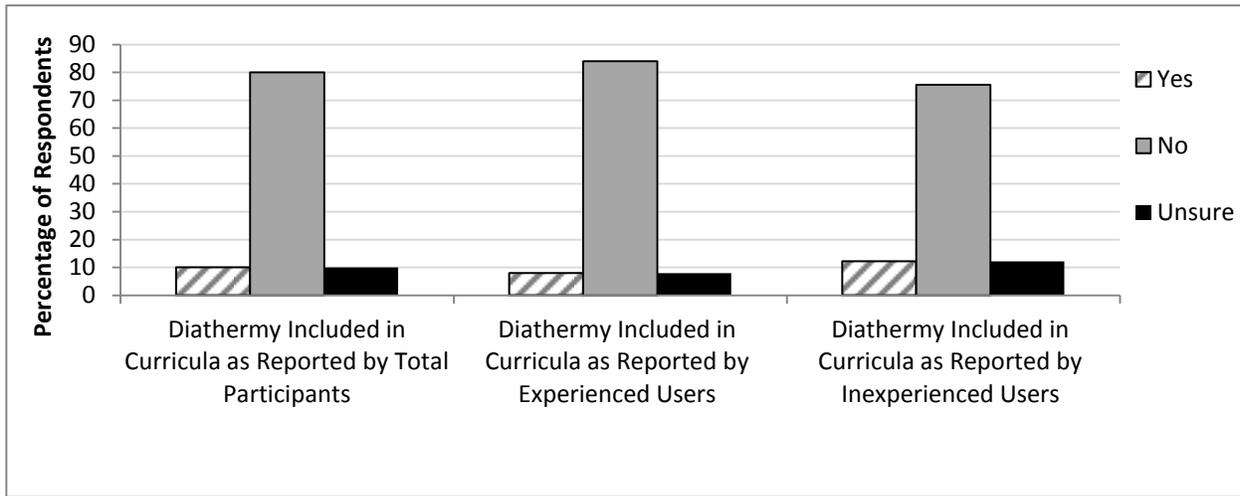


Figure 1. Demographic results: (A) comparing years of experience as an occupational therapist and years of experience as an occupational therapist in a SNF among participants with and without diathermy experience; (B) comparing study participants with and without diathermy experience in regards to the number of SNFs they have worked in for greater than three months during their careers; (C) regions in which participants have spent the majority of their careers.

A)



B)

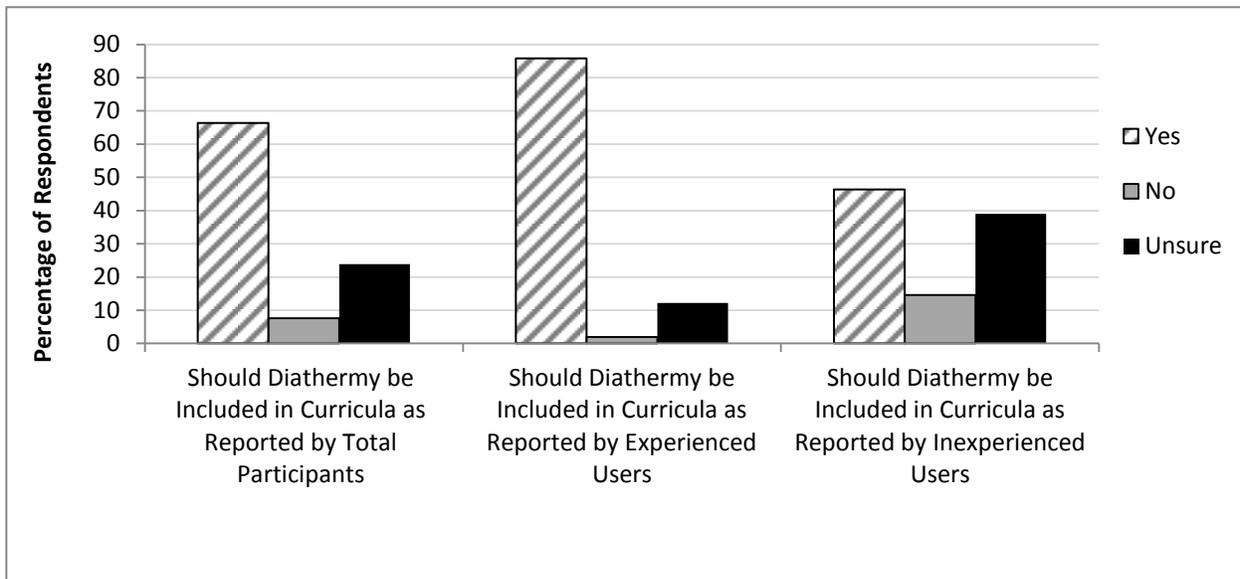


Figure 2. Comparing responses regarding exposure to diathermy information in occupational therapy school curricula : Total participants ( $N = 90$ ); Experienced users ( $n = 49$ ); and Inexperienced Users ( $n = 41$ ). (A) Comparing percent of participants who had diathermy included in their curricula and (B) comparing responses of whether or not diathermy should be included in the curricula.

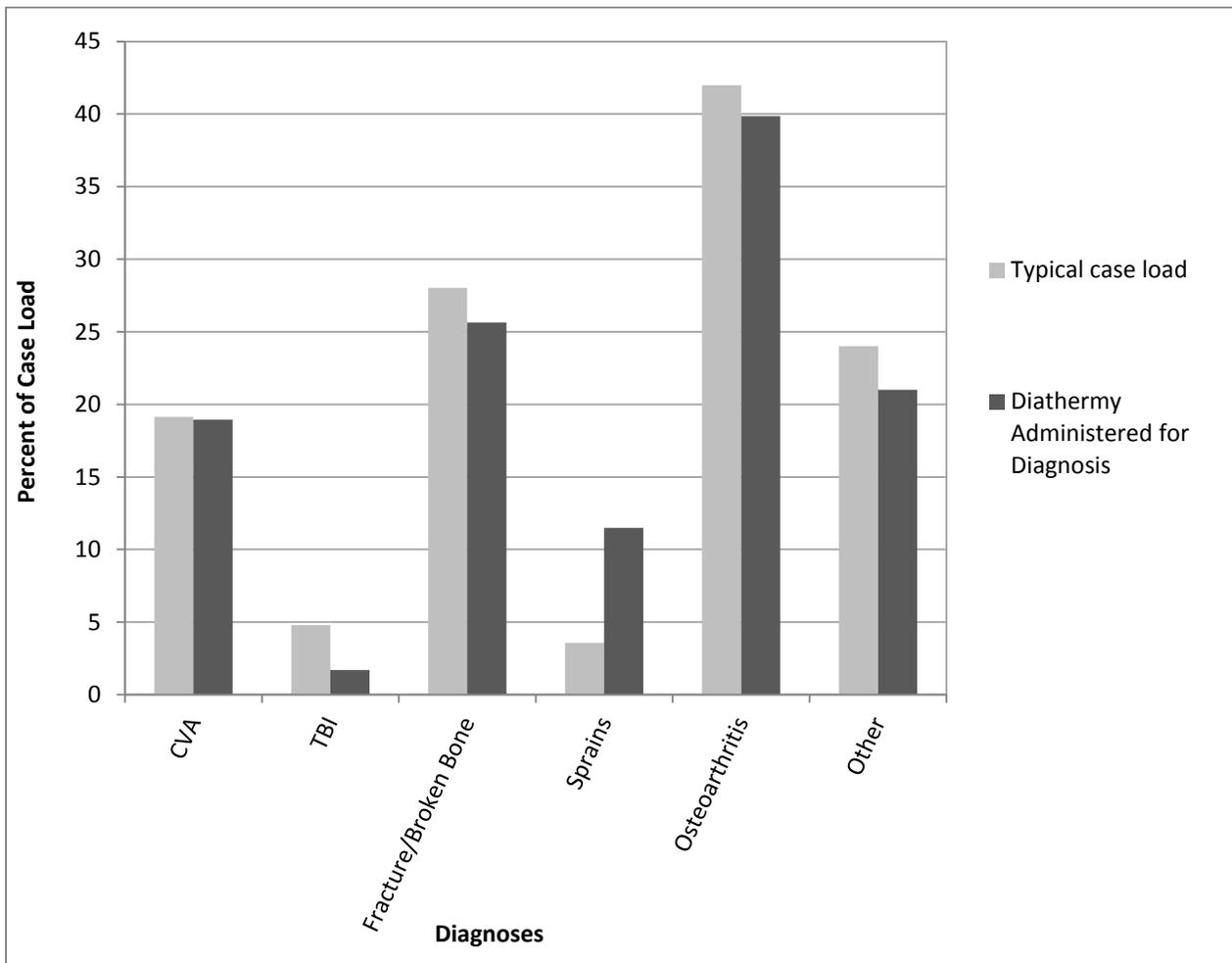
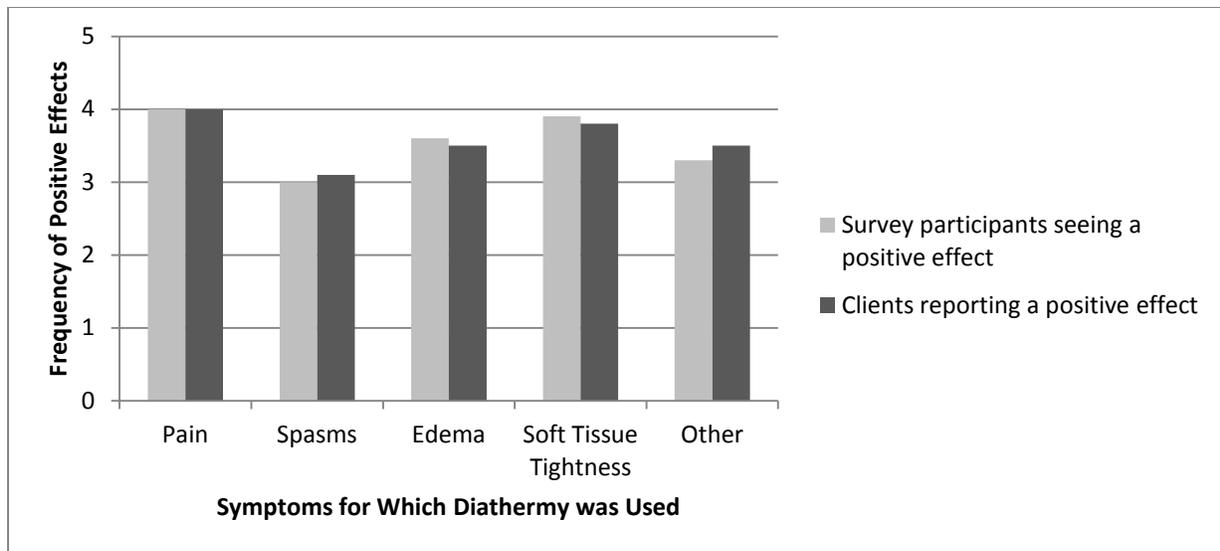


Figure 3. Comparing percent of typical diagnoses on caseload with percent diathermy is administered for that particular diagnosis ( $n = 48$ ).



*Figure 4.* Average frequency of positive effects of diathermy use for particular symptoms as seen by survey participants and as reported by the clients they are treating. 0 = 0-20% of the time, 1 = 21-40% of the time, 3 = 41-60% of the time, 4 = 61-80% of the time, 5 = 81-100% of the time. Number of responses varied for each diagnosis: pain ( $n = 44$ ), spasms ( $n = 25$ ), edema ( $n = 39$ ), soft tissue tightness ( $n = 40$ ), and “Other” ( $n = 6$ ).

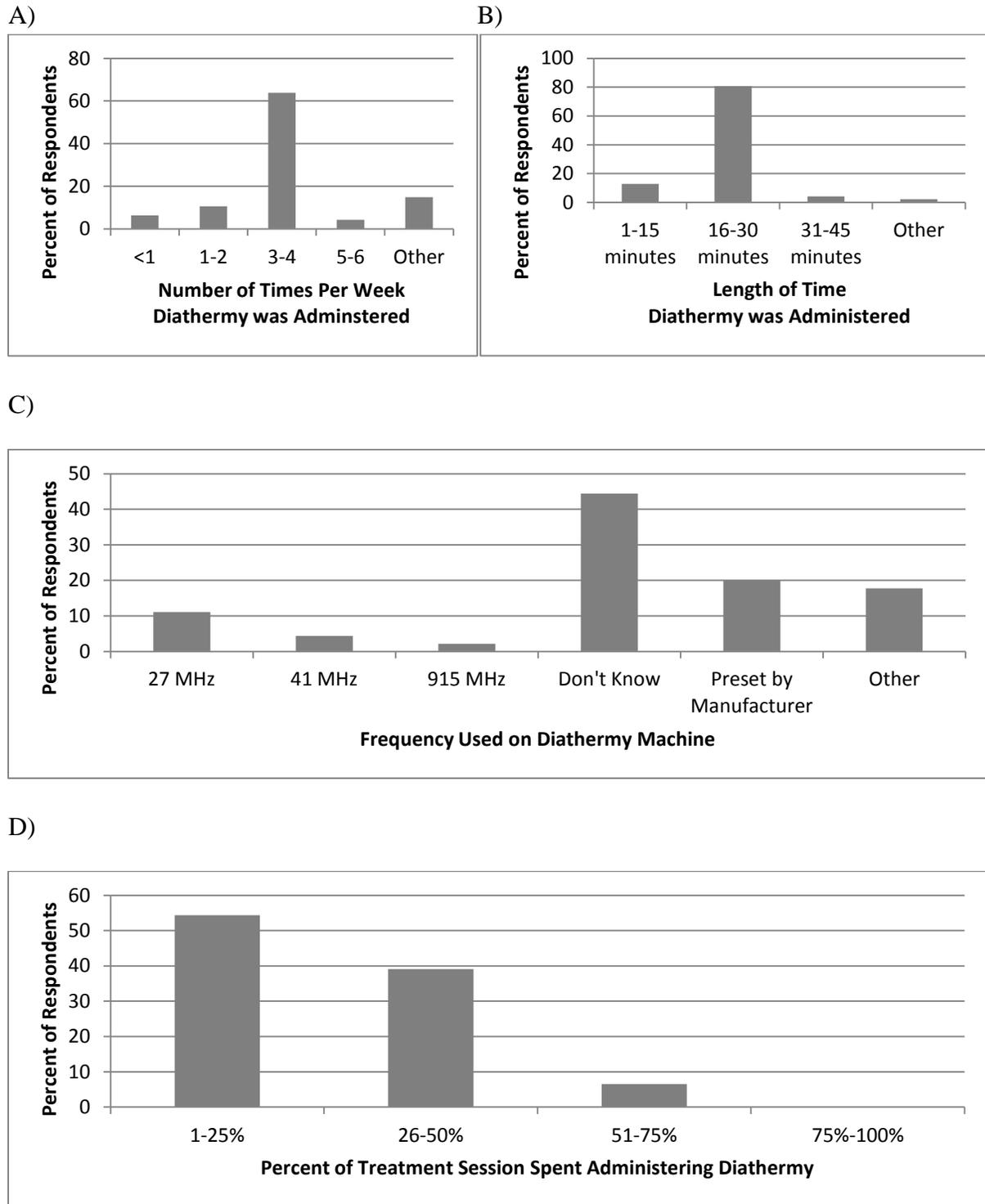


Figure 5. Trends of diathermy use including: (A) number of times per week diathermy was administered ( $n = 47$ ); (B) the length of time diathermy was administered per session ( $n = 47$ ); (C) the frequency of diathermy (MHz) used ( $n = 45$ ); and (D) the percent of treatment sessions devoted to administering diathermy ( $n = 46$ ).