

Abstract

Type 2 diabetes mellitus (T2DM) is a serious and costly metabolic disease that is a growing concern in the United States. T2DM is associated with numerous **comorbid conditions** that can lead to negative patient outcomes. Comorbid chronic pain is very common in T2DM due to the presence of **diabetic neuropathy** and **musculoskeletal conditions** that are associated with prolonged **hyperglycemia**. Neuropathic pain is the most common type of comorbid pain studied in T2DM, while musculoskeletal pain has received less attention in the literature. However, recent studies have highlighted types of musculoskeletal pain that appear to be highly prevalent in T2DM such as arthritis and low back pain. These studies have suggested that comorbid musculoskeletal pain may limit important **self-care activities**, particularly physical activity, in individuals with diabetes. Based on the existing research, further exploration of the impact of pain in T2DM is warranted. The current study will examine the prevalence, characteristics, and severity of comorbid pain conditions using interviews and self-report questionnaires in a sample of adults with T2DM attending two diabetes clinics in Southeast Ohio. The study will also assess **psychosocial** variables related to pain to examine 1) the impact of neuropathic and musculoskeletal pain in patients with T2DM in terms of quality of life, disability, physical activity, and other **self-care activities**, 2) the relationships among symptoms of depression, anxiety, and pain in T2DM, and 3) how pain coping strategies may be related to self-care in T2DM. Further research in this area will help to expand existing knowledge of different types of comorbid pain conditions in T2DM and can also help to inform clinical interventions to address pain and improve self-care in this population. Results of the current study will be presented at the Society of Behavioral Medicine Annual Meeting in April 2011.

Narrative

Type 2 diabetes mellitus (T2DM) is a serious and costly metabolic disease that is a growing concern in the United States (CDC, 2007; Leahy, 2008). Chronic pain is one type of **comorbid condition** that is very common in T2DM due to the presence of **diabetic neuropathy** and **musculoskeletal conditions** that are associated with prolonged **hyperglycemia** (Burner & Rosenthal, 2007; Krein et al., 2005; Wolak et al., 2001). Although neuropathic pain is most commonly studied in T2DM research, recent studies have highlighted several types of musculoskeletal pain that appear to be highly prevalent in T2DM such as arthritis and low back pain (CDC, 2008; Gore et al., 2006; Hoff, Midthjell, Zwart, & Hagen, 2008; Mantyselka, Miettola, Niskanen, & Kumpusalo, 2008; Tishler et al., 2003). These studies have also suggested that chronic musculoskeletal pain may limit **self-care activities**, particularly physical activity, in individuals with diabetes (Burner & Rosenthal, 2009; Butchart et al., 2009; Krein et al., 2005). This is concerning in T2DM due to the importance of adherence to **self-care activities** to maintain control of blood sugar levels (American Diabetes Association [ADA], 2007; Kerr et al., 2007). However, since most studies have only considered the role of neuropathic pain in T2DM, more research is needed to determine how musculoskeletal types of pain may be related to self-care adherence. Research on pain conditions in other medical illnesses has also found a relationship between pain and **psychiatric comorbidity** (Bair, Robinson, Katon, & Kroenke, 2003). For example, individuals with comorbid pain and depression may have worse health outcomes than those without depression (Kerr et al., 2007). Although few studies have examined this relationship in T2DM, this is an important area to consider due to the high rates of depression in T2DM (Anderson, Freedland, Clouse, & Lustman, 2001).

In light of existing research, further exploration of the impact of different types of pain in T2DM is warranted (Kim et al., 2001; Krein et al., 2005). Research in this area will help to expand existing knowledge of comorbid pain in T2DM and can help to inform clinical interventions to address pain in diabetes treatment settings. The current study will involve a comprehensive assessment of the types of pain present in adults with T2DM in a clinical setting. The study will also examine 1) the impact of comorbid pain in patients with T2DM in terms of quality of life and **self-care activities**, 2) the relationships among symptoms of depression, anxiety, and pain in T2DM, and 3) pain coping strategies in adults with T2DM that may influence **self-care activities** and other patient outcomes. Although previous studies have examined some of these variables in terms of neuropathic pain in T2DM, this will be the first study to include both neuropathic and musculoskeletal pain conditions while assessing for psychiatric comorbidity and other psychosocial variables that may be related to pain. Based on prior research it is hypothesized that the presence of comorbid chronic pain will be associated with higher levels of **psychiatric comorbidity**, lower levels of quality of life, and lower levels of self-care adherence. Since pain coping strategies have not been examined previously in T2DM, analyses related to coping will be exploratory in nature.

Participants will be recruited from the University Medical Associates Endocrinology and Diabetes Centers in Athens, Ohio and Belpre, Ohio (see Appendix for letter of support). **A priori power analyses** indicated that approximately 100 participants will be needed to complete proposed study analyses with a power of .80. In order to complete recruitment and data collection, the principal investigator (PI) will be present in the diabetes clinics on days when patients with T2DM are seen by their physicians. Data collection will take place between May 2010 and August 2010. Eligible participants (individuals over age 18 with T2DM) will receive a

study flyer when they arrive for their physician's appointment. If a patient expresses interest, the PI will complete the informed consent process with the participant, which will include a **HIPAA** Authorization Release Form to review their medical records. The participant will complete a brief interview (15-20 minutes) with the PI to assess types of pain experienced, frequency of pain, severity of pain, and how pain interferes with daily activities. The interview will include items from the Brief Pain Inventory (BPI) and the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS), two well-validated measures of pain assessment (see Appendix for sample items; Bennett, 2001; Cleeland & Ryan, 1994; Tan, Jensen, Thornby, & Anderson, 2004). By using both of these measures, the PI will be able to determine if the participant is experiencing chronic pain and whether the pain is neuropathic or musculoskeletal. The participant will complete 6 additional study questionnaires on a touch-screen laptop computer with audio computer-assisted self-interview software. The software will allow participants to listen to the questions while wearing headphones instead of reading them if they prefer. The questionnaires will include a demographics form, the Coping Strategies Questionnaire – Revised (CSQ-R) to assess types of pain coping, the Self-Care Inventory – Revised (SCI-R) to assess self-reported adherence to diabetes self-care activities, the Patient Health Questionnaire (PHQ) to assess the presence of symptoms of psychiatric disorders such as depression and anxiety, the Hospital Anxiety and Depression Scale to assess the severity of symptoms of depression and anxiety (HADS), and the Short Form 12 Health Survey (SF-12) to assess quality of life (Spitzer, Kroenke, & Williams, 1999; Rosentiel & Keefe, 1983; Ware & Sherbourne, 1992; Weinger, Butler, Welch, & La Greca, 2005; Zigmond & Snaith, 1983). The total time to complete the questionnaires will be approximately 30-45 minutes. If the participant is not able to complete the questionnaires prior to the start of their doctor's appointment, they will have the opportunity to

finish them after meeting with their doctor. Participants will also be given the option of completing paper and pencil versions of questionnaires and returning them by mail. The interview and questionnaires will be given in a separate education room in the clinics to ensure participant privacy. After completing the interview and questionnaires, the participant will be paid \$20 for their time. The participant will then receive a pedometer and 2-week activity log on which to record their daily steps and activity. The log will take approximately 1-2 minutes per day to complete. After returning the completed activity log (in the stamped envelope provided), the participant will be paid an additional \$20 for their time. Participants will be able to keep the pedometer for personal use. The PI will collect data related to diabetes severity, medications, and comorbid conditions from the participant's medical record (with their permission) for use in study analyses.

The primary aim of the current study is to explore the prevalence, frequency, and severity of various types of pain in patients with T2DM which will be determined by **descriptive analyses**. **Correlations** will be conducted in order to determine whether there are significant associations between the main study variables of pain severity, pain interference, pain coping strategies, diabetes self-care adherence, and physical activity. Finally **hierarchical regression analyses** will be conducted to determine if pain severity, interference, and coping strategies are able to predict two dependent variables, 1) quality of life and 2) self-care adherence in the presence of variables related to diabetes severity.

Results from the current study will help to guide further research on pain in T2DM and can also inform the development of clinical interventions for pain management that can be used within diabetes treatment settings. Study findings will be presented at the Society of Behavioral Medicine Annual Meeting in 2011.

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Budget

<i>Budget Items to be Partially Covered by GSS Original Works Grant</i>			
Item	Source	Cost per item	Total
100 Yamax Digiwalker CW 701 Pedometers	Step Into Health	\$28.00	\$2,800.00
HADS ^a Manual & 100 questionnaires	GL Assessment	\$188.00	\$188.00
SF-12 ^b Manual & 100 questionnaires	QualityMetric	\$212.94	\$212.94
Postage for return of 2-week activity logs (2 stamps each)	USPS	\$0.88	\$88.00
1 box of 100 9"x12" manila envelopes	Staples.com	\$16.99	\$16.99
Photocopying costs (consent forms, questionnaires)	OU Psychology Department	\$0.05	\$100.00
Color printing cost for flyers (300 total)	OU Psychology Department	\$0.10	\$30.00
		Total	\$3435.93
<i>Budget Items not Covered by GSS Original Works Grant</i>			
Item	Source	Cost per item	Total
Participant Compensation (100 participants)	N/A	\$40.00	\$4,000.00
QDS Audio Computer Assisted Self-Interview (ACASI) software	Nova Research	\$1,125.00	\$1,125.00
4 Dell Latitude Netbooks (with touch-screen option)	OU Technology Department	\$766.00	\$3,064.00
		Total	\$8189.00
Funds	Source	Amount	Total
Ohio University Diabetes Research Initiative (DRI) Research Grant	DRI	\$10,260.00	\$10,260.00
Budget Summary		Total	11,624.93
Funding Received from OU Diabetes Research Initiative			\$10,260.00
Total Amount Requested from GSS Original Work Grant			\$750.00
Remaining Costs (covered by personal funds)			\$614.93

^aHospital Anxiety and Depression Scale (HADS)

^bShort-Form 12 Health Survey (SF-12)

Budget Justification

Yamax Digiwalker CW-701 Pedometers: Pedometers will provide a more objective measure of participant physical activity by allowing participants to record their steps walked per day.

Pedometers are also less expensive option than accelerometers, and studies have demonstrated that this model is among the most accurate available for research purposes (Crouter et al., 2003; Schneider, Crouter, & Bassett, 2004). The CW-701 model includes 7-day memory which reduces inaccurate reporting that can occur when participants forget to reset their pedometers daily. Participants will be allowed to keep pedometers for their personal use in order to increase interest in the study.

HADS and SF-12 Manuals and Questionnaires: Although many of the study questionnaires are available at no charge for student use, these two questionnaires require copyright fees for each copy of the measure in addition to mandatory purchase of the survey manual. However, due to their strong psychometric properties for use in medical settings, these measures are still the best choice for the current study.

Postage and envelopes: These supplies will be used to allow participants to return their completed activity logs and any remaining questionnaires.

Photocopying and printing costs: Although computer-assisted questionnaires will reduce photocopying costs, copies of consent forms will be needed along with color copies of the study flyers. Additionally, paper copies of the questionnaires may be needed for participants who prefer to complete the study at home.

Participant Compensation: Due to the total time requirement (1.5-2 hours) and length of study participation with regards to the 2-week activity log, compensation will be provided for both parts of the study. Participants in previous studies at the UMA diabetes clinics have received \$20 for a one-time only questionnaire completion. In order to ensure adequate recruitment, participants will receive \$20 after completing their interview and questionnaires. After completing and returning the 2-week activity log, they will be mailed an additional \$20 for their time.

QDS - ACASI Software: Computer-assisted software allows participants to complete questionnaires with potentially sensitive topic matters (e.g., psychiatric symptoms) in privacy while reducing the number of skipped or inaccurate items. Audio-assisted software can also guide individuals in answering questions which can be helpful in samples with variable reading levels.

Dell Latitude Netbooks: These laptops will allow multiple participants to complete the self-report questionnaires at once in the clinics. The touch-screen feature will make it easier for participants to choose answers to the self-report questions.

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Education:

Ph.D. Candidate, Clinical Psychology Anticipated June 2012
 Ohio University, Athens, OH
 Specialty Track: Health
 Current GPA: 3.88

Master of Science, Clinical Psychology August 2008
 Ohio University, Athens, OH
 Master's Thesis Title: Perceived Spousal Criticism, Self-Efficacy, and Adherence to Diet and
 Exercise Self-Care Behaviors in Adults with Type 2 Diabetes

Bachelor of Arts, Psychology, with Honors May 2003
 Washington University, St. Louis, MO

Pre-Doctoral Positions:

Diabetes and Depression Laboratory September 2005-June 2009
 Department of Psychology
 Ohio University, Athens, OH
 Position: Graduate Research Assistant
 Supervisor: Mary de Groot, Ph.D.

Childhood Bereavement Program August 2003-July 2005
 Department of Psychiatry
 Weill Cornell Medical College, New York, NY
 Position: Research Coordinator
 Supervisor: Cynthia Pfeffer, M.D.

Cognitive Control and Psychopathology Lab January 2003-May 2003
 Department of Psychology
 Washington University, St. Louis, MO
 Position: Undergraduate Research Assistant
 Supervisor: Deanna Barch, Ph.D.

Membership in Professional Societies:

2006-Present	Society of Behavioral Medicine
2005-Present	American Diabetes Association
2005-Present	American Psychological Association

Publications:

1. de Groot, M., Kushnick, M., Doyle, T., **Merrill, J.**, McGlynn, M., Shubrook, J., & Schwartz, F. Depression among adults with diabetes: Prevalence, impact, and treatment options. *Diabetes Spectrum*, 23, 15-18.
2. de Groot, M., Kushnick, M., Doyle, T., **Merrill, J.**, McGlynn, M., Shubrook, J., & Schwartz, F. A model of community-based behavioral intervention for depression in diabetes. *Diabetes Spectrum*, 23, 18-25.
3. Edwards, K.M., **Merrill, J.C.**, Desai, A.D., & McNamara, J.R. (2008). Ethical dilemmas in the treatment of battered women in individual psychotherapy: Analysis of the beneficence versus autonomy polemic. *Journal of Psychological Trauma*, 7, 1-20.

Manuscripts Under Review:

1. de Groot, M., Kushnick, M., Shubrook, J., Doyle, T., **Merrill, J.**, Rabideau, E., & Schwartz, F. Program ACTIVE: A combination depression treatment for rural Appalachians with type 2 diabetes. Manuscript under review at *Diabetes Research and Clinical Practice*.

Manuscripts in Preparation:

1. de Groot, M., Risaliti, C., Doyle, T., **Merrill, J.**, Pinkerman, B., Shubrook, J., Gotfried, B., & Schwartz, F. Depression and type 2 diabetes in rural appalachia: An 18-month follow-up study. Manuscript in preparation.
2. Murphy, M., Edwards, K.M., **Merrill, J.**, & Gidycz, C. College women's reactions to body image research: Is it distressing? Manuscript in preparation.
3. Doyle, T., de Groot, M., **Merrill, J.**, Hockman, E., & Klein, W. Theory of planned behavior, cardiovascular disease risk, and exercise in type 2 diabetes. Manuscript in preparation.

Poster Presentations and Abstracts:

1. **Merrill, J.**, Russell, C., de Groot, M., Shubrook, J., & Schwartz, F. (2009, November). The relationships among perceived spousal criticism, self-efficacy, and depressive symptoms in adults with type 2 diabetes. Poster presented at the annual convention of the Association of Behavioral and Cognitive Therapies, New York, NY.
2. **Merrill, J.**, Ng, H.M., Demireva, P., Edwards, K.M., Kearns, M., Gidycz, C., Calhoun, K.. (2009, November). The relationships among avoidant coping, psychological distress, and physical symptoms in college women. Poster presented at the annual convention of the Association of Behavioral and Cognitive Therapies, New York, NY.

3. Ng, H.M., Demireva, P., McInerney, K.F., **Merrill, J.**, Heffner, K., & Suhr, J. (2009, November). The impact of sleep on memory processes in health older adults. Poster presented at the annual meeting of the Society of Behavioral Medicine, Montreal, Canada.
4. Doyle, T.A., de Groot, M., **Merrill, J.**, Rabideau, E., Shubrook, J., Kushnick, M., & Schwartz, F. (2009, April). *Program ACTIVE: Combination treatment for depression improves psychosocial outcomes in Appalachians with type 2 diabetes*. Poster presented at the annual meeting of the Society of Behavioral Medicine, Montreal, Quebec.
5. Rabideau, E.R., Turcotte, D., de Groot, M., Doyle, T., & **Merrill, J.** (2008, May). Participation in diabetes education programs and diabetes treatments type predict glycemic control in individuals with type 2 diabetes in rural Appalachia. Poster presented at the Ohio University Research and Creative Activity Exposition, Athens, OH.
6. McGlynn, M.L., Knutson, M.J., Doyle, T.A., **Merrill, J.**, Rabideau, E.M., de Groot, M., Shubrook, J., Schwartz, F., & Kushnick, M.R. (2009, May). Program ACTIVE: The effects of a combination of exercise and CBT counseling on aerobic fitness and anthropometric measures. Poster presented at the Ohio University Research and Creativity Exposition, Athens, OH.
7. **Merrill, J.**, Russell, C., de Groot, M., Shubrook, J., & Schwartz, F. (2009, April). Development of a spousal criticism questionnaire for adults with type 2 diabetes. Poster presented at the annual meeting of the Society of Behavioral Medicine, Montreal, Quebec.
8. Russell, C., **Merrill, J.**, & de Groot, M. (2008, May). The effects of positive social support, negative social support, and self-esteem on depression in patients with type 2 diabetes. Poster presented at the Ohio University Research & Creative Activity Exposition, Athens, OH.
9. Doyle, T. A., de Groot, M., **Merrill, J.C.**, Hockman, E., & Klein, W. (2007). Cardiovascular disease risk, theory of planned behavior, and exercise among T2DM patients. Poster presentation at the annual meeting of the Society of Behavioral Medicine, Washington, D.C.
10. de Groot, M., Risaliti, C., Doyle, T., **Merrill, J.C.**, Pinkerman, B., Shubrook, J., Gotfried, B., & Schwartz, F. (2007). Persistence of depression among type 2 diabetes Appalachians [Abstract]. *Annals of Behavioral Medicine*, 33, S178.

Research Experience:

Research Assistant and Study Therapist

2006-2009

Depression Treatment for Type 2 Diabetes Appalachians: Program ACTIVE

Principal Investigator: Mary de Groot, Ph.D.

This project was funded by the National Institute for Diabetes, Digestive Disease & Kidneys (#R34DK071545).

- Assisted in recruitment and coordination of study activities.
- Provided 10-week CBT intervention for study participants.

- Completed SCID interviews for study participants at baseline, post-intervention, and follow-up visits.
- Met with study participants for weekly contacts to monitor adherence and safety in exercise intervention.

Project Coordinator **2007-2009**

Psychosocial Aspects of Diabetes Among Medical Patients in Athens County: 4 Year Follow-Up

Principal Investigators: Mary de Groot, Ph.D.

This project was funded by the Ohio University Diabetes Research Initiative

- Coordinate preparation of study materials, recruitment, data collection, and data entry and analysis.

Project Coordinator **2005-2006**

Caring for Diabetes: A Family-Based Educational Intervention for Patients with T2DM.

Principal Investigators: Mary de Groot, Ph.D.

This project is funded by the Ohio University Diabetes Research Initiative

- Coordinated preparation of study materials, recruitment, data collection, entry, and analysis.
- Assisted with planning and implementation of two one-day educational interventions.

Clinical Experience:

Supervision Trainee **March 2009 – June 2009**

Ohio University Psychology and Social Work Clinic, Athens, OH

Supervisor: Kevin Byrd, Ph.D.

- Provided clinical supervision to a second-year graduate student using a competency-based approach that incorporated setting goals with the supervisee, providing feedback on videotaped sessions, and incorporating outside materials and reading related to supervisee goals for the quarter.
- Received weekly umbrella supervision from licensed clinical supervisor that included review of supervision tapes, feedback on supervision strategies, and role-playing of supervisory techniques.

Health Psychology Trainee **September 2008 - June 2009**

O'Bleness Family Practice Clinic, Athens, OH

Health First Care Center, Athens, OH

Supervisors: Bernadette Heckman, Ph.D., Joseph Bianco, Ph.D., & Mary de Groot, Ph.D.

- Completed patient consultations as requested by physicians and provided feedback regarding their referral questions.
- Educated patients about the Health Psychology Service and provided appropriate referrals to outside providers when necessary.
- Conducted intake assessments with new patients to determine their presenting concerns, psychosocial and medical history, health behaviors, treatment needs, and recommendations for physicians.
- Tailored brief individual psychological interventions for patients as needed for health psychology concerns including: smoking cessation, medication adherence, physician-patient

communication, coping with stressful events, building social support, assertive communication, weight management, and pain management.

Psychology Trainee

January 2009 – June 2009

New Horizons Youth and Family Center, Lancaster, OH

Supervisor: John McNamara, Ph.D.

- Conducted intake assessments with child, adolescent, and adult clients to evaluate presenting concerns and psychosocial history, determine preliminary diagnoses, and refer to appropriate treatment options within the agency.
- Provided individual therapy to approximately 7 adult clients and couples therapy for 2 adults and their spouses using a combination of cognitive behavioral therapy techniques and interpersonal therapy.

Graduate Student Clinician

September 2006 – July 2009

Ohio University Psychology and Social Work Clinic, Athens, OH

Supervisors: Heather Alvarez, Ph.D., Christine Gidycz, Ph.D., Melissa Buelow, M.S., Paul Castelino, Ph.D., John Garske, Ph.D., and Timothy Anderson, Ph.D.

- Provided brief and long-term individual psychotherapy to university students.
- Applied interventions from multiple theoretical orientations including: cognitive-behavioral, psychodynamic, and interpersonal therapies.
- Received 1-2 hours of individual supervision and 2 hours of group supervision per week. Supervision included case presentations, review of videotaped sessions, and feedback on case conceptualizations, intervention techniques, and ethical issues.

Psychology Trainee

July 2007 – December 2007

HeartWorks Cardiopulmonary Rehabilitation Program

Cornwell Center, O'Bleness Memorial Hospital, Athens, OH

Supervisors: Joe Bianco, Ph.D. and Mary de Groot, Ph.D.

- Conducted individual psychosocial assessments with patients at intake and discharge.
- Provided psychoeducational lectures about cognitive behavioral interventions for stress management.
- Led 15-minute in-vivo relaxation groups for patients using visualization and progressive muscle relaxation techniques.
- Tailored brief individual psychological interventions for participants as needed for psychosocial issues relevant to cardiopulmonary health including: smoking cessation, medication adherence, physician-patient communication, coping with stressful events, building social support, assertive communication, couples issues, and coping with emotional trauma following medical procedures.
- Received 1.5 hours of individual supervision per week and attended monthly team meetings to present and discuss case material.

Glossary

a priori power analyses: analyses conducted prior to a study to estimate sample size needed.

comorbid conditions: medical conditions that exists in addition to the primary illness.

correlation: a measure of the relationship between two variables.

descriptive analyses: statistics to describe the main features of data such as means, standard deviations, range, and distribution.

diabetic neuropathy: damage to the nerves or nerve cells that can occur in diabetes and may cause symptoms of numbness, tingling, or pain.

musculoskeletal conditions: these conditions involve the muscles or components of skeletal system such as tendons or joints (e.g., arthritis, gout, foot problems).

hierarchical regression: a form of regression that examines in which order the independent variables (predictors) influence the dependent variable (outcome).

HIPAA: Health Insurance Portability and Accountability Act forms protect participant information and explain how their health information will be used in the study.

hyperglycemia: high blood glucose (sugar) levels that can occur in diabetes.

psychosocial: related to psychological aspects (e.g., depression, anxiety) and social aspects (e.g., quality of life, interference with social activities).

psychiatric comorbidity: psychological disorders (e.g., depression, anxiety) that exist in addition to the primary illness.

self-care activities: aspects of treatment for individuals with diabetes that include diet, exercise, taking medications, and monitoring blood glucose levels.

type 2 diabetes mellitus: the most common form of diabetes in which the body does not produce enough insulin or cells cannot use the insulin properly, leading to an excess of glucose (or sugars) in the bloodstream.

Appendix

Anticipated Project Timeline

May 2010	June 2010	July 2010	August 2010	September 2010
Begin recruitment and data collection	Data collection	Data collection	Data analysis	Data analysis and SBM ¹ abstract preparation

¹Society of Behavioral Medicine (SBM)

Sample Questions from Pain Interview*Brief Pain Inventory*

1. Please rate your pain by circling one number that best describes your pain at its worst in the last week.

0 1 2 3 4 5 6 7 8 9 10

No
pain

Pain as
bad as
you can
imagine

2. What treatments or medications are you receiving for your pain?

4. In the last week, how much relief have pain treatments or medications provided?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

No
relief

Complete
relief

Leeds Assessment of Neuropathic Symptoms and Signs

1. In the area where you have pain, do you also have “pins and needles”, tingling, or prickling sensations?

2. Does your pain make the affected skin abnormally sensitive to touch? Getting unpleasant sensations or pain when lightly stroking the skin might describe this.