The Investigator's Protocol

1. Title

Benefit of lumbar bracing for chronic low back pain due to degenerative disc disease

2. Principal Investigator and Co-Investigators

Dr. Thiru Annaswamy

3. Sponsor of the Study

The Foundation of Physical Medicine and Rehabilitation

4. Investigational New Drug (IND) / Investigational Device Exemption (IDE)

None

5. Purpose of the Study, Including the Hypothesis to be Tested

The main objectives of this study are to evaluate the benefits of back bracing in the symptomatic management of patients with CLBP due to degenerative lumbar disc disease. We plan to study patients with uncomplicated CLBP without symptoms of radiculopathy or neurogenic claudication.

The secondary objectives of the study are to evaluate if a back brace provides any additive benefit to usual care consisting of exercise and patient education in patients with CLBP due to degenerative disc disease.

Specific Aim 1. To evaluate the effectiveness of back brace to improve pain and patient-reported functional measures in patients with uncomplicated CLBP due to degenerative disc and degenerative joint disease without associated symptoms of neurogenic claudication or lumbosacral radiculopathy.

Hypothesis 1. Back brace in addition to usual care will provide statistically significant improvement in pain and functional measures compared to usual care alone.

Specific Aim 2. To evaluate the adherence to back brace wear instructions in patients with uncomplicated CLBP due to degenerative disc and degenerative joint disease without associated symptoms of neurogenic claudication or lumbosacral radiculopathy

Hypothesis 2. Patients with CLBP, due to degenerative disc and degenerative joint disease without associated symptoms of neurogenic claudication or lumbosacral radiculopathy, who are prescribed a back brace, will demonstrate clinically acceptable rates of adherence to brace wear instructions.

6. Background and Results of Previous Related Research

Physiatrists use back braces (lumbar support, back corset, semi-rigid brace, and lumbar orthotic) for symptomatic management of patients' chronic low back pain (CLBP) despite very poor evidence supporting their use in the few published studies that have examined them. Evidence supporting back braces in other populations, such as pregnant women, and patients with sub-acute or acute low back pain, is better established. (Pennick, 2013; Calmels, 2009; Podichetty, 2008) However, the benefits of back braces in the CLBP population are very unclear.

A Cochrane review on the role of lumbar supports in treating chronic LBP revealed that limited evidence was available, which led to their conclusion that "it remains unclear whether lumbar supports are more effective

than no or other interventions for treating low-back pain." (van Duijvenbode, 2008) They emphasized the need for high quality randomized trials evaluating the effectiveness of back braces, and also recommended that compliance of brace wear be monitored.

The mechanism by which back braces might help patients with CLBP is also unclear. The semi-rigid design of the commonly used back brace does not mechanically limit movement enough to suggest that movement limitation is the mechanism by which back braces provide relief. However, some studies have suggested that back braces help patients with CLBP by providing postural support or a kinesthetic reminder of their posture. Using posturography, Munoz et al., studied the forces applied by lumbar bracing and concluded that back braces seem to help by improving the quality of balance strategy used by the patient. (Munoz, 2010) Another mechanism by which back braces are believed to help patients is by providing warmth underneath the brace.

There is poor published information regarding adherence to instructions (compliance) about the use of back braces. Based on our anecdotal clinical experience we find that adherence rates vary widely among our patients who are prescribed back braces, ranging from non-use to constant use around the clock. Poor adherence to instructions can be a significant factor resulting in inconclusive evidence supporting the role of back brace in patients with CLBP. A recent study showed that a strong predictor for consistent adherence to back brace usage was a positive attitude towards it. In this study, positive attitude towards the back brace explained 41% of the variance in outcomes. In addition, they found that perceived benefit from the brace outweighed any subjective discomfort. (Roelofs, 2010)

Back braces have been used as adjunctive therapy in addition to other conservative care options. A recent study evaluated the cumulative effect of bracing to exercise and found that bracing helps to increase trunk stiffness and augments muscle contractions, which may remind the patients to better comply with exercise instructions. (Aleksiev, 2014) This suggested a potential synergistic effect of bracing and exercise in the management of patients with CLBP.

7. Definition of the Population to Which the Study is Directed, with Justification

Patients with CLBP who have been referred to the PM&R Spine clinic will be the population from which the study subjects will be recruited from. Patients with CLBP are referred from primary care clinics and other specialty clinics within the VA North Texas Health Care System.

8. Subject Selection, Inclusion and Exclusion Criteria

Inclusion	Exclusion
18-85 years of age	Lumbar radiculopathy
Diagnosis of lumbar degenerative disc disease or joint disease	Neurogenic claudication
Low back pain > 6 weeks	Spondylolisthesis with instability
Uncomplicated low back pain without symptoms	Previous lumbar spine surgery
	Recent (<1 year) brace use or physical therapy

of pain radiating below the knee	program No active psychiatric illness

All patients will need to have a radiograph (x-ray) or magnetic resonance imaging (MRI) of the lumbosacral spine on file within 1 year of their enrollment into the study. No X-rays or MRIs will be ordered specifically for screening purposes for this study. Patients with no X-rays or MRIs available for review will be excluded from the study. Once the targeted patients are identified, and they agree to participate in the study and sign an IRB-approved informed consent document, they will undergo initial history and physical examination. Their radiological images will be reviewed and applicability of study criteria will be documented.

9. Number of Subjects in the Study

In this study, we plan to recruit 120 adult subjects.

We powered the study based from previous data we collected and published using the PDQ. (Annaswamy, 2012) In that study, we observed a mean difference between the two study groups of 8 points on the PDQ total score.

Using other PDQ data obtained from a different study by one of the authors, we found a standard deviation of 18 for the PDQ functional subscale. We would expect a change in function as sign of improvement in the proposed study, so we calculated a power analysis based on a moderate effect size of 0.44 to 0.5 (Cohen's d).

Using G-Power analysis software, for a one-tailed probability (since we expect only improvement, not worsening) and effect size ***d*** of 0.5, with an alpha error of 0.05 and a power (1-β error probability) of 0.8, we would expect a difference in mean score between the 2 randomized groups to be detectable with a sample size of 51 subjects in each group, total sample size of 102. Estimating a 15% drop out rate, we would need 60 subjects in each group, for a total sample size of 120.

10. Justification for the Use of Vulnerable Populations

Vulnerable patients will not be enrolled in this study.

11. Study Design

This is a prospective, randomized controlled trial. Blinding of the subjects is not possible because a back brace is a visibly obvious intervention. In addition, since we are evaluating the adherence of back brace wear, blinding of the investigator is also not possible. Therefore, this study will be an unblinded RCT.

12. Description of Procedures to be Performed

Patients will undergo baseline assessment of function, pain and quality of life (QOL) by completing the following paper-based questionnaires and assessments:

1) Pain diary (Numerical Rating Scale) for 7 days prior to visit from which we will obtain an average numerical rating of low back or buttock pain in the previous week.

2) The Pain Disability Questionnaire (PDQ) (Anagnostis et al., 2004).

3) PROMIS instruments in several domains established to be relevant/appropriate in back pain patients: the instruments that will be administered include: pain interference, pain behavior, pain intensity, physical function, emotional distress- depression, fatigue, sleep disturbance, satisfaction with social roles and activity, social isolation, global health scale and PROMIS-29 profile.

4) European Quality of Life (EQ-5D) questionnaire, which is composed of 5 questions on quality of life. The EQ-5D instrument, as a standardized, cross-culturally validated measure of self-assessed health has a hugely important role in understanding population health within and across countries. Over the past two decades a wealth of international population health survey data have been accumulated by the EuroQol Group from research conducted in many countries across four continents. One of the success factors of the EQ-5D instruments has been the easy availability of national or international sets of EQ-5D data, as well as clear explanations and guidance for users.

After the baseline assessment, study patients will be randomized either to the treatment group or to the control group.

Control group: Control group patients will participate in 2 (1-hour) sessions of back school program (provided over 2 weeks) aimed at providing basic education on anatomical, physiological and exercise principles aimed at improving their ability to self-control and self-manage their chronic low back pain symptoms.

Treatment group: Patients in the treatment group will be provided a semi-rigid, sized, but not custom-molded, in-stock brace fitted by a professional orthotist at our facility. The prescribed brace will be the same standardized orthotic for all study patients, throughout the study period. After the fitting of the brace, treatment group patients will participate in the same 2-week back school program as the control group.

Brace Wear Instruction: Patients will be instructed to wear the brace during work (if applicable) or during their typically symptomatic periods. They will be instructed to wear the brace at least once a day-for 30-minutes, up to 6 hrs/day (maximum). The back brace will be replaced within the study period for any unusual wear/tear as necessary.

All treatment group patients will be provided with a diary in which they will document the number of hours they wore the brace on each day and document adverse events, if any. All control group patients will be asked to document in a diary their pain and exercise routine.

Time Points
Study patients will be assessed at the following time points:

a) Baseline

b) A brief, phone call at 3 weeks to assess any reports of adverse events or concerns of brace wear in patients

in the treatment group.

c) The 6-week time point will be our primary end-point. At this point, all study patients including patients in the treatment group and the control group will undergo all assessments they underwent at the baseline visit.

d) Our secondary end-points will be at 12-weeks and 6-months during which we will re-administer all baseline assessments as well as obtain a narrative report on additional interventions or treatments that the patients might have sought and/or obtained in the interim. These assessments will be conducted telephonically by our research coordinator.

Patients will be requested not to undergo any additional treatments and interventions during the 6-week period of back school. We will coordinate with their spine & pain clinic providers as well as with their primary care clinics to ensure compliance with the study protocol during this period.

13. Anticipated Data and Data Analysis

We will perform descriptive statistical analysis to evaluate baseline variables and demographics of all study subjects. We will use appropriate inferential analyses to evaluate for differences in outcome measures between the study and control groups. For all statistical analyses, we plan to use Stata 13 (College Station, TX).

14. Provisions for Managing Adverse Reactions

Pain and discomfort from wearing the back brace is possible. The subjects in the study group who report these side effects will be evaluated in clinic and appropriate clinical interventions will be initiated to address the problem. Subjects in both groups may have lack of improvement in their symptoms as a result of their intervention. This will be addressed by their clinician during follow up as a part of their routine medical care. Unexpected adverse events as a result of participation in this research study will be reviewed and addressed on a case-by-case basis.

15. Risk/Benefit Assessment

Physical – minor pain, and discomfort are possible from participation in this trial.

Psychological – Can be minimal or transitory (e.g., embarrassment).

Social – wearing a back brace may stigmatize the subject as a person with disability or a disabling condition

Economic – none

Legal – none

Overall risk classification for the research: minimal

16. Data Safety Monitoring

Does this study require a Data Safety Monitoring Plan (DSMP)? NO

Does this study have a Data Safety Monitoring Board (DSMB)? NO

17. Process for Obtaining Informed Consent and Protecting Patient Privacy

All recruitment will follow the eligibility and exclusion criteria mentioned earlier and adhere to the

stipulations identified in the IRB consent form. All study activities will be conducted within the VA PM&R clinics, at the Dallas VAMC. Participants will be provided with copies of the consent form and allowed time to process and give thoughtful decision regarding their participation. Ample time will be allowed for family members to discuss any concerns related to participation with the investigator.

18. Documentation of Informed Consent

Enrollment and completion notes will be entered into CPRS. This enrollment note will follow the structure in Chapter 8 of the PPHRS.

19. Payment to Subjects for Their Participation

Upon completion of the study, each subject will be able to receive a total of $50. This money is for the time and travel spent in this study. If the subject withdraws before finishing the study, they will only receive a fraction of the amount stated above, based on the following:

$25 for completing baseline questionnaires
$25 for completing the study

20. Provisions for Data Storage and Confidentiality

The investigator will take all necessary steps to ensure confidentiality of the data. This includes coding data and choosing an appropriate and secure data storage mechanism that will prevent unauthorized access. Please see the Research Data Security Plan (RDSP) form for details of the data security plan.

In accordance with HIPAA, the consent form describes to the subject what protected health information (PHI) will be obtained and/or stored and for what purpose, as well as a list of who may have access to this data, including outside agencies.

All paper records will be maintained in a locked cabinet in the research team's locked office. Computerized data will be de-identified, stored separately from the key code, and stored on the VA-secured network that is accessible from a password protected computer in a locked office of the research team.

All records of this research study will continue to be securely maintained in accordance with VHA Record Control Schedule upon completion of the study. The records will be kept in a locked file cabinet or locked room with limited access or stored at a VA-approved storage facility. If the PI leaves the VA facility, the research records will be retained by the institution.

21. Provisions for storage/analysis of research specimens

Not applicable.

22. Dissemination of Research Results

The overall results of are anticipated to be presented at a national conference and/or submitted to a peer reviewed journal for publication.

~~23.~~ **23. Multi-Center Research**

(a) VANTHCS will be the coordinating site for this study

(b) i. Researchers at UTSW (Parkland) will be engaging patients for this study

ii. Parkland Spine Clinic

iii. Each site has an FWA

iv. The PM&R research coordinator at UTSW: Cindy Dolezal
Cindy.Dolezal@UTSouthwestern.edu
UT Southwestern, Charles Sprague Building CS6.102
5161 Harry Hines Blvd.
Dallas, TX 75390

v. UT Southwestern Institutional Review Board (IRB)

vi-x. The research coordinators at both sites will have regular communications to ensure all protocols are up to date, communicating any adverse events or unanticipated problems.

xi. See attached copy of UTSW IRB approval

Collaborative Research

1.

a. The data collected for this study will include questionnaire data, relevant demographic and clinical information. All de-identified UTSW data will then be transmitted to the VA (via REDCap) for further analysis of pooled data at the VA.

b. The VA data will be combined with non-VA (UTSW) data received using the REDCap data input center. Dr. Annaswamy will analyze the combined, de-identifed data, at the VA location.

c. Baseline study visit/surveys and back school with be done at UTSW for all UTSW patients. VA patients will receive the same care at the VA. After the initial visit, UTSW patients will be contacted for follow-up surveys by the VA research coordinator.

d. This is a pre-existing protocol at the VA. UTSW (Parkland) will be joining this research effort, but all data ownership remains with the VA. However, no data from UTSW (Parkland) has been collected to date. All data collected will be stored and maintained at the VA site.

e. As the data will only be collected at the VA, the VA will assume all data ownership. The UTSW (Parkland) investigators will be given opportunity to opt-in for authorship credit.

2. Since data will only be transferred from UTSW (Parkland) to the VA, no changes to the informed consent or HIPAA authorization are necessary.

~~**Multi-Center Research**~~

~~This is not a multi-center research study.~~

1. Summary of Activities for "Collaborative" Research

RESEARCH ACTIVITIES	ACTIVITIES FOR VA RESEARCH These activities **MUST** be approved by the VA R&D Committee		ACTIVITIES FOR NON-VA RESEARCH These activities **MUST NOT** be approved by the VA R&D Committee	Explain how VA and NON-VA activities of Dual-Appointment personnel are distinguished
	VA Site	**Non-VA Site**		
Advertising				
Recruitment	X	X		
Research-related medical procedures to be performed **(LIST)**				
Other interventions or interactions with living individuals to be performed **(LIST)**	Back school – 2 sessions covering back anatomy and physical therapy, follow-up surveys	Back school – 1 session covering back anatomy and physical therapy		
Clinics, labs, other units to be used **(LIST)**				
PHI Use	X			
PHI Disclosure	X			
Data Coordinating Center	X			
Members of Research Team **(LIST)**	Thiru M. Annaswamy, MD Mitchell Kroll	Aleksander Borreson, Chung-Kuang Lin, Cindy Dolezal, Chen Cui, Jason Petrasic, Amir Ahmadian