Classification-Based Treatment of Cervical Disorders: Analysis of Student Physical Therapist Clinical Internship Experience

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ABSTRACT

Objectives: 1) To determine if selected student physical therapists (SPTs) treating cervical disorders practice in a manner consistent with the current practice guidelines concerning treatment-based classification. 2) To determine if selected SPTs treating cervical disorders achieve similar results compared to that reported in the literature.

Background: Cervical disorders are a common complaint and contributor to pain and disability. To improve physical therapy intervention, a treatment-based classification for neck pain has been proposed to achieve significant improvement in pain and disability.

Methods: Four SPTs collected twenty-one data sets for patients with primary complaint of neck pain over a nine month period of student clinical internships. Two health-related quality of life measures, Neck Disability Index (NDI) and Numeric Pain Rating Scale (NPRS), were used to assess patient outcomes. Patients were categorized and treated using proposed interventions for treatment-based classification.

Results: Clinically significant outcomes were found in both areas of patient-reported pain and disability as measured by the NPRS and the NDI. Patients reported clinically significant reductions in NPRS scores across all five categories. Patients in the Pain Control and Mobility categories reported clinically significant changes in NDI scores.

Conclusion: Patients treated with matched interventions demonstrated clinically significant improvement in self-reported pain and disability. Treatment interventions were consistent with current practice guidelines to achieve patient reported success and yielded outcomes that matched or exceeded those reported in the literature.

Background

Neck pain is reported to affect 70% of the general population at some point in their lives. Patients seek different healthcare providers to alleviate or manage symptoms associated with neck pain. Up to 41% of patients with neck pain seek care from a general practitioner and 33% from a physical therapist (PT). Although neck pain is usually not life threatening, it can decrease quality of life and productivity at work. Costs associated with work loss and medical treatment are estimated to total billions of dollars and suggest an improvement in intervention strategies.

Physical therapy treatment for neck pain differs based on the education, experience, and personal beliefs of the treating clinician. Inconsistencies across the physical therapy profession result in a lack of uniform treatment among clinicians. Current guidelines suggest the use of particular signs and symptoms of neck pain to classify patients into specific treatment categories. Using a treatment-based classification to target intervention for neck pain may provide appropriate differentiation...
of patients with cervical complaints and decrease the conflicting outcomes commonly reported in the literature.\textsuperscript{2,6,8,11-15} Childs and colleagues\textsuperscript{16} were the first to propose a treatment-based classification system designed to identify sub-groups of patients with neck pain for the purpose of guiding treatment. The proposed treatment-based classification system identified five subgroups of patients according to their signs and symptoms: Pain Control, Centralization, Exercise & Conditioning, Mobility, and Headache. Matched interventions were proposed for each category and were drawn from the literature, generally recommended treatment guidelines, and incorporated a biopsychosocial approach. Selected interventions were consistent with the current best evidence at the time and suggested a combined treatment approach. Consistently, findings in the literature suggested that combined interventions outperformed any single treatment modality.\textsuperscript{2,4,8,11,12,17-19} The Neck Disability Index (NDI) and Numeric Pain Rating Scale (NPRS) were suggested as metrics to measure patient self-reported outcomes.\textsuperscript{16}

Since the initial introduction of the treatment-based classification system in 2004, only one randomized controlled trial of substantial quality has been published to validate the original classification system. Fritz and Brennan\textsuperscript{20} analyzed the treatment of patients who were matched and unmatched to the proposed classification system. Their findings supported the hypothesis that patients who are correctly matched to an identifiable subgroup responded better to specific combined interventions than their unmatched counterparts. Since that time, published reports continue to support the tenet that treatment using combined interventions yields superior results compared to treatments using a single modality.\textsuperscript{8,11,21-23}

Student physical therapists (SPTs) are educated to use evidence-based patient management strategies and, upon graduation, will become the newest providers of physical therapy to patients seeking treatment. However, the extent to which SPTs use current best evidence to treat patients with neck pain is unknown as is the lack of evidence indicating outcomes of cervical pain with treatment provided by SPTs. This study served two primary purposes: 1) to determine if selected SPTs practice in a manner consistent with the current evidence concerning treatment-based classification for neck pain, and 2) to discover if patients with neck pain who are treated by selected SPTs, using treatment-based classification and intervention, report outcomes similar to those found in the literature.

**Methods**

This study was designed as an observational study to gather information and examine clinical practice patterns related to the treatment of neck pain by selected SPTs. Four SPTs gathered data from twenty-one patients with neck pain during a nine month period of clinical internships. Patients were examined using a standardized examination form and were classified into one of five treatment categories proposed by Childs and colleagues: Mobility, Centralization, Headache, Pain Control, and Exercise & Conditioning.\textsuperscript{16} Patients were then treated using suggested matched interventions proposed for outcome success.\textsuperscript{16,20}

Prior to the students’ clinical internship, the design of the study was constructed to consolidate evaluative and treatment criteria. Inclusion criteria were patients of both
genders and all ages presenting with primary complaint of neck pain. Exclusion criteria were patients presenting with red flag conditions to include, but not limited to: cervical fracture, vertebral-basilar artery insufficiency, cervical myelopathy, cancer, inflammatory or systemic disease, and upper cervical ligamentous instability. This study met criteria and was granted status of exemption by the Texas State University Internal Review Board.

Before data collection, each SPT met with his clinical instructor to explain the purpose of the study, answer questions, and request support to use the treatment-based classification system to manage patients with neck pain. This was an important component of the study and served as an opportunity for the SPTs to share information learned in the classroom and to encourage practice with their clinical instructors on the examination and intervention techniques specific to the treatment-based classification for neck pain. Information specific to the correct classification of patients was clarified to enhance the ability of the clinical instructors to substantiate students’ examination findings and correctly classify patients prior to intervention.

Data collection began on the patient’s first scheduled visit. During the initial evaluation, each patient was asked to complete two self-report measures of pain and disability: the NPRS and the NDI. The NPRS used an eleven-point scale with 0 as the lowest score indicating no pain and 10 as the highest score indicating extreme pain. The minimal clinically important difference (MCID), the smallest change in score that patients perceive as beneficial, for the NPRS is reported to be 1.3 points for patients with mechanical neck pain. The NDI was selected for use as it has high test-retest reliability and a minimum clinically important difference of five raw points or ten percentage points.

A physical therapy examination was performed by a SPT using a standardized cervical and upper quarter examination form (Appendix). Based on the findings gathered in physical therapy examination, patients were classified into one of five treatment categories proposed by Childs and colleagues. Treatment proceeded with category-matched interventions proposed by Childs and reported as successful by Fritz and Brennan. NDI and NPRS scores were documented each week along with specific interventions determined by each patient’s particular classification.

Descriptive data were gathered and analyzed using Microsoft Excel. Variables of interest were group classification and change from initial to final NDI and NPRS scores. These values were compared to the results of Fritz and Brennan to assess whether the selected SPTs obtained similar outcomes of success using treatment-based classification and proposed matched interventions.

Results

A total of twenty-one patients (sixteen females, 76%) met the criteria to be included in this study. The majority (68%) of patients were aged forty to fifty-nine years of age. On initial evaluation, all patients (100%) were classified into one of five subgroups using the treatment-based classification for neck pain. SPTs discussed with their clinical instructors findings from the examination prior to implementing treatment and throughout the patient therapy program. Patients received matched treatments per classification in eighteen data sets (86%); three data sets received unmatched interventions. The unmatched
data sets were classified as such because the patients did not receive the minimum necessary interventions within the first three treatment sessions as defined by the classification protocol proposed by Childs and colleagues. Two unmatched data sets were in the Pain Control category and were not identified as matched as they did not receive cervical range of motion exercises within the first three treatment sessions. One Mobility data set was unmatched as the patient received neither deep neck flexor training nor mobilization/manipulations to the cervical or thoracic spine. The eighteen matched data sets received interventions consistent with those proposed by Childs and colleagues and reported as successful by Fritz and Brennan (Table 1).

Clinically significant outcomes were found in both areas of patient-reported pain and disability. Patients reported clinically significant reductions in NPRS scores (MCID >1.3 points) across all five categories (Figure 1). Additionally, patients in the Pain Control and Mobility categories reported clinically significant changes in NDI scores (MCID >10%). (Figure 2).

A comparison of final self-reported outcomes of pain and disability for patients in this analysis of practice study was made with those reported by Fritz and Brennan. The average change in NPRS scores for patients in the categories of Mobility, Centralization and Headache exceeded that of Fritz and Brennan (Table 2). The average change in NDI scores for patients in this analysis of practice study exceeded that of Fritz and Brennan across all categories (Table 3).

Discussion

Literature informing the treatment and outcomes of patients with neck pain often yields conflicting results. This finding appears to be related to the wide variance in practice patterns of treating clinicians. One explanation for the variance in practice patterns is the lack of differentiation of patients with neck pain and the simultaneous lack of selective interventions deemed appropriate for the different presentations. The development of the treatment-based classification for neck pain proposed by Childs and colleagues was designed to improve outcomes by grouping patients into appropriate diagnostic categories and providing matched interventions representative of best practice patterns. A follow-up study by Fritz and Brennan examined the effectiveness of this patient management system and found patients who received matched interventions responded better than their unmatched counterparts. Since that time, the treatment-based classification system has gained recognition as an effective approach to treat patients with neck pain. The extent to which SPTs use the treatment-based classification system has not been reported.

The objectives of this study were twofold. The first objective was to learn the extent to which selected SPTs used the treatment-based classification system during their clinical internship to subgroup and treat patients with neck pain. Often, students are taught patient management strategies in the classroom only to find their implementation of such strategies is limited for various reasons to include, among others, physician preference for treatment, facility protocol, or unfamiliarity on the part of the clinical instructor with the particular management practice using the treatment-based classification system for neck pain. The second objective was to compare the outcomes of patients treated by SPTs with those reported by Fritz and Brennan. Data from this analysis of practice indicated that
Table 1. Primary interventions per classification provided during first week of treatment

<table>
<thead>
<tr>
<th>Category</th>
<th>SPT</th>
<th>Education</th>
<th>Centralization</th>
<th>Headache</th>
<th>Pain Control</th>
<th>Exercise and Conditioning</th>
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<tbody>
<tr>
<td>Mobility</td>
<td>3.3</td>
<td>Education</td>
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<tr>
<td>Cervical-Thoracic Mobilization/Manipulation</td>
<td>3.3</td>
<td>Repeated Retraction</td>
<td>Cervical Mobilizations</td>
<td>Thoracic Manipulation</td>
<td>Deep Neck Flexor Exercises</td>
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<tr>
<td>Cervical Flexibility Therex</td>
<td>6.8</td>
<td>Mechanical Traction</td>
<td>Deep Neck Flexor Exercise</td>
<td>Cervical Mobilization</td>
<td>Upper Quarter Exercises</td>
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</table>

Table 2. Comparison of average change in NPRS scores (initial to final) as reported by Student Physical Therapists (SPT) and Fritz & Brennan (F&B)

<table>
<thead>
<tr>
<th>Category</th>
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<th>F&amp;B</th>
</tr>
</thead>
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<tr>
<td>Mobility</td>
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<td>2.3</td>
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<tr>
<td>Centralization</td>
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<td>1.7</td>
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<td>Exercise &amp; Conditioning</td>
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<td>1.1</td>
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</table>

Table 3. Comparison of final average NDI scores (% initial to final) as reported by Student Physical Therapists (SPT) and Fritz & Brennan (F&B)

<table>
<thead>
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<th>Category</th>
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<th>F&amp;B</th>
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<td>29.3</td>
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<tr>
<td>Exercise &amp; Conditioning</td>
<td>6.4</td>
<td>11.3</td>
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</table>
Figure 1. Mean Change from Initial to Final NPRS scores (MCID=1.3 Points)

Figure 2. Mean change from Initial to Final NDI Scores (MCID>10%)
the participating SPTs were consistent in their selection and use of the treatment-based classification system to categorize patients with neck pain (100%), and the majority of patients (86%) received matched interventions. The outcomes for patients in this study were similar to those reported by Fritz and Brennan.²⁰

The self-reported outcomes for pain and disability for patients in this analysis of practice met and exceeded the threshold for a minimal clinically important difference. Across categories patients reported clinically significant decreases (MCID > 1.3) in NPRS scores. Additionally, patients in the Pain Control and Mobility categories reported a change in NDI scores that exceeded the MCID level (MCID > 10%). Outcomes for patients in this analysis of practice were similar to, and sometimes greater than, those reported by Fritz and Brennan.²⁰ One explanation for this may be the small number of patients represented in this study. Small numbers can cause the results to look different from the way they would look if the sample size were large. Also, the outcomes reported in this study represent patients who were under the care of a therapy team, that is, the SPT and his clinical instructor. The attention provided with the team approach could have effectively skewed the results in a positive direction. The robust findings reported in the study are not believed to be an indication of better treatment, merely a reflection of the appropriate use of a patient management system on a small sample of patients. Consistent with the findings reported in the literature, this analysis of practice found improvement in patient reported pain and disability when the treatment-based classification system was used to manage patients with neck pain.

Several limitations in this study are worth noting. Subjects comprised a sample of convenience from patients available during student clinical affiliations, resulting in a relatively small sample size. The four SPTs were educated at the same institution such that information they received regarding the treatment-based classification system for neck pain, and patient management strategies, may differ from that taught at other institutions. Furthermore, at the time of the study, the four SPTs had completed all didactic work and were finishing the last component of their education, which consisted of nine months of internship. As such, they were further along in their education than other SPTs who may use the treatment-based classification system to manage patients, making comparison among SPTs difficult. Most interventions were performed according to the proposed matched treatment criteria, however, some patients received only mobilizations and not manipulation due to the practice patterns of certain clinics. Three patients did not receive matched intervention. Lastly, the findings reported in this study represent patients who received a major portion, if not all, treatment from a SPT. However, SPTs practice under the guidance and direction of licensed physical therapists, thus the reported outcomes reflect the influence and participation of a team approach to treatment and not solely the product of SPT practice.

Conclusion

Analysis of practice supports the use of a treatment-based classification for patients with neck pain. Patients treated with matched interventions demonstrated clinically significant improvement in self-reported pain and disability. The average change in pain as measured using the NPRS exceeded the threshold for a clinically
important difference across all five categories. Likewise, the average change in disability as measured by the NDI exceeded the minimal clinically important difference for patients classified into the Mobility and Pain Control categories. The scored results from this study are consistent with those reported by Fritz and Brennan.\textsuperscript{16, 20} Findings illustrate the ability of SPTs to achieve outcomes similar to those reported by experienced clinicians who treat patients with neck pain using the treatment-based classification system proposed by Childs and colleagues.\textsuperscript{16}

Findings from this study would benefit from additional research using a larger patient population and a greater number of SPTs. Results would be more generalizable if students educated at different institutions participated. The inclusion of more facilities in various geographic regions would help generalize findings across patient populations. Finally, consistency in intervention by SPTs, particularly manipulation when deemed most appropriate, would enhance examination of the usefulness of the treatment-based classification system to manage patients with neck pain.

References


Appendix

Cervical Form
Examined by: Licensed PT  Student PT  Both
PT  Both
Demographics & History (Initial Only)
Patient ID:  
Date (Initial):  
Location (check all that apply):
Neck
Thorax
Arm above elbow ( Bilat  Uni)
Arm below elbow ( Bilat  Uni)
Head ( Bilat  Unilat)
Total duration of symptoms (yrs):
Height: ____ ft ____ in       Wt (lb):______
Gender:  Male  Female
Age:
Duration current episode (days):______
FABQ (modified for neck) PA______ WK_______
Other signs/symptoms/conditions (check all applicable):
N/A  Thoracic Spine
Upper Extremity(ies)  Hip(s)
Back Pain  Shoulder Pain
Headache  Dizziness/Light Headedness
Hemifacial Sxs  ** Smoking (circle): Current smoker / Smoked in past / Never Smoked
Post surgical?  Yes  No  Previous episodes of neck pain:  0  1-2  3-5  >5
Sought medical care for this same episode in the past?  Yes  No  Is this injury due to whiplash?  Yes  No

PHYSICAL EXAM: (Initial Only)
Upper limb tension:  +  —
Spurling’s:  +  -  Not Indicated
Distraction:  +  -  Not Indicated
Cervical rot<60°:  +  -
Deep neck flexor endurance (secs):______
Cervical rotation lateral flexion:  +  -
Posture:
Cervical ROM:
Centrallization:
Dermatomes (C5-T1)  Myotomes (C5-T1)  Reflexes:
Normal  Abnormal
C5:  Nl  Dec  Inc
C6:  Nl  Dec  Inc
C7:  Nl  Dec  Inc

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<th>Interventions</th>
<th>Classification (circle one)</th>
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<td>Exercise &amp; Endurance</td>
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<td>General Conditioning Exercises</td>
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<td>H</td>
<td>Repeated Retraction Exs (McKenzie)</td>
<td>P</td>
<td>Behavioral Exercise Approach</td>
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| Date of Last Visit: _____ / _____ / _____ | Duration of Care To Date (days):__________ | Is the last visit the discharge visit: Yes / No | Number of Visits To Date: __________ |
