

Effectiveness of Comprehensive Physical Therapy for Patients with Cervicogenic Headaches

An Evidence Based Review



UCSF

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Introduction: The Problem

- 50 million Americans suffer from headaches (primary, secondary, neuralgia type) with \$25 billion a year reported in lost productivity

-Alix & Bates, 1999; Moore, 2004

- Prevalence

Point Prevalence (general)	16%
Tension-Type	29%
Migraine	2%
Cervicogenic	15-20% 4:1 female to male ratio

Introduction: The Problem

- Patients with neck pain are frequently referred to physical therapists; some also have headaches (cervicogenic headaches-CH) *-Bogduk, Sjaastad, Jensen*
- Definition of CH
 - 1853 Headache linked to a problem in the neck;
 - 1853: Schutzenberger
 - 1983 “Cervicogenic headache”: Clear involvement of the neck
 - *Antonaci 2005*; 1983: Sjaastad
 - 1988 IHS: Secondary Headache
 - “pain, referred from a source in the neck and perceived in one or more regions of the head and/or face”
- Physical therapists need to appropriately diagnose and treat patients with cervicogenic headaches

Gap in Research

- Variety of approaches to treating cervicogenic headaches with little evidence to support any one approach
 - **Current approaches**
 - Manual therapy
 - Postural education/exercises
 - strengthening exercises
 - Combination of treatment
 - Outcomes to monitor:
 - Reduce Pain
 - Reduce headache:
 - Frequency
 - Intensity
 - Duration
 - **A search of the evidence on the effectiveness** of treatment is needed to guide therapists in making decisions about treatment

Primary Question

- For patients with cervicogenic headache, is comprehensive physical therapy (including manual therapy) more effective than manual therapy alone?
 - Foreground question: Patient management:
 - **P**opulation: patients with cervicogenic headache
 - **I**ntervention: Manual therapy, postural education/exercises, strengthening exercises
 - **C**omparison: Manual therapy alone vs. combined intervention
 - **O**utcomes: Primary (clinical) outcomes

Theoretical Rationale: Diagnosis and Treatment of CH

- The etiology of CH is usually multi-factorial
 - musculoskeletal mal-alignment
 - changes in muscle behavior: tightness, spasm, length changes
 - neural tension
 - stress
- Once the diagnosis is clear, it is important to know what parameters of treatment may impact effectiveness
 - patient characteristics
 - specific treatment techniques
 - frequency and duration of treatment
 - outcomes measured

Null Hypotheses/Expectations

- Hypothesis: There will be no significant differences in outcomes between patients treated with manual therapy alone versus manual therapy combined with postural education/exercises and strengthening exercises.
 - In the short term
 - In the long term
- Expectations: In patients with CH, a treatment approach consisting of manipulation alone is not as effective in maximizing **long term** outcomes as a treatment approach that combines manual therapy, postural education/exercises, and strengthening exercises

Outcomes to Measure: Post Treatment Cervicogenic Headaches

- Intensity, frequency and duration of headaches
- Pain levels (head and/or neck)
- Cervical spine AROM
- Use of pain medications
- Strength: deep cervical flexor, scapular and lower abdominal muscles
- Function (ADL's, return to work, return to recreational activities)
- Patient perception of quality of life.

Secondary Outcomes: Cost Effectiveness

- Treatment time per session
- Number of physical therapy sessions
- Rate of recurrence or repeat need for physical therapy

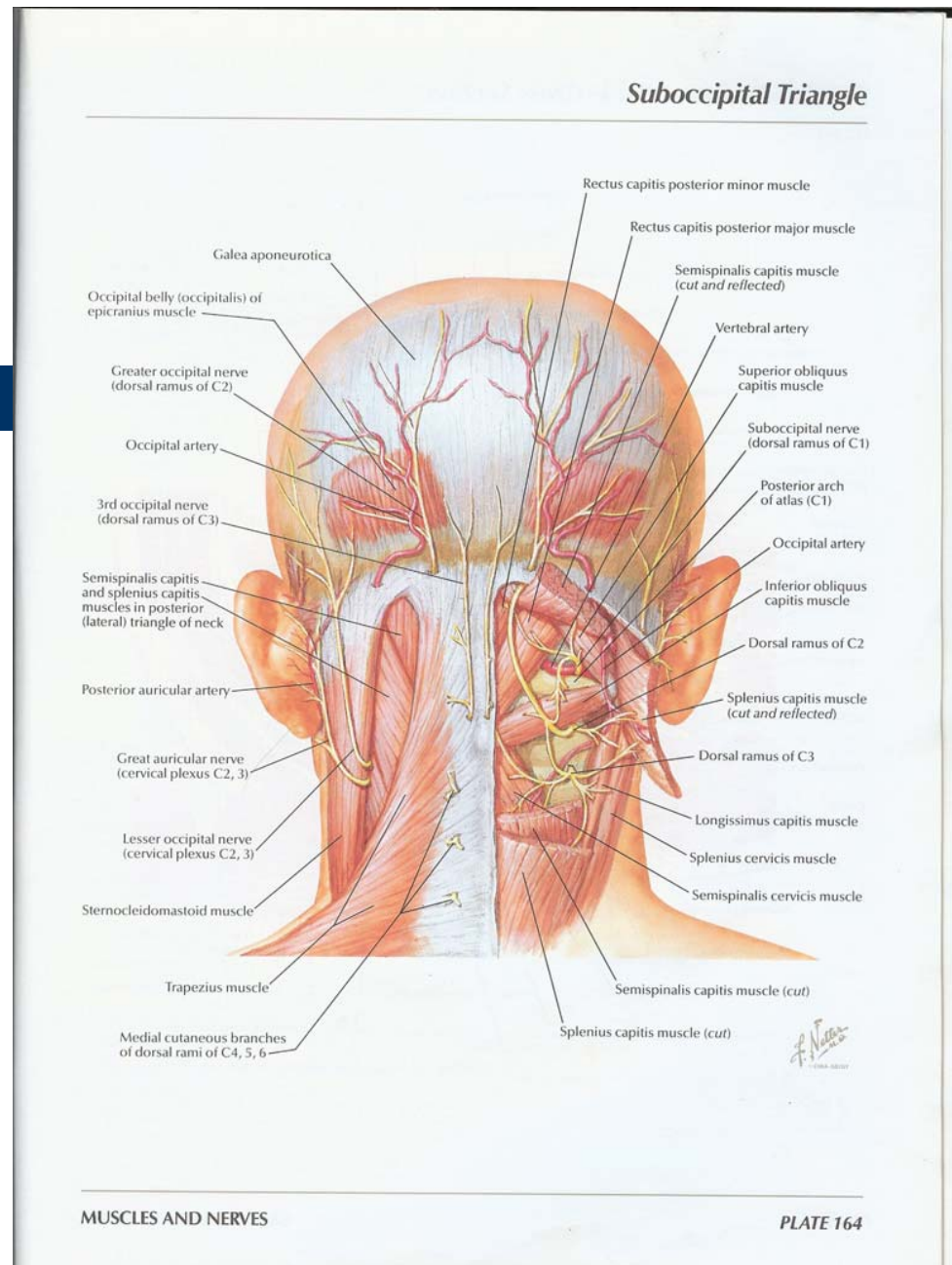
Background: Anatomy

Suboccipital Triangle

-Netter 7th Ed.

- Atlanto-axial joint
 - Atlanto-occipital joint
 - C2/3 and C3/4 facet joints
 - C2/3 intervertebral disc
 - Surrounding musculature
-
- Trigemino-cervical nucleus convergence

-Bogduk 2004



Differential Diagnosis

- Primary headaches:
 - Hemicrania continua
 - Migraine
 - Cluster Headache
 - Tension-Type Headache
- Secondary headaches
 - Chronic post-traumatic headache
 - **Cervicogenic headache (CH)**
 - Arteritis
 - Caffeine/drug withdrawal
- Occipital neuralgia

Diagnostic Criteria for CH (IHS)

- Pain localized to the neck and occipital region
- Pain associated with specific neck movements or sustained postures
- One or more of the following:
 - Resistance to or limitation of passive neck movements
 - Changes in neck muscle behavior
 - Abnormal tenderness neck muscles
- Radiological abnormalities
- Gold Standard: Decreased headache with controlled diagnostic local anesthetic blockade of cervical structures and nerve supply

Background

Secondary Problems associated with CH

- Myofascial trigger points
- Weakness of the deep cervical flexor muscles
- Poor postural alignment or control
- Anthropometrics

Predictors: Responsiveness to Physical Therapy

- Cervicogenic or combination headache?
 - CH and migraine
 - CH and Tension-Type
- Cervical AROM: flexion-rotation test
 - Sensitivity: 91%; Specificity: 90% (P<.001)
- Palpation: TTP upper cervical region
- EMG:
 - Decreased activity of the deep cervical flexor muscles
 - Increased activity of sternocleidomastoid muscles

-Ogince 2006

Methods for Search

- Sources

- Pub Med/Medline
- The Cochrane Library
- Ovid
- PEDro
- CINAHL
- TRIP
- Hooked on Evidence

- Keywords

- Cervicogenic headache
- Musculoskeletal headache
- Posture
- Therapeutic exercise

Studies Included in Search

- Primary Question
 - Systematic Reviews
 - Randomized Clinical Trials
- Secondary Questions
 - Systematic Reviews
 - Randomized Clinical Trials
 - Case Studies and Reports

Studies: Inclusion and Exclusion Criteria

- Inclusion
 - Level of Evidence: I-V
 - Diagnosis:
Cervicogenic headache (CH)
 - Population: Ages 12 to 85
 - Minimum of 20 subjects in RCT
 - Two groups (control and treatment group) in each RCT
- Exclusion
 - Patients with history of migraines
 - Bilateral symmetrical headaches
 - Conditions that contraindicate SM
 - Foreign studies without English translation

Data Analysis: Evidence Based Statistics

- EER: experimental event rate
- CER: control event rate
- RRR: relative risk reduction
- ARR: absolute risk reduction
- NNT: number needed to treat

Study Findings

- Total number of studies located: 41
- Number of studies appropriate to answer secondary (background) questions: 22
- Total studies to answer primary question: 8
 - 5 studies level II evidence
 - 3 studies level III evidence
- Agreement of second reviewer: studies selected met criteria

Results: Description of Studies

The Cochrane Collaboration (2004)

- Systematic review
 - Twenty-two studies (n=2628); Cervicogenic: 5
 - Ages: 12-78
 - IHS diagnostic criteria
- Objectives
 - compare the magnitude of short and long-term effects of specific non-invasive physical treatments for headache
- Author's conclusions
 - For CH, evidence that both neck exercise and SM are effective in the short and long term when compared to **no treatment**

Results: Description of Studies

Jull et al (2002)

- Prospective multicenter RCT
 - Unblinded treatment; blinded outcome assessment
 - Four groups (n=200; ages 18-60 years)
 - MT, Exercise (low load), Combined and Control
 - CHISG criteria; 8-12 treatments
 - 25 experienced PT's using Maitland technique
 - Treatment period: Six weeks; Follow-up: 3, 6, &12 months
- Author's conclusions
 - SM and exercise can reduce the symptoms of CH
 - Weak but clinically relevant benefit to combining the two
 - The effects were maintained at the 12 month follow-up

Results: Description of Studies

Whittingham and Nilsson (2001)

- Double-blinded RCT
 - Two groups (n=105; ages 29.4-54.4 years)
 - Group 1: n = 49; Group 2: n = 56
 - Four trial phases (3 weeks per phase):
 - One: 3 week baseline observation
 - Two: Grp 2: SM of upper C-spine 3x/week; Grp 1: sham treatment
 - Three: Grp 2: no treatment; Grp 1: SM
 - Four: Grp 2: sham treatment; Grp 1: no treatment
 - Measurements at week: 0, 3, 6, 9, & 12
 - IHS diagnostic criteria
- Author's conclusions
 - AROM of the C-spine increases with SM
 - AROM in Grp 1 and 2 ↑ after SM

Results: Description of Studies

Nilsson, N. (1995)

- Blinded RCT
 - Two groups (n=38, ages 20-60 years)
 - Spinal Manipulation (SM)
 - Low-level laser & deep friction massage
 - High-velocity, low-amplitude SM: 2x/wk for 3 wks
 - IHS diagnostic criteria
- Author's conclusions
 - Possible positive effect of SM on CH
 - Failure of methodology (no control group)

Results: Description of Studies

Nilsson et al (1997)

- Blinded prospective RCT
 - Two groups (n=38, ages 20-60 years)
 - High-velocity, low-amp SM: 2x/wk for 3 wks
 - IHS diagnostic criteria
- Results/Authors Conclusion:
 - Significant reduction in:
 - Analgesics use ↓'d by 36% (p=0.04)
 - # of HA hours ↓'d by 69% (p=0.03)

Results: Description of Studies

Howe et al (1983)

- Blinded RCT
 - Two groups (n=52)
 - SM (26)
 - Control (26)
 - High-velocity, low-amp SM: one, two or three visits
- Author's Conclusions
 - Decreased neck pain & stiffness, no change in HA
 - SM also produced a significant ↑ in rotn but not SB (wk 3)

Results: Description of Studies

Niere and Robinson (1997)

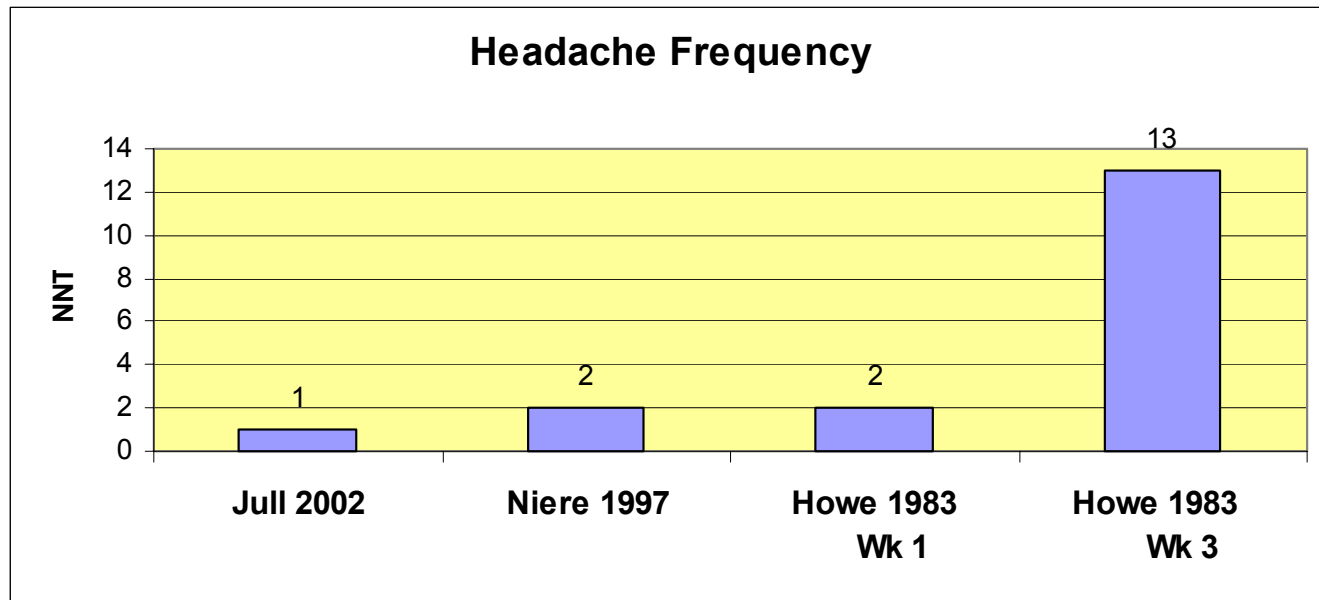
- Questionnaire (data from 26 manual PT clinics)
 - n=112
 - SM (no description of exact technique or number of treatments)
- Results
 - Two-way within subjects, repeated measure ANOVA
 - Post-hoc analyses ($p < .05$)
- Authors conclusions
 - 51 of 91 pts had positive response (HA intensity, frequency & duration)

Results: Description of Studies

Sjogren et al (2005)

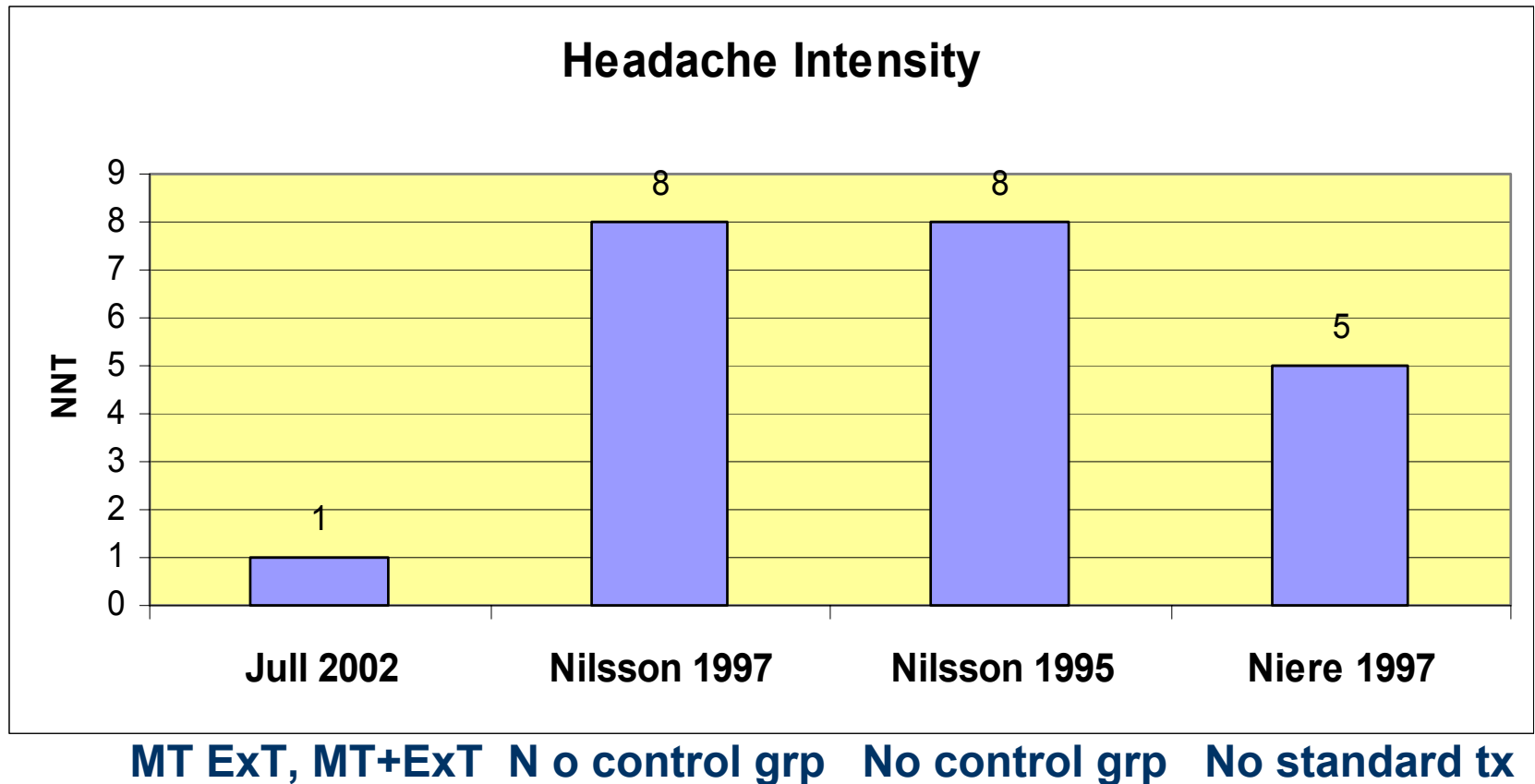
- Effects of a workplace physical exercise intervention on the intensity of headache and neck pain
- Cluster RCT with crossover design (n=90)
- Author's conclusions
 - specific exercise may be clinically important to alleviate general headache and neck symptoms

Results: Number Needed to Treat *Headache Frequency*

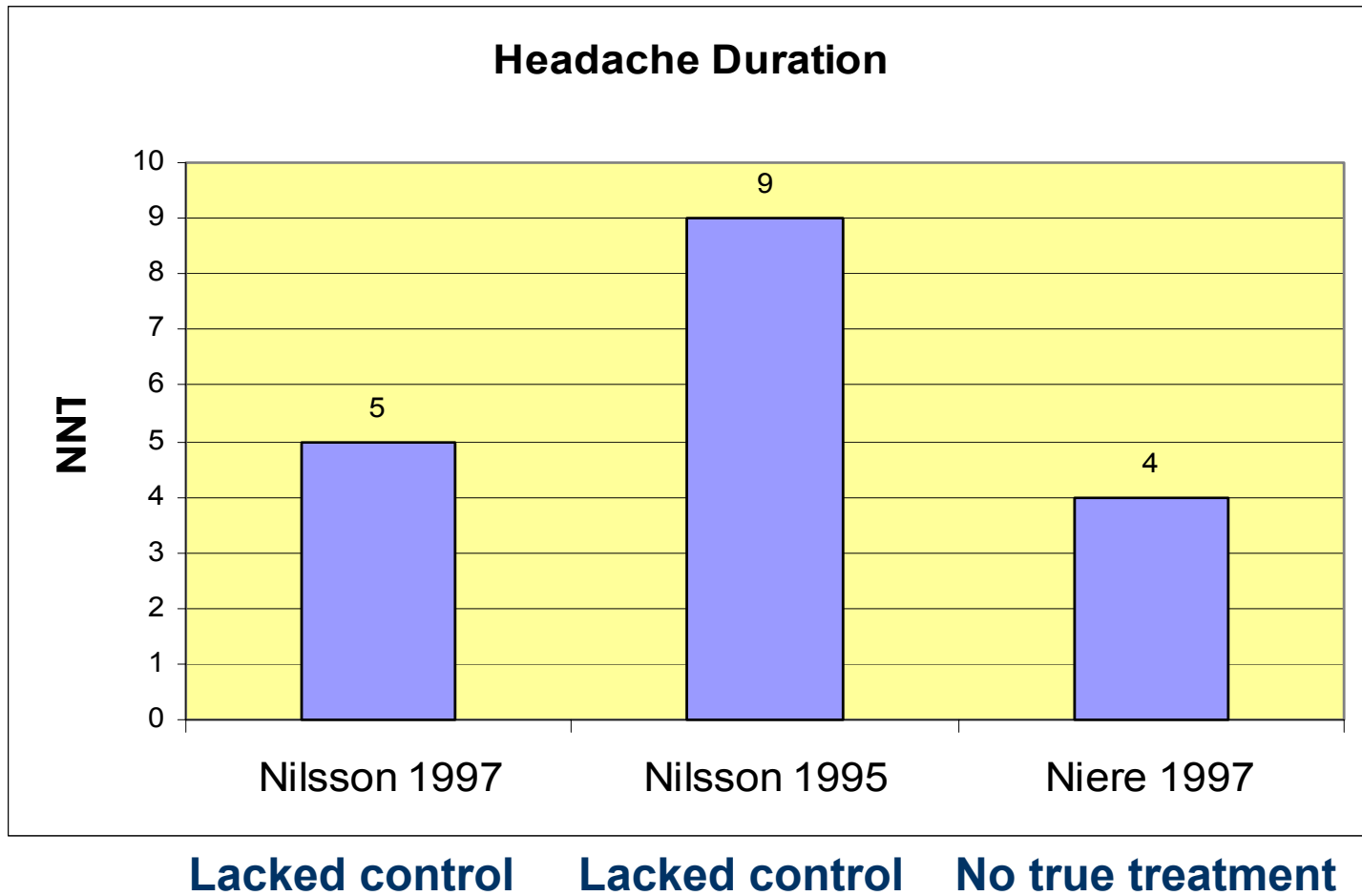


- Follow up:
 - Jull: 7 weeks and 12 months; MT, ExT and MT + ExT
 - Niere: 2 months: no organized treatment
 - Howe: weeks 1 and 3; SM and Control

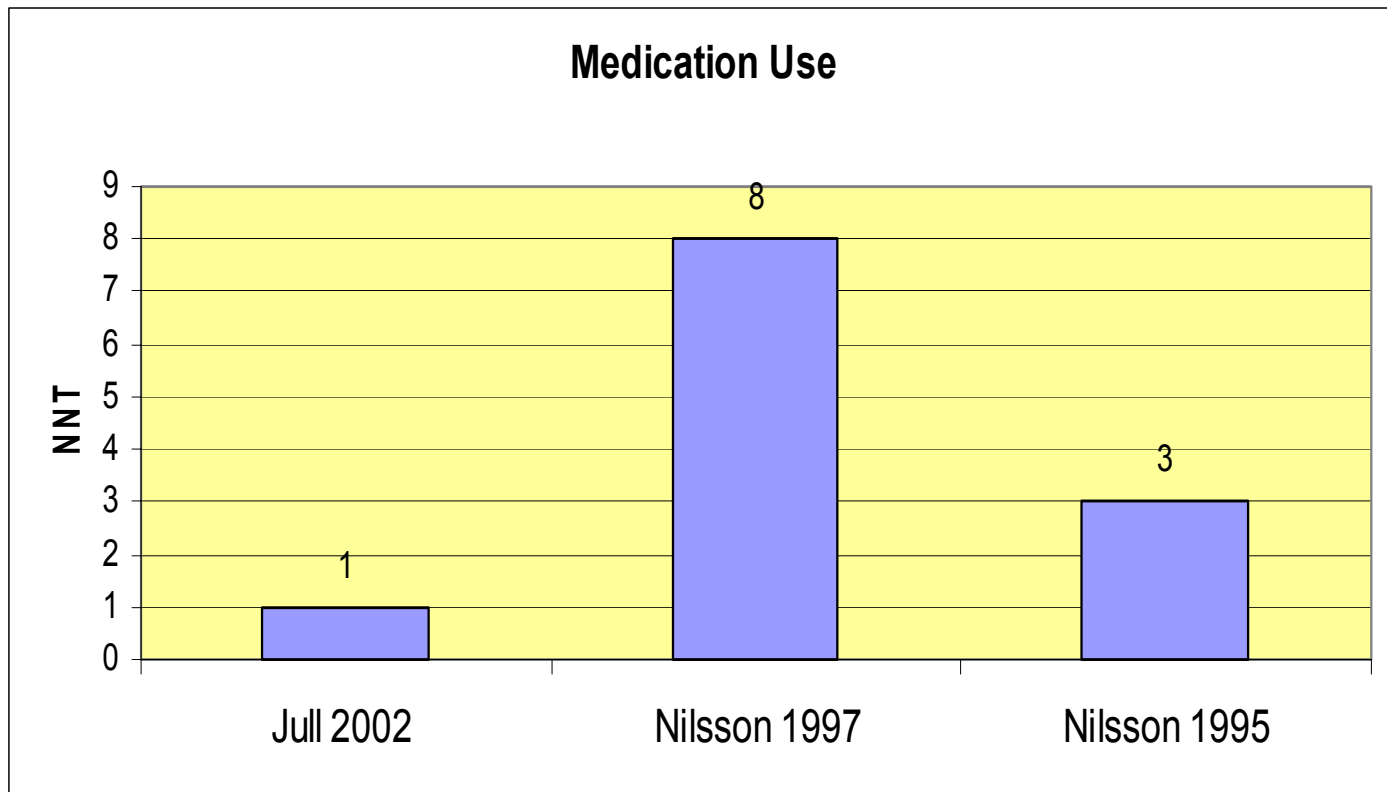
Results: Number Needed to Treat *Headache Intensity*



Results: Number Needed to Treat *Headache Duration*



Results: Number Needed to Treat Medication Use

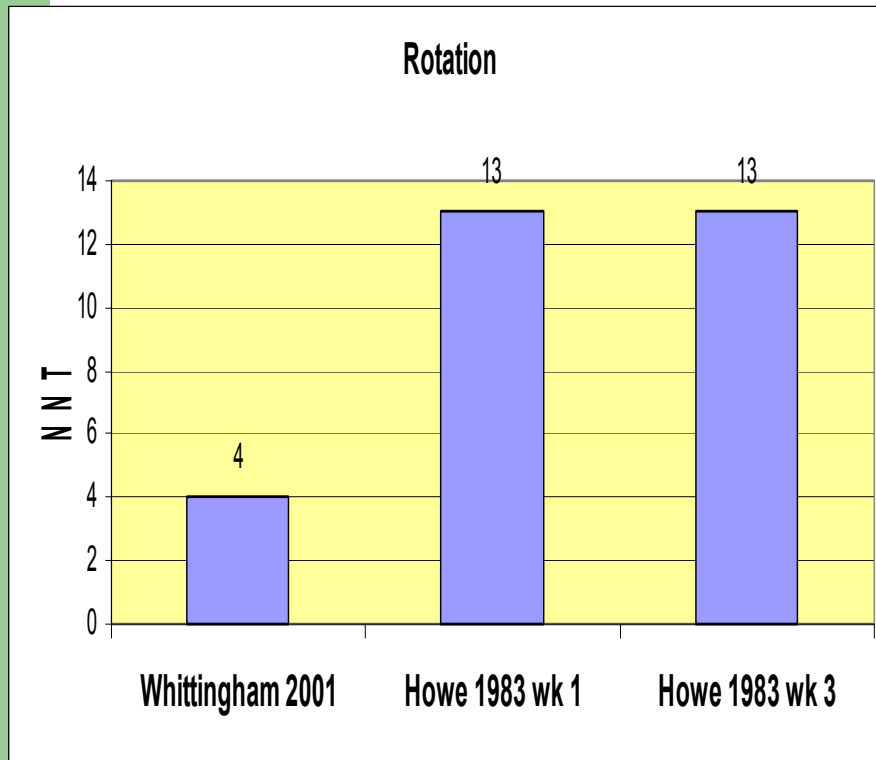


MT, ExT, MT +ExT

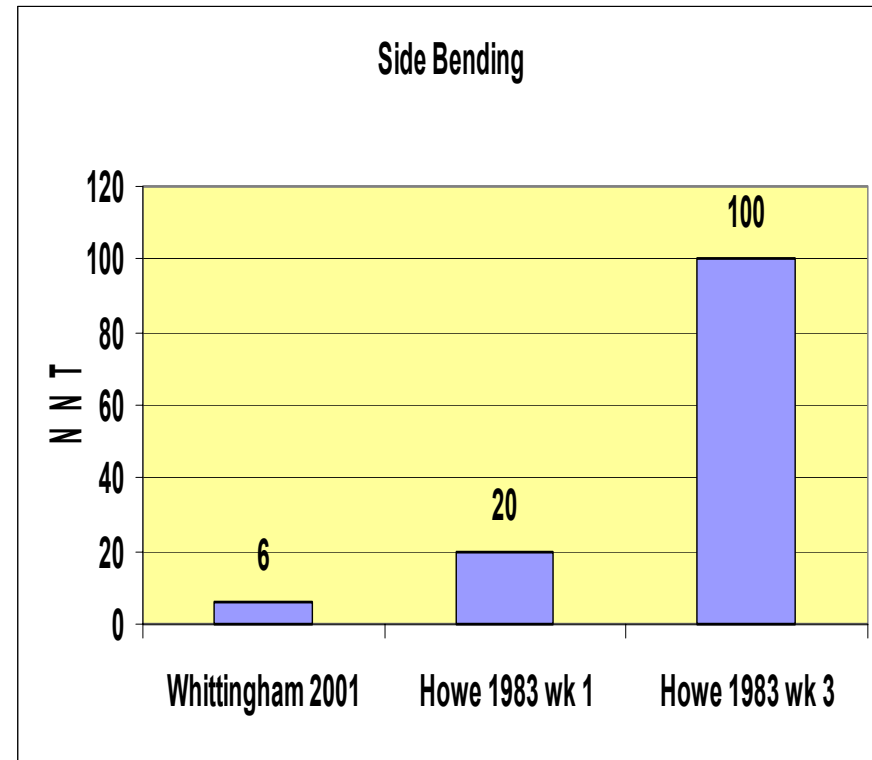
No true control

No true control

Results: Number Needed to Treat *C-spine AROM*



Crossover **1-3 sessions** **1-3 sessions**
No control



Crossover **1-3 sessions** **1-3 sessions**
No control

Potential Harms/Adverse Events

- Potential Harms associated with spinal manipulation include:
 - vertebrobasilar accident (VBA)
 - stroke
 - spinal disc herniation
 - vertebral and rib fracture
 - cauda equina syndrome *-Senstad 1997*
- None of the studies reported any harm or adverse events

Economic Cost of CH

- Lost time from work
- Frequent MD visits
- Unnecessary imaging/diagnostic tests
- Unnecessary/overuse of medications
- Excessive PT visits
 - \$100/visit x 12 visits annually=
\$1200/year x 10 years=\$12,000 total
 - \$100/visit x 12 visits in a lifetime=\$1,200 total

Integration of findings

- Lack of homogeneity of treatment and outcomes
- Jull 2002 most promising (systematic review)
 - Treatment group: all groups (MT, Ex, MT + EX)
 - NNT 1 for 22 of 24 studies reviewed
 - 12 month follow-up
- Other studies
 - Short follow-up
 - Larger NNT's (not impressive)

Accept/Reject Hypotheses

- Short term outcomes
 - Headache frequency
 - Headache intensity
 - Headache duration
 - C-spine AROM
 - Use of Medications
- Long term outcomes
 - Headache frequency
 - Headache intensity
 - Headache duration
 - C-spine AROM
 - Use of Medications
- Accept hypothesis
 - C-spine AROM (Whittingham '01)
- Accept hypothesis
 - Medication use
 - Headache duration (no exercise group)
- Reject hypothesis
 - Headache frequency
 - C-spine AROM (Howe '83)
- Reject hypothesis
 - Headache frequency (Jull '02)
 - Headache intensity (Jull '02)
 - C-spine AROM (Howe '83)

Discussion: Limitations

- Research Gaps
 - Discrepancies between IHS and CHISG criteria
 - Lack of homogeneous groups
 - Preponderance of research done by chiropractors
 - Statistical vs. clinical significance
 - Often multiple variables in treatment
 - Modalities, STM, patient education and exercise
 - Lack of evidence based research on exercise alone
 - Lack of long term follow-up

Discussion: Recommendations for Future Research/Optimal study design

- Large sample double-blinded RCT
- $n \geq 300$
- Six groups
 - Cervical manipulation
 - Cervical mobilization
 - Core stabilization exercise
 - Combo manip/ther ex
 - Combo mobs/ther ex
 - Control (no intervention)
- Treatment frequency and duration (9-12 visits)
 - 2-3x/week for 3 weeks
 - 1-2x/week for 3 weeks
- Follow-up at
 - Six weeks; 3, 6, 12 and 24 months
- Future studies
 - Thoracic manipulation
 - Thoracic mobilization
 - STM/trigger point release
 - Postural education/cues
 - Modalities

Recommendations for PT Practice (Grade B)

- Differential diagnosis
- Objective
 - deep cervical, scapular and lower abdominal muscle testing
 - upper C-spine AROM: flexion-rotation test and general AROM
 - palpation of C1-3 and it's correlation to reproducing the HA
 - muscle length testing
- Questions to ask to predict success
 - Postures and positions that provoke/exacerbate the HA
 - Decreased ROM and trigger points
 - Use/disuse of medications/caffeine
 - Patient's motivation to participate in PT and home program

Discussion:

Treatment Recommendations

- Joint mobilization/manipulation
 - Frequency: 2-3x/ week
 - Intensity: Grades III-V
 - Duration: 3 weeks
- Extensive posture, body mechanics and ergonomic education
- Daily strengthening program emphasizing core stabilization and neuromuscular re-ed
 - Deep c-spine flexor muscles
 - Scapular muscles
 - Abdominal and back extensor muscles

Summary

- The evidence suggests that any treatment is better than no treatment; Howe et al demonstrated positive short term gains with spinal manipulation but the gains were not maintained
- More evidence based research is needed to determine long term outcomes
- There is a trend suggesting
 - postural education and neuromuscular retraining may improve long term outcomes
 - Conservative treatment of CH is cost effective



Thank you

- Nancy Byl**
- Sarah Balys**
- DPT class of 2007**