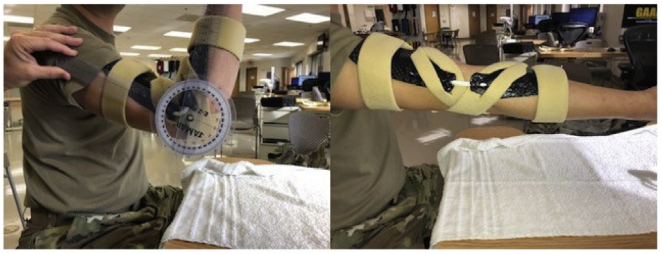

Figure 1. Active elbow flexion with passive elbow extension at rest while wearing the CTCO.

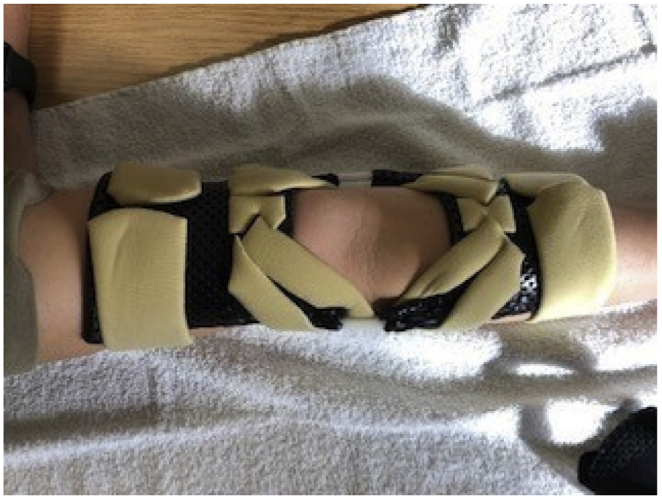

Figure 2. Use of thermoplastic dynamic bars and location of strapping prevents pressure over the cubital tunnel.

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Normative Data for the 5 Position Baseline Hydraulic Pinch Meter and the Relationship Between Lateral Pinch Strength And Pinch Span

N. HOCK, D. LINDSTROM
Occupational Therapy, Western Michigan University, Grand Rapids, MI, United States

Purpose: The primary aim of this study was to collect normative data for the Baseline® 5 Position Hydraulic Pinch Meter using health adult subjects. The secondary aims were to evaluate interrater reliability using the Baseline® 5 Position Hydraulic Pinch Meter as well as to identify at which pinch span the greatest force was produced.
Methods: Ten occupational therapy student raters were used to examine interrater reliability. An average intraclass correlation (ICC) was calculated. Subjects for normative data collection were recruited of various socioeconomic status levels across several locations in West Michigan. Testing procedures recommended by the American Society of Hand Therapists were followed and lateral pinch strength was assessed with three trials in each of the 5 positions measured at (2cm, 3cm, 4cm, 5cm, & 6cm) in pinch span bilaterally with rest (15 sec) between each trial. Data were analyzed by age categories and sex to develop normative standards. A one-way repeated measures ANOVA was used to determine if there was a significant difference between mean force produced at the 5 different pinch spans and a three-way mixed ANOVA was used to determine if there was an interaction between pinch span, age, and sex.
Results: The Baseline 5 Position Hydraulic Pinch meter showed excellent interrater reliability (ICC=.98). Normative data were calculated using descriptive statistics for a sample of 605 subjects (292 males and 313 females) with a minimum of 38 men and women per age category. The greatest pinch force was produced at the 3rd level (4cm span) with males using their left hand and females bilaterally, and at the 4th level (5cm span) with males using their right hand. One-way repeated measures ANOVA demonstrated significant differences between means between of the 5 different spans ($p<.001$), but a small effect size was noted. A non-significant three-way interaction between age category, pinch spans, and sex was noted ($p=.552$ right hand, $p=.551$ left hand). A significant two-way interaction was noted between pinch spans and sex ($p<.001$) bilaterally.
Conclusion: The pinch span that produced the greatest amount of force was not consistent with previous literature. However, previous literature examining pinch force and pinch span all created various pulleys attached to fabricated frames which may explain the mixed conclusions. Although there was a statistically significant difference in pinch force produced at the difference pinch spans using the Baseline 5 Position Hydraulic Pinch Meter, a small effect size was noted, and a mean difference in pinch strength of 1 to 2 pounds of force was noted between the different pinch spans. The clinical environment is becoming increasingly demanding for both assessments and interventions to be provided in a timely fashion to reduce cost. Assessing lateral pinch strength at 5 different pinch spans bilaterally is time consuming and not likely worth this increaesd time given the limited difference produced between the various pinch spans.

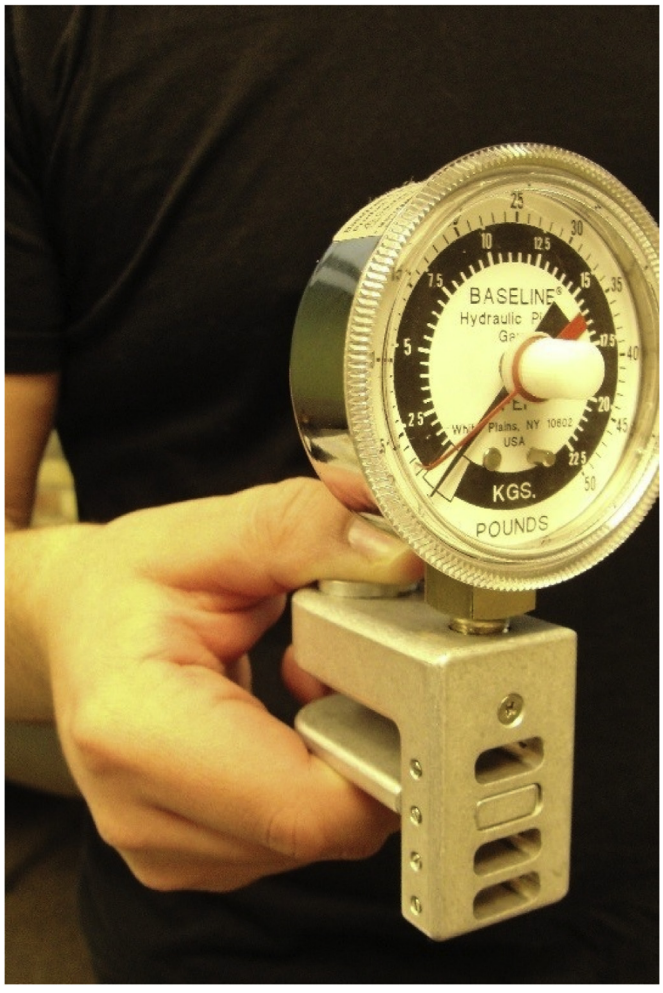

TABLE:
Results of One-Way Repeated Measures ANOVA

Population	df	F	Sig.	Partial Eta Squared
Males R Hand	2.49, 725.21	87.68	p<.001	.23
Females R Hand	2.15, 670.21	47.49	p<.001	.13
Males L Hand	2.38, 692.99	37.08	p<.001	.11
Females L Hand	2.04, 636.56	20.74	p<.001	.06

Three Way Interaction: Age, Pinch Span/Level, Sex

Hand	df	F	Sig.	Partial Eta Squared
R Hand	14.22, 1400.65	.91	p=.552	.009
L Hand	13.53, 1332.74	.55	p=.551	.002

A non-significant three way interaction was noted bilaterally.

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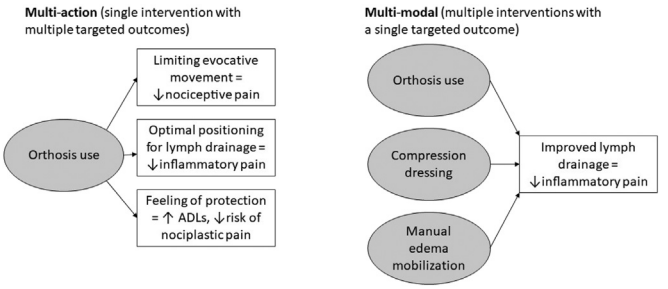
Rehabilitation Interventions for Acute Pain Management After Hand Injury or Surgery: An Evidence Synthesis Overview

R. SANGRAR [1], *T. PACKHAM* [1,2]
[1] *School of Rehabilitation Sciences, McMaster University, Hamilton, ON, Canada*
[2] *Michael G. DeGroote Institute for Pain Research and Care, McMaster University, Hamilton, ON, Canada*

Purpose: Management of acute pain is an early goal in hand rehabilitation, where conditions include fractures, soft tissue trauma, and post-operative treatment of emergent injuries and planned surgeries. Effective pain management promotes rehabilitation participation, and develops therapeutic alliance. Occupational therapists and physiotherapists develop treatment plans using evidence, client presentation, preferences, and available resources. To inform these decisions, we undertook evidence synthesis to provide an overview of research evaluating available interventions.
Methods: We conducted a systematic literature search, data screening and extraction, quality appraisal and narrative synthesis of systematic reviews and randomized controlled trials (RCTs) addressing acute pain after hand or wrist injury.
Results: Thirteen systematic reviews and 16 RCTs met our inclusion criteria, reporting pain reduction or self-reported composite measures including pain appraisal (e.g. pain subscale of Patient-Rated Wrist Evaluation). Interventions were categorized as a) mobilization/ immobilization interventions (splinting, casting, exercise), b) non-prescription medications (e.g. NSAIDs, arnica, vitamin C) or c) modalities and supervised therapy (for example, thermal modalities). Even high quality reviews (our mode AMSTAR rating was 100%) generally contained low quality trials (our Jadad RCT mean rating of 2.1/5 was representative of the overall literature) with modest effects reflecting heterogeneity in intervention frequency and duration, and pain representation.
Conclusion: Therapists often combine multi-action and multi-modal approaches: there is little evidence to recommend any single management strategy for acute pain after hand injury or surgery. Future research to advance patient care would benefit from explicit linkages between an intervention's anticipated mechanism of action, and pain outcomes.



Multi-action vs. multi-modal approaches to pain management interventions

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The Relationship Between Patient Reported Outcomes Measurement Information System (PROMIS) Measures With Therapy Referral And Utilization

S. COCHRANE [1], *A. DALE* [1,2]
[1] *Occupational Therapy, Washington University in St. Louis, Saint Louis, MO, United States*
[2] *Department of Medicine, Washington University in St. Louis, Saint Louis, MO, United States*

Purpose: Patients seeking treatment for an upper extremity condition are at risk for experiencing symptoms of depression, anxiety, and pain which limits functional abilities. These symptoms can negatively impact their treatment, and functional outcomes. A newly available series of measures, Patient Reported Outcomes Measurement Information System (PROMIS), have been previously validated to measures of depression, (Patient Health Questionnaire (PHQ-9)), anxiety (Generalized Anxiety Disorder (GAD-7)), and pain (Brief Pain Inventory). This study aims to examine the impact of patient reported symptoms of depression, anxiety, and pain interference at presentation to a hand surgeon on referral rates to hand therapy services and utilization of therapy services, using PROMIS measures.
Methods: This cross-sectional retrospective study analyzed electronic medical records of patients with at least one of seven common upper extremity diagnoses, treated at a tertiary orthopedic center. At each visit, patients were asked to complete PROMIS Depression, Anxiety, and Pain Interference measures preloaded on an IPad at each appointment with a hand surgeon. A data query and electronic medical record review provided data on demographics, ICD-10 diagnoses, PROMIS scores, and therapy referral for patient visits between April 2016 and November 2017. The number of therapy visits attended by a patient was obtained for a subsample of patients who attended therapy at the orthopedic center. All PROMIS scores were standardized to a general population distribution with a mean of 50 (SD: 10). Higher PROMIS scores indicate higher levels of the health domain (greater depression, anxiety, and pain). Descriptive statistics, Pearson chi-square and t-test analyses were performed to show differences in patient referral status to therapy.
Results: The sample of 351 patients is predominantly Caucasian (84.1%), female (59.5%), with an average age of 52.7 (±16.6) years. At baseline, 17.7% self-reported depression and 10.3% reported taking depression medications on intake questionnaires. Baseline PROMIS scores were close to the norm or lower for anxiety (51.7±11.0) and depression (46.4±10.3) but poorer for pain interference (60.5±7.4) modules. Forty-nine percent of patients were referred to hand therapy (n=172), though t-test analysis showed no difference in mean baseline PROMIS scores in all measures between patients referred and not referred. Overall, 11.0% of patients had PROMIS scores meeting or exceeding the clinically relevant threshold for depression (59.9) and 17.4% for