Evidence-Based Journal Club
MEETING MINUTES
March 31, 2009

Topic: Effects of stretching programs in children with Cerebral Palsy

Roles:
Facilitator: Pam Barnard
Keeper of the Rudder: Peggy Owen Sands
Recorder: Marie MacLeod
Processor: Deanna Wilcox
Timekeeper: Deb O’Rourke
Wellness Provider: Pam Barnard

Process:
I. Welcome and check-in, reminder to sign-in/out:
Sites included: Waterbury, Williston, St. Albans, White River Junction, Randolph, and Rutland (at least 2 participants per site).

Announcements: AMBUCS Bike fitting event Saturday May 16th in Winooski. See Marie MacLeod for information.

II. Introduction to topic-
Pam provided information on: her interest in the topic, some insights and new knowledge, her literature search, and a brief presentation on the topic. Please see the presentation handout for the literature search process.

PICO question: In children with spastic CP, what is the effect of stretching programs on range of motion?

Additional notes from the presentation:

Effects of stretching are not well known which is what drew Pam’s attention to this topic. Reviewed ICF components, noting that stretching addresses impairment level. Discussion on new research on structural mechanical alterations in spastic skeletal muscle. Structural changes cannot be explained by neural context only. Mechanical elements contribute to stiffness more than stretch reflex. Discussion on unintended consequences of stretching, such as pain and negative perception of PT/OT. Also, we may have fed a false belief to parents that if the child stretched, then they might avoid surgery. This perhaps caused therapists to have misplaced priorities, focusing on stretching when we should be focusing on participation and function. Goniometry has large variability and research suggests that the changes in the range of 15-20º do not represent meaningful change.
III. See handout for meeting for article review forms and summaries-

Article #1 reviewed:

Purpose: To study the changes in LE passive range of motion in children and youth with severe limitations in mobility during periods of direct PT intervention and naturally occurring periods of no intervention.

RESULTS: Overall, no consistent pattern of change across joints and across subjects with periods of naturally occurring intervention and non-intervention. The only statistically significant difference when data was pooled was for a decrease in ROM over summer vacation (A-1). For individual students, there was only weak support for stretching programs as defined in the study. Other health or growth factors may explain the decrease in ROM over the summer for 2 students. Positioning (both in the classroom and at home) may account for some changes.

*Notes from article review presentation:*
⇒ Inter-rater reliability was established.
⇒ Results- No significant pattern of change without much evidence for stretching for children at level V of the GMFCS.
⇒ Limitations- looking at PROM, but did not account for positioning or active work that was happening (functioning that may have affects if done, or in a particular way or not at all)
⇒ Take home message from this article: Not great evidence for stretching programs for children at level V on GMFCS (stretching 1-2 times a week) especially looking at functional movement. Since we don’t know what each child/family was doing at home, we need to consider each child. Is the amount of stretching at 1-2 times a week enough? Basically we need to look more broadly than looking at one classification on the GMFM. Does this mean that this would not be effective for a child at level II or III? We need to continue to look at the broader population. Also, we could easily do a trial of non-intervention and keep data to see what the results are.

Article #2 Reviewed:

*Summary:*
This single-subject design study incorporated 2 multiple baseline designs. The subjects were older, 20-44 years, all with spastic quadriplegic CP and LE contractures. During Phase A, one group continued with PROM 3x/week and the other group had no PROM. They groups switched for Phase B. The authors determined reliability with goniometric measurements very thoroughly before the study. Multiple joints were measured and the data were analyzed using visual analysis and C statistic. No consistent differences were observed in the phasing protocol and as a result of this study, PROM exercises were
discontinued for all participants. The authors “suggest that therapists reconsider programs that focus only on PROM because of both clinical usefulness and social validity”. This study was well designed and reflects the situations and tools we have in clinical practice.

**Conclusions and clinical implications:** No consistent changes w/PROM program. PROM exercises discontinued for all participants in the study. The authors “suggest that therapists reconsider programs that focus only on PROM because of both clinical usefulness and social validity”.

**Notes from article review presentation and discussion:**
- This study was on adults with CP, but it is really well done, looking at results for each subject and could be done on children. This is a really strong design and should be used as a reference for us if we choose to do our own study.
- This study was done initially to help decide if folks should continue PROM stretching or to add stretching back into the schedule for those who were not receiving PROM exercises.
- Significant difference in ages of subjects.
- Results- No data change- ROM decreased in some joints. For these participants, there was not a significant change, so all ROM exercises were discontinued for all participants. Therapists should reconsider programs that focus on PROM for clinical usefulness and social validity.
- Question raised as to: if the subjects’ results were pooled? The data was grouped for groups and then done individually. Group data showed no significance.

**Article #3 Reviewed:**

**Summary:**
This is a review article designed to address the clinical question, “Does passive stretching improve passive ROM effectively in children with CP?” The literature search was thorough and to be included, studies needed to have children less than 18 years old, use quantitative measurements and be published in peer reviewed journals. The review included 7 studies, though 2 addressed spasticity levels only. We are discussing the 5 studies that examined PROM. The quality of these studies was assessed for levels of evidence (AACPDM evidence levels for single case designs) and quality (using the PEDro scales). Two of these studies ranked at a Level 1 (with randomized groups), though there were some methodological weaknesses. One study was a Level II, another a Level III and the last a level V.

Are the results important and relevant? Yes, the studies included a heterogeneous population typical of the range of children with CP.

“There appears to be no conclusive evidence to definitely state that passive stretching can increase the range of movement in a joint, although there is some
evidence favoring passive stretching in an increasing range of movements in children with CP.” Page 860

This review looked at ROM only, the impairment level of disability. Many therapists assume improved ROM will result in improved function, but this relationship was not examined. We don’t have data from children and families about their perceptions regarding limited ROM and interventions and their impact on activities and participation.

**Conclusions:** The authors state that the “evidence supporting the effectiveness of passive stretching in children with CP is weak”.

**Notes from article review presentation and discussion:**

⇒ The studies included different stretching protocols and a couple included positioning for more sustained stretching. The results showed only small changes in PROM (<12 degrees), close to the measurement error. The authors state “there is no conclusive evidence to definitely state that passive stretching can increase PROM” and they suggest we “rethink the use of passive stretching in clinical settings”. There is some evidence to suggest that sustained stretching may be more effective than manual/passive stretching. We do not have enough information to make policy changes, since they were not all using the same stretching protocol. Also, most of the studies were underpowered. This study did a great job of looking at the effect size in the articles they reviewed. The age range between subjects and the stretching protocols varied between all the studies so it is hard to pool the results (hence no significance found).

⇒ Take-home message from this article: Consider the adverse effects. There is some evidence in favor of passive stretching for children with CP, but it is weak and the effect size is small so we should consider this in our recommendations in the future. These studies did not have enough power to come to the conclusion that passive stretching does not work.

**IV. Further discussion following presentation of all 3 reviews:**

⇒ There weren’t any studies that looked at casting as a method of stretching.
⇒ No information in the studies that showed whether the ROM stayed the same. Many of us are not looking for improvement; we are looking to maintain ROM. “Fixing” or making ROM better is not often one of our goals with persons who exhibit spasticity. Also, one of the issues we are dealing with for kids is preventing loss of ROM during bone growth.
⇒ Participants discussed that the period of no treatment was not long enough.
⇒ Stretching and its results are different within populations such as adults, and with kids that are moving easily for recreation, and those who do not have much independent movement and are more dependent on others for positioning and movement changes.
⇒ We wondered how much of the loss of ROM noted during summer was from normal growth and then it takes a bit of time for the child’s movement within that new ROM and stretching to make up for this. Does this loss of ROM follow within a typical child’s growth patterns? Did they gather anthropometric data? Weight and leg length
measurements were taken in the Fragala et al. article, but not discussed within the study.
⇒ Also, there was no discussion of the children’s daily activities that may have given insight to if this was an active or sedentary family or child, therefore do not assume that the loss of ROM is totally due to lack of stretching. Another weakness discussed of this study was that it did not account for any of the other functional activities or positional stretching that may be occurring over summer.
⇒ One reviewer brought up discussion on the ROM measurements for the Fragala et al. study. The ROM measurements taken at each joint they were looking at often have strong tonal patterns. They will have large, perhaps nonfunctional windows, of ROM, and due to these abnormal muscle pull/forces the individual children’s joints will have preferred directions that the joints want to go if left alone. Does stretching change this window towards one that is more functional?
⇒ There is no conclusive evidence to definitely state that passive stretching can increase PROM but we do not know if it helps to maintain functional ROM over time. There is some evidence to suggest that sustained stretching may be more effective than manual/passive stretching.

V. Guided Clinical Implications Discussion

Evidence-based Journal Club
Questions to Guide Clinical Implications Discussion

Previously we have used the EBM Efficacy Criteria (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000) to rate the level of evidence of studies reviewed. This time we used a new scale developed specifically for single subject research design: The AACPDM Methodology to Develop Systematic Reviews for Single Subject Design (Revision 1.2, 2008), available from: http://www.aacpdm.org/membership/members/committees/treatment_outcomes_methodology.pdf
1. Are the results of the studies reliable and valid (quality of studies)? Explain?
The quality of the studies presented had some weaknesses, but the authors recognized the weaknesses of the studies and so they appear to be reliable and valid.

2. Using the efficacy criteria above, what is the level of evidence of the studies reviewed today as a group? Are there additional studies in the literature (not reviewed today) that may enhance the level of evidence?
2 level 1 articles in the systematic review
2 level 2 articles- Fragala et al. and Cadenhead et al.
1 level 3 article in the systematic review
1 level 5 article in the systematic review

3. Considering the quality of the studies and the level of evidence, what do the studies’ results mean for your clinical practice?
⇒ There is only weak evidence in favor of passive stretching for children with CP. The effect size was small and may not represent a clinically meaningful change given that the error of measurement is quite high with ROM in children with CP. We don’t know if changes in ROM will have an impact on functional changes. These studies did not have enough power to come to the conclusion that passive stretching does not work. They did raise some good questions and things to consider such as the unintentional adverse effects on children and their families.

⇒ Clinically, consider changing our practice so that stretching is directly connected with a functional activity. Consider stretching in preparation for functional activities that are meaningful and connected to the child’s life and daily activities. Prolonged stretching seems to be more effective than quick stretching, so we may try incorporating prolonged stretching into functional activities. Also, we should think carefully about prescribed exercises and the burden on families. Recommendations for functional activities within typical routines will be more meaningful and valuable. We now need to provide proof/documentation that there is compliance in home programs for Medicaid to continue coverage. So we need to think about how this information impacts what we give parents for following a home program. How do we document compliance with home exercise programs?

4. What additional information do you need about this topic to enhance clinical practice/decision making?
- Longer term follow up studies with anthropometric measurements
- Documentation of progression of contracture leading to deformity
- Feedback from families and kids on what their priorities are and what is most important to them.
- Have more homogeneous studies- including more groups other than a level 5 on the GMFCS. For example, is stretching more beneficial for more active kids at levels 1 & 2?
- Studies that look at ROM, but also chart functional activities and look at lack of intervention.
• More single case studies that look at different types of stretching (casting, splinting, night splinting for example)
• Look at PROM in relation to post-surgical outcomes.
• Look at the role of positioning throughout the day on ROM.
• Functional activities that help with UE stretching.
• Strengthening does enhance function with children with CP. We haven’t yet examined the relationship between strengthening and range of motion. Do strengthening programs increase range of motion?
• Qualitative studies on the perceptions of children and caregivers.

5. Combining the evidence of these studies and the discussion about clinical practice implications, what is the take home message? There is weak evidence for the effectiveness of stretching for children with CP who are level 5 GMFCS. Think about incorporating prolonged stretching within functional activities as there is some evidence that longer positional passive stretching may be effective. We really need to pay attention to the negative effects of stretching such as loss of sleep, pain, and lost opportunities for participation due to time and family stress. Recommend using pain scales to assess and document.

In our own practice we can use the methodology of single subject research design to evaluate the effects of stretching programs for individual children by taking careful measurements and asking the question, “is this effective?”

VI. Wrap up
1. Pam cited studies done on adults with neurological conditions assessing the same PICO question. These were high quality, randomized clinical trials (13) and all demonstrated no significant increase in range of motion with a 30 minute controlled passive stretch.

2. The ICF is a helpful framework to guide our practice. For example, at the impairment level, there is evidence that strengthening and improving balance increase function. A comprehensive program should combine these elements with activities (e.g. mobility, communication, activities of daily living) and meaningful participation across environments.

3. Best practices suggest we emphasize physical activities for children with CP to prevent secondary impairments, promote growth in all developmental areas and to “develop, maintain and perhaps restore neural structures and pathways.” (Damian, D. (2006). Activity, activity, activity: rethinking our PT approach to CP, Physical Therapy, 86(11), 1534-1540.)