Evidence-based Journal Club
November 27, 2007 (3-5 pm)

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<tr>
<th>Locations</th>
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<tr>
<td>Waterbury</td>
<td>Pam Barnard, PT</td>
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<td>Marcella Pelkey, OT</td>
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<td>Mary Ellen Seaver-Reid</td>
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<td>Lauren Briere, OT</td>
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<td>Williston</td>
<td>Abigail Dewolfe, OT</td>
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<td>Ruth Dennis, OT</td>
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<td>Peggy Owen, PT</td>
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<td>Karen Downey, OT</td>
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<td>Marie-Christine Potvin, OT</td>
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<td>Michelle Villeneuve, PT</td>
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<td>Linda Kogut, OT</td>
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<td>Deanna Wilcox, OT</td>
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<td>Michelle Barnier, PT</td>
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<td>Johnson</td>
<td>Sarah Stutz, OT</td>
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<td>Carol Lehmann, OT</td>
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<td>Rutland</td>
<td>Patty Thomas, OT</td>
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<td>Susan Boles, OT</td>
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<td>White River Junction</td>
<td>AJ Zwikelmaier</td>
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<td>Denise Mitchell, SLP</td>
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<td>Alisa</td>
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<td>Marie-Christine Potvin, OT</td>
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**Instructions to Participants:**
1) Please sign-in AND sign-out on the TRIPSCY sign-in sheet. This is critical for OTs who want to report this activity for continuing education credits.
2) Handouts were sent to you by email.
3) Please assign one person at each site who will collect all the material at the end (i.e., sign-in sheets, completed surveys, etc.) and mail it back to me. We will reimburse you for postage.

Thank you and see you all on the air,

[Signature]

Marie-Christine Potvin
Center of Disability and Community Inclusion/UVM
Mann Hall – 3rd floor
208 Colchester Ave.
Burlington VT 05405-1757

**TRIPSCY Journal Club Goals**

1. The TRIPSCY Journal Club will be an opportunity for physical and occupational therapists working with children and youth to enhance their critical appraisal skills and to stay abreast of the literature.
2. The TRIPSCY Journal Club will serve as a medium for physical and occupational therapists to gain knowledge to answer clinical/practice questions.
3. From these discussions, the TRIPSCY Journal Club will develop mini-reviews of the topics and make them available to other physical and occupational therapists on the TRIPSCY website.
**TRIPSCY Journal Club Norms**
1. We will prepare for each meeting we attend, and follow through on assignments.
2. We will share responsibilities for the success of meetings. We will make an agenda for each meeting and keep minutes.
3. We will celebrate our successes and accomplishments, being aware of the positive results of our efforts.
4. We will listen with open, nonjudgmental minds to the words and ideas of others, seeking first to understand others and their point of view.
5. We will discuss, debate, and disagree openly in meetings, expressing ourselves as clearly and honestly as possible, so all understand our point of view.
6. We will strive to balance participation and “talking” of all. We will speak one person at a time, without interrupting.
7. We will bring discussions/dialogues to closure, re-stating actions agreed upon.

**Agenda**
3:00 Welcome, Check in with all sites, reminder to sign-in, microphone instructions for those who are new to VIT, overview of the agenda and general orientation to the handout (Marie-Christine)
3:05 Today’s topic and how the articles were selected (Deanna)
3:10 What are good single case studies (Ruth)
3:45 Article reviews summary (10 min. each with questions)
4:05 Discussion (Deanna)
4:30 Next meeting (Marie-Christine)
   Topic: Motor Learning
   Date: January 22, 2008
   3 Volunteers needed:
4:45 End --- Remember to sign-out

**Literature Search**

**Topic**
Single Case Design: Functional Research

**Search Strategies**
This month’s journal club topic required a very different type of literature search. We used a selected review approach to identify articles that would allow us to learn about the application of single case study design to rehabilitation.
1. Contacted colleagues who suggested:

2. Reviewed the reference list from the above article and chose the following article since picky eating was an interest identified by this group last year.


3. Colleague also recommended following article as good single-case study in pediatrics when topic of meeting was described. Felt it was a good match to the meeting topic as well as interest expressed by group last year.


Abstract
The objective of the study was to evaluate the effectiveness of modified constraint-induced movement therapy in young children with hemiplegia. It was a single-case experimental design using children as their own controls. Assessment was at entry to the study and subsequently at 4-weekly intervals. A 4-week baseline period with no hand treatment, controlling for maturation, was followed by a 4-week treatment period and a second 4-week period with no hand treatment to measure carry-over. Treatment consisted of twice-weekly 1-hour sessions of structured activities with a therapist and a home programme for non-treatment days. Only verbal instruction and gentle restraint of the unaffected arm were used to encourage use of the affected arm. Nine children (six males, three females; median age 31 mo, age range 21 to 61mo) presenting with congenital spastic hemiplegia (five right side, four left side) were involved in the study. Changes in hand function were evaluated with the Quality of Upper Extremity Skills Test. Improvement was seen throughout the study with statistical significance, using the Wilcoxon signed rank test, of 0.01 immediately after treatment. Results of this pilot study suggest that this modification of constraint-induced movement therapy may be an effective way of treating young children with hemiplegia. Future work is planned to consolidate and develop these results.

4. Used OvidMEDLINE and CINAHL (1996-present) with the following search terms: Single-case Study, English Language Journal and Humans. Some hand searching was done through the results from this search for relevant articles, the article below was selected as likely being of most interest to the group.

Reviews

**Article 1:** Luiselli, James K. Cueing, Demand Fading and Positive Reinforcement to Establish Self-Feeding and Oral Consumption in a Child with Chronic Food Refusal. *Behav Modif*, (2000).

**Reviewer:** Lauren Briere

**Critical Appraisal Summary**

This study explores antecedent control procedures combined with positive reinforcement to treat feeding aversion. The study uses a single case design (N=1) with one period of observation pre-intervention and a 60-days period of intervention. The subject was 3 years 9 month old boy who was born 3 months prematurely and for 6 months after birth. He had broncopulmonary dysplasia resulting in respiratory illness and lung infections, severe esophageal reflux requiring a g-tube to overcome vomiting. He had age appropriate cognitive, language, and social skills. At the time the study was initiated, he took several sips of water a day by mouth and sampled small spoons of applesauce presented by his speech therapist. He rejected all other food and resisted self-feeding. Antecedent controls (visual cueing and demand fading) combined with positive reinforcement was developed through a behavioral consultative model. The parents implemented the intervention strategies in their home at lunch and dinner time.

Intervention: At lunch and diner, the child sat at the table with his family and a bowl of food was given to him. The child earned a "reward time" of 30-minutes (i.e., play with favored activity/toy right after the meal) when he self-feed. The number of bites necessary for obtaining a reward was placed on the card next to his bowl (visual support). As the child ate a bite, the number was crossed off on the card place beside his bowl. The demand for number of bites per meal increased over time. Once the number of bites required was eaten, the “reward time” was offered. If 25 minutes elapsed before number of bites eaten was achieved, the child earned no reward time for this meal. If the child chose not to eat, the parents would ignore the behavior.

Using a demand-fading approach, the child progressed from a requirement of 1 bite per meal to 2, 3, 4, 8 and 10 self-feeding responses. On many occasions, the child consumed more bites than the response criterion indicated. Food consumption became rewarding as well as the social praise from his parents. The child was able to overcome his oral feeding disorder (i.e., eating an age-appropriate diet) characterized by escape-avoidance motivated behavior when manipulating the antecedent variables.

**Critical Appraisal Form:**

<table>
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<tr>
<th>STUDY PURPOSE:</th>
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<tr>
<td>Outline the purpose of the study (i.e., study objective or aim):</td>
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<td>Children with congenital and chronic medical problems may develop <em>conditioned food aversion</em>. When presented with feeding demands, active resistance and avoidance occurs due to the associated physical distress (gagging, aspiration or emesis) experienced during early feeding. This study explores antecedent control procedures combined with positive reinforcement.</td>
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____ X Yes

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November 27, 2007
### LITERATURE:
Was relevant background literature reviewed?  
**X** Yes  
___ No

Describe the justification of the need for this study (3-4 key points)  
1. 1996 article explored behavior-contingent physical prompting to treat escape-avoidance. Utilized physical guidance and utensil to mouth.  
2. 1993 article used non-contingent pleasure sensory stim (rocking) for stimulus control during feeding. Increased rates of oral consumption occurred.

### DESIGN:

Describe the study design:  
AB design with pre-set criterion for progress of phase.

Can the author answer the study question with the study design?  
Yes

Were the design and/or method used introducing biases. If so describe:  
No.

Sample Description (e.g., age, gender, diagnosis, other characteristics)

3.9 year old boy, 3 months premature, hospitalized birth to 6 months of age. Bronco-pulmonary dysplasia (BPD) resulting in respiratory illness and lung infections. Severe esophageal reflux requiring gastric feeding to overcome emesis > gastrostomy tube. Age appropriate cognitive, language, social skills. 17 feedings a day via tube. Several sips of water a day, sampled small spoons of applesauce presented by speech therapist. Rejected all other food and resisted self-feeding. Diagnosed by OT with severe oral-motor dysfunction and candidate for systematic feeding intervention.

### SAMPLE SIZE:

N = 1  
Was sample size justified?  
**X** N/A

How was sample identified? Was it a representative sample?  
No but appropriate for the study design.

If there were more than one group, was there similarity and differences between the groups? Describe:  
Not Applicable

Was informed consent and assent obtained?  
Not mentioned in the article

### OUTCOMES:

Specify the frequency of outcome measurement (i.e., pre, post, follow-up):

Outcome areas  
⇒ Self-feeding  
⇒ Operationalized:
  1. grasp spoon,  
  2. scooping food,  
  3. spoon to mouth,  
  4. spoon in mouth,  
  
List measures used  
⇒ Direct observation of self-feeding by parents. Response criterion of achieving success of all six steps for one self-feeding response. Meal concluded when child achieved predetermined criterion or when 25 min.

Reliable and Valid?  
⇒ Interobserver reliability  
⇒ Preset criterion for progress per week
5. food from spoon, elapsed. Data was collected during lunch and dinner each weekday.
6. swallow food.

| INTERVENTION: | Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting. Pre-testing revealed two influences on child's food refusal: the demands of self-feeding appeared aversive and the attention from his parents to encourage bites inadvertently provided positive reinforcement. Antecedent controls (visual cueing and demand fading) combined with positive reinforcement was developed via a behavioral consultative model. The strategies were implemented by the parents in the home setting. Treatment: Earned "reward time" when self-feeding responses occurred. 30 minutes of play with special toys immediately after success with lunch or dinner. Number of bites necessary for reward was placed on card next to bowl. As child ate the indicated bite (s), the number was crossed off. He moved from 1-bite criterion to 1, 2, 3 bites. Once number achieved, reward time offered. If 25 minutes elapsed before number achieved, no reward time but could earn it next meal. Study lasted 60 days. |
| INTERVENTION was described in detail? | Yes | No | Not addressed |
| Contamination was avoided? | Yes | No | Not addressed |

| RESULTS: | What were the results? At baseline, child never fed self. With intervention, progressive increase in self-feeding corresponds with gradual advancement of response criterion (expected number of self-feeding bites). By changing the avoidance provoking stimuli and providing positive reinforcement, child was eating independently for the first time. |
| RESULTS were reported in terms of statistical significance? | Yes | No | NA |
| Was the analysis, that is the type of statistically tests used, appropriate for the type of outcome measures and the methodology? | Yes | No | NA |
| Clinical importance was reported? | Yes |

| EXPLAIN: | No statistical test done as this was a study with only 1 subject. If not statistically significant (i.e., p < 0.05 or 0.01), was study big enough to show an important difference if it should occur (power and sample size)? NA |
| What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful?) |
The fact that the child was able to accept to eat solid food and self-feed independently to a level of normalcy is clinically significant.

If yes, why did they drop out? How were drop-out participants included in the statistical analysis?

What did the author concluded?
Able to overcome oral feeding disorder related to escape-avoidance motivated behavior when manipulating the antecedent variables.

What were the main limitations of the study as stated by the author(s) and from your point of view?
⇒ Very small study: 1 single-case study with 1 subject
⇒ The evaluation to identify the cause of the feeding problem was incomplete.

What are the implications of these results for your practice?
Very applicable since currently treating a child with chronic food refusal. Increased success with use of behavioral model.

**CONCLUSIONS AND CLINICAL IMPLICATIONS:**
The conclusions made by the authors were appropriate given study methods and results.

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**Article 2 - Lewis & Fragala-Pinkham (2005). Effects of aerobic conditioning and strength training on a child with Down syndrome: a case study**

**Article Reviewer:** Paul Woodruff

**Critical Appraisal Summary:**
This is a single case study looking at the effects of a 6 week home exercise program for a 10 year old girl with Down Syndrome. The program consisted of aerobic conditioning and strength training on alternate days. The program was increased from 4 days initially to 6 days per week for 30 to 60 minutes daily. The authors theorized that strength training and aerobic conditioning may be more effective for improving cardiovascular function in kids with DS than the aerobic training alone. This is because muscle weakness and muscle fatigue may be a limiting factor in a child with DS ever stressing the cardiovascular system to affect change.

This was a simple AB design. The authors took measurements of the parameters they chose before the exercise program and then after the 6 week program. The parameters they chose included cardiovascular testing, body dimensions, flexibility, gross motor assessment, anaerobic power and muscle strength.

The aerobic program consisted of ribbon wand exercises, walking through an obstacle course and stair climbing. It was started 2 times a week for 10 to 15 minutes and worked up to 3 times for 45 to 60 minutes. The maximal heart rate for a child with DS was found to be 170 to 180 beats per minute by other investigators. These authors started the initial aerobic training at 60% of 180 and progress up to 80% of this.
The strength training also started out at 2 times a week and progressed to 3 times for up to 45 minutes. It included traditional strength training exercises, sit ups, trunk extension, squats, toe raises, heel raises, some cuff weights for UE strengthening etc. The program was individualized for the child and her abilities. For example she could not do a regular sit up so they were modified to eccentric lowering of trunk and upper body with assist.

Results. There were positive changes noted in the subject’s heart rate and respiratory rate following the program, but there were not changes in VO2 or oxygen consumption. Body mass index did not change, nor did flexibility. There were significant gains in gross motor skill as seen in BOTMP scores. There were strength gains in all measurements for trunk and upper limbs. And she demonstrated about a 60% increase in anaerobic power.

This study shows that strength training combined with aerobic conditioning did have some benefits in cardiovascular fitness. The program needs to be at moderate to high intensity (30 minutes 5-6 days week). This program worked because it was individualized for the subject and her parents were very involved. It was interesting to note though that the intensity was too high and following the study a less intensive program was implemented. It seems that the parents were motivated to continue based on the results they saw. One of their goals was weight reduction but this was not seen, it stayed the same. However, there were not changes in the subject’s diet which would be necessary for weight reduction.

**Critical Appraisal Form:**

- **Purpose clearly stated:** yes
- **Relevant literature:** yes
- **Design:** single case study
- **Size:** N=1 justified N/A power N/A

**Outcomes:**

- **Pre and Post test**
  1. Cardiovascular (HR, RR, VO2)
  2. Body dimensions (BMI)
  3. Flexibility
  4. Gross Motor Assessment (BOTMP)- not valid if used first edition
  5. Anaerobic Power (Margaria-Kalamen power test)- modified this test from adult use
  6. Muscle Strength

**Intervention:**

- **Described in detail:** Yes

**Results:**

- **Reported statistical significance:** yes Paired T test

**Appropriate?** Unsure
Clinical importance: yes- aerobic conditioning and strength training are most effective to impact cardiovascular benefits for kids with DS, moderate to high intensity for 5-6 days per week for cardiovascular fitness, the parents had to be involved in the home program, the program had to be adapted to the interests and attention of the child and that physical activity has to become part of the lifestyle for children and adolescents.

Conclusions: yes- The high intensity fitness program incorporating strength and aerobic conditioning was effective to change cardiovascular variables not reported in other studies employing aerobic conditioning only for children with DS.

**Discussion**

1. From what we learn today, what clinical question (in your work environment) do you think you could address using a single-case design?

2. What additional help and support might you need to do design a single-case study?

3. How will what you learned today affect your clinical practice? How is this information applicable to your work?

4. How will learning about SCD affect how you will keep and organize data in your clinical practice?

5. Is there any additional information you need to be able do a SCED? How will you obtain this information?

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