Therapy During Lifespans of Individuals with Multiple Handicaps

Poster Presentations:

• American Occupational Therapy Association Annual Conference, Denver, Colorado, April 1995
• American Academy for Cerebral Palsy and Developmental Medicine Annual Meeting, Minneapolis, Minnesota, September 1996
• Minnesota Occupational Therapy Association State Conference, Minneapolis, Minnesota, October 1995

This updated version was presented as a Roundtable Discussion at the TASH Conference, Milwaukee, Wisconsin, November, 2005

Abstract

This poster presents longitudinal case studies of assessment and treatment of hand problems in children with multiple handicaps, especially cerebral palsy, as they grow into adulthood. It reflects the changing theoretical and management focus of the therapy professions as well as the multidisciplinary area of cerebral palsy during the past decades. Both quantity and quality of skills are measured by identifying missing components of arm/hand sequential development interfering with functional skills in home, school, and community environments.

A theory of inappropriate prehension patterns based on these sequences compares normal, delayed, and atypical arm/hand positions, providing a method of analysis leading to developmentally targeted intervention and functionally appropriate adaptations. Since atypical patterns are viewed as an expression of compensatory postural stability during efforts to achieve function, one of the goals of intervention illustrated is to teach appropriate points of proximal stability for effective distal mobility, and promote normal prehension patterns with awareness of future adult outcomes.

The case study examples and photographs show how the theoretical model is used to improve postural stability with three individuals with cerebral palsy who have different types and levels of physical and mental dysfunction, in different environmental contexts, and at different age levels within their own lives. The three children are followed through a ten-year period, from ages 4 to 14 years, 6 to 16 years, and 14 to 24 years, as they receive occupational therapy in their homes, schools, and community. The new Occupational Therapy Practice Framework (AOTA, 2002) is used to describe the specific activities which prepare these children for engagement in future occupation to support participation in context include:

• Mirror play (activities of daily living: grooming)
• Mud play (leisure: gardening)
• Balance activities (work: cleaning crew at pizza shop)
In addition, the theoretical model is used to improve fine motor skills such as:
- Cube grasp (instrumental activities of daily living: handling utensils for meal preparation)
- Pellet grasp (instrumental activities of daily living: handling medications for health management)
- Crayon or pencil grasp (education: handling paint brush in high school art class)

The process of transition from childhood to adulthood needs to begin at birth, with functional activities introduced early in therapy, becoming increasingly important as the individual matures. Intervention models that combine components of developmental theory with realistic functional needs offer a unique challenge for therapy programs integrated into each child's current environmental contexts. As the child's world expands from home to school and community environments, arm/hand skills become increasingly important in determining degree of inclusion, level of independence, and quality of life.

**A Theory of Inappropriate Prehension Patterns Relating to Developmental Hand Dysfunction**

![Diagram showing normal, delayed, and atypical prehension development patterns](http://home.att.net/~rperhardtdp/handposter.html)
A Treatment Model for Grasp of the Cube

The normal 7-month infant demonstrates developmentally appropriate patterns at the chronological age.

The delayed 7-month infant may demonstrate primary developmentally inappropriate patterns at the 5-month level.

The atypical older child may demonstrate secondary developmentally inappropriate patterns ranging from the 3-month level to the 9-month level.

Radial-Palmar Grasp
7-month Component

A Treatment Model for Grasp of the Pellet

Radial-digital grasp: Object held with thumb and fingertips, space visible between.

Radial-palmar grasp: Wrist straight, fingers on far side of object press it against thumb and radial side of palm.

Palmar grasp: Thumb adducted.

Held in ulnar side, wrist flexed.

Key:
- Present normal pattern components combining to form atypical patterns
- Italicics indicate absent normal pattern components needed to fill sequential gaps
- Current developmental level
- Patterns present
- Patterns absent

Treatmnet
Scissors Grasp
8-month Component

<table>
<thead>
<tr>
<th>Normal 9-month Infant</th>
<th>Typical</th>
<th>Pattern Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Pincer grasp</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Inferior-pincer grasp: Between ventral surfaces of thumb and index finger, beginning thumb opposition</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Scissors grasp: Between thumb and side of curled index finger, proximal thumb joint extended, distal thumb joint slightly flexed</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Thumb adducted, distal thumb joint flexed</td>
<td></td>
</tr>
<tr>
<td>Current developmental level</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key:**
- | Patterns present
- | Patterns absent

Present normal pattern components combining to form atypical patterns

*Italics indicate absent normal pattern components needed to fill sequential gaps*
A Comparison of Normal, Delayed, and Atypical Prehension Development: Treatment Models for Spasticity, Athetosis, and Flaccidity in Childhood
The normal 8-month infant demonstrates developmentally appropriate patterns at the chronological age.

The atypical older child may demonstrate certain secondary developmentally inappropriate patterns ranging from the fetal to the 8-month level.

<table>
<thead>
<tr>
<th>Month</th>
<th>Normal</th>
<th>Pattern Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Crawls on hands and knees</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Pushes straight back to sitting from hands and knees</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Head control in midline on forearms with flexor/extensor control, elbows under well-depressed shoulders, hands open</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Beginning head control in midline, shoulders slightly elevated, elbows flexed and posterior to shoulders, hands lightly flexed, right more than left</td>
</tr>
</tbody>
</table>

Joanne Age 14
Patrick Age 6
Kristy Age 4

A Comparison of Normal, Delayed, and Atypical Prehension Development: Treatment Models for Function during Transitions to Adulthood
The normal 8-month infant demonstrates developmentally appropriate patterns at the chronological age.

The older child or adult with atypical prehension may demonstrate certain secondary developmentally inappropriate patterns ranging from the 3-month to the 6-month level.

<table>
<thead>
<tr>
<th>MONTHS</th>
<th>NORMAL</th>
<th>ATYPICAL</th>
<th>PATTERN COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>Stabilizes with hands to rotate from hands and knees to side-sitting</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>Pushes straight back to sitting from hands and knees</td>
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<tr>
<td>6</td>
<td></td>
<td></td>
<td>Wrists extended</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>Shoulders well depressed</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Shoulders slightly elevated Wrists flexed</td>
</tr>
</tbody>
</table>

Joanne Age 24
Patrick Age 16

Kristy Age 14