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MOVE

Systematic Programming for Early Motor Intervention

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Support for more functionally oriented programming for early motor intervention appears to be mounting as traditional, developmentally based practices continue to fall out of favor. This shift in perspective has prompted numerous calls for a change in programming for children with motor impairments. In spite of these calls for change, functional outcome programming and activity-based intervention have been slow in moving from theory to practice. It is hypothesized that this slow transition is due to a lack of systematic programming that would provide guidelines to help practitioners integrate these principles into service delivery. This article presents Mobility Opportunities Via Education, a structured process for planning and delivering motor intervention, based on functional outcomes and activity-based instruction, as one option to guide the transition from theory to practice. Brief examples of the application of Mobility Opportunities Via Education are presented along with current research findings. **Key words:** *dynamic systems theory*, *family centered*, *functional outcomes*, *motor impairment*, *motor learning theory*, *physical therapy*

WITHIN recent years, the motor intervention literature has emphasized the importance of programming that focuses on functional abilities. There has been growing acceptance of functionally oriented motor treatment approaches that address meaningful outcomes within activity-based practice (Carr & Shepherd, 2000; Damiano, 2006; Harris, 1991; Heriza & Sweeney, 1994; Thelen, Kelso, & Fogel, 1987; Valvano, 2004). In spite of an emphasis on a functional orientation to motor intervention, the transition from theory to practice has been slow (Case-Smith, 1996; Darrah, Law, & Pollock, 2001; Mahoney, Robinson, & Perales, 2004; Valvano, 2004).

Mahoney et al. (2004) argued that the most commonly used approaches in pediatric therapy continue to be based on developmental or neuromaturational theories. These theoretical approaches have been shown to have limited success in improving motor abilities (Attermeier, 1991; Atwater, 1991; Ketelaar, Vermeer, Hart, van Petegem-van Beek, & Helders, 2001). Because of the professional publications related to these changes in theoretical perspectives, most practitioners are aware of current motor learning principles; however, as suggested by Palisano (2006), "dissemination of knowledge and research is a necessary, but not sufficient condition for evidence-based practice" (p. 1296). Practitioners frequently need more specific guidance to successfully apply functionally oriented theories to practice.

For example, Hayes, McEwen, Lovett, Sheldon, and Smith, (1999) reported the results of a survey of pediatric physical therapists in which a majority of therapists expressed a desire to incorporate motor learning principles into their interventions. However, many of these therapists expressed difficulty in doing so and thought that more information was needed to help them successfully apply these concepts. Also, Darrah et al. (2001) conducted a pilot study investigating the effectiveness of functional therapy approach based on dynamic systems theory and family-centered philosophy. The

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authors presented this approach as yielding promising results. However, when surveyed as part of this study, therapists reported that they had difficulty identifying intervention strategies within this functional framework and initially reverted back to traditional developmental techniques. The authors concluded that more specific intervention guidelines are needed to help practitioners integrate functional therapy goals into practice.

The above findings suggest that the application of current theories of motor development to practice may be limited—not so much by a lack of knowledge or acceptance of current theories, but by adherence to traditional techniques and practices. Although these professionals may be open to integrating new principles into practice, more knowledge on how to apply the principles and a more systematic approach to programming appears to be needed.

MOBILITY OPPORTUNITIES VIA EDUCATION

One program that uses a functional approach to motor intervention is the Mobility Opportunities Via Education (MOVE) curriculum (Thomson, 2005). MOVE is an activity-based mobility program that is aligned with current theories of motor development that emphasize functional and meaningful outcomes (Kern County Superintendent of Schools, 1990). This program was originally created in the mid-1980s by D. Linda Bidabe to address the needs of children with severe and multiple disabilities who attended special education schools. In the last 20 years, this program has grown into an international mobility-training curriculum that is used across age levels and settings. MOVE International and MOVE Europe, nonprofit, charitable foundations, support training and program development for the MOVE curriculum (for more information, contact MOVE International at: www.move-international.org). MOVE uses a collaborative team approach (parents, child, and professional staff) and a 6-step process that includes a functional mobility assessment, a family interview to identify priority goals, and a system for planning and implementing intervention (Bidabe, Barnes, & Whinnery, 2001).

The 6 steps of MOVE are (1) Testing, (2) Setting Goals, (3) Task Analysis, (4) Measuring Prompts, (5) Reducing Prompts, and (6) Teaching the Skills. The first 3 steps of MOVE form the foundation for deciding what to teach. In step 1, the MOVE team, including the parents and child, determine the child's current functional mobility skills using the Top-Down Motor Milestone Test (TDMMT) (Kern County Superintendent of Schools, 1990). This instrument was developed to determine priority motor skills for programming within the MOVE curriculum and is completed through an interview process with family and staff. The TDMMT provides an ecological assessment of an individual's current use of functional mobility skills (consistent use across environments) related to sitting, standing, transferring, and walking. It has been found to be a reliable tool for determining motor functioning in a functional context (van der Putten, Vlaskamp, Reynders, & Nakken, 2005).

In step 2, a family interview is conducted to determine priorities for the family and child. Families are not asked to specifically identify mobility priorities but rather priority life activities related to current and future needs and desires of the family and child. In most cases for individuals with severe physical disabilities, the attainment of these priorities is based on the mastery of basic mobility skills. This step is essential in establishing the goals and focus for the intervention. In MOVE, these priority activities vary from family to family. Walking with assistance from room to room within the house may be the priority activity for one family because of limited room for a wheelchair. Another family whose concerns are related to back strains caused from lifting their child may desire greater participation during transfers in and out of chairs.

Once the family's goals or priority activities are established, the team begins to identify the specific motor skills that are needed for these activities in step 3, Task Analysis. Instead of developing programs based on the next isolated skill in a typical sequence of development, motor skills are selected because they are needed to perform the priority activities. As these motor skills are identified, the information from the TDMMT provides the child's current functional use of these skills. For example, in step 2, a single mother who finds it necessary to take her young son with low-muscle tone to the grocery store may identify sitting safely in a shopping cart seat as a priority activity. The team determines which specific sitting skills from the TDMMT are needed for the activity and identifies the child's current abilities in this area. This task analysis assists the team in determining the functional mobility skills to be emphasized in MOVE programming.

To facilitate the individual's participation in the priority activities, the MOVE curriculum provides a system of prompts (physical supports). Step 4 defines a prompt system and provides a systematic process for measuring prompts based on (1) the body segment to be supported, (2) the type of support, (3) the amount of support, and (4) the position of the support (ie, beside, in front, or behind the child). These prompts are determined on the basis of support needed for a particular activity.

At the same time, a plan is established for reducing prompts (step 5). Prompts should be reduced as the child's ability to participate in the activity increases. This reduced need for support leads to greater independence (Barnes & Whinnery, 2002; van der Putten, Vlaskamp, Reynders, & Nakken, 2005; Whinnery & Barnes, 2002). Prompt reduction decisions are determined on the basis of the priority activity. For example, if the family enjoys going to the local ice cream parlor but has difficulty transporting bulky mobility equipment, the prompt reduction plan would focus on reducing the *type* of support needed (ie, reduction from mechanical to support from another person) in order to facilitate participation in the family activity. As teaching occurs and mobility skills improve, prompts are faded. Establishing a prompt reduction plan at the same time that prompts are initially identified helps the team visualize the ultimate functional outcome, and press for greater progress.

In one application of MOVE, a family expressed a desire for their young child to be able to walk with adult support to attend church and go into the community without the need for bulky equipment (Barnes, 1999). Because this child initially needed significant support to compensate for poor strength and postural balance and had limited motivation to walk, a gait trainer (adaptive walker) was used during motivational activities to facilitate reciprocal stepping. At the same time, a plan was developed to reduce prompts from a gait trainer to adult support while walking. As the child gained strength and balance through continued practice, support was reduced to 2 hands held, then to 1 hand held, and eventually to independent walking. This progression of prompt reduction was directly related to the family's goal (reducing the need for equipment to increase community access). The systematic reduction of prompts provided a supportive environment for the development of new motor skills and promoted active programming toward family goals (Barnes & Whinnery, 2002; Whinnery & Barnes, 2002).

Once the priority activities, critical skills, and necessary prompts are determined, targeted skills can be taught (step 6). In step 6, practice opportunities are identified within the child's natural environment and normal routine. When it is not logical or natural to practice the actual priority activity throughout the day (eg, sitting in a shopping cart seat), other engaging and motivating activities are identified to allow the child to practice the same skills (eg, sitting in a moving scooter). Teaching the same critical skills within other nonpriority activities can result in transfer if these additional activities are also functional (Horn, Warren, & Jones, 1995). Children become engaged in activities and are motivated to try skills that they may not otherwise attempt when intervention occurs in fun activities that require use of these functional mobility skills. A child learning to sit on the edge of the bed during dressing might also work to maintain balance on a backless bench during music time in order to hold a real microphone and sing karaoke. Or, a child learning to walk around the home might be motivated to take steps in a gait trainer in order to walk across the room to feed a pet. Practicing motor skills during meaningful tasks allows for natural reinforcers to be used to increase motivation and skill practice.

RESEARCH SUPPORTING MOVE

Although MOVE is supported by principles of current motor learning theory, research on the effectiveness of MOVE is in the early stages. Initial studies have reported successful outcomes when the MOVE program was used to teach functional mobility skills to children with motor impairments. Barnes and Whinnery (2002) conducted a multiple-baseline, single-subject study of MOVE with 5 elementary-aged children with multiple disabilities (physical and intellectual disabilities). These children, aged 3 through 9, all attended special education classes in a regular elementary school where they received physical therapy services as part of their school programs. The school team (teacher, occupational therapist, and physical therapist) participated in a 2-day MOVE Basic Provider training program prior to implementation of the study. The authors provided on-site consultation. Four of the 5 children made gains in walking (number of reciprocal steps taken) during the intervention year. All 4 of these children maintained or improved their walking skills during the maintenance phase, and 2 of the 4 children eventually walked independently (>500 steps with no assistance or support). Although the fifth child took no steps during the intervention year, with continued programming, he increased his willingness to have his feet on the floor, bear partial weight, and then stand bearing full weight. By the maintenance phase, he was able to take more than 100 reciprocal steps in a gait trainer.

In a second single-subject report, a home application of the MOVE program was studied (Whinnery & Barnes, 2002). A nonambulatory, 3-year-old girl with cerebral palsy was at risk for hip dislocation and was being considered for surgery. Prior to implementing the MOVE curriculum, traditional physical therapy had been conducted on a regular basis in an early intervention program and by the mother within the home. With the desire to avoid surgery, the mother chose to try MOVE at home within daily activities. The mother first obtained permission from the orthopedic surgeon to have her daughter in a supported upright and partial weight-bearing position. She then completed a 2-day course in the use of the MOVE program in which she learned how to implement the 6 steps of MOVE. Priority activities included walking to the bathroom, maintaining standing balance for grooming and dressing, and walking greater distances without her mother's support. With the help of the 2 authors, the mother created MOVE programs to accomplish these priority activities. Some activities were completed with adult support, whereas others relied on the use of a gait trainer for balance and partial weight support. Additional practice activities to improve standing and walking skills included the game of finding her dolls that were hidden in the yard, walking to feed her dog in the backyard, and standing to paint at her easel in her bedroom. After 5 months of programming, gains were made in functional standing and walking. During the last week of data collection, the daughter indicated a desire to walk to her grandmother's house. With great determination and assistance from her mother, she was able to walk, in a gait trainer, to the edge of her grandmother's yard, a distance of approximately 600 ft. In addition, the orthopedic surgeon reported a reduction in the degree of hip subluxation and surgery was no longer recommended by the surgeon (Whinnery & Barnes, 2002).

The effectiveness of MOVE to increase *generalization* of motor skills learned in natural environments was investigated using a single-subject, multiple-baseline across settings design. This study was conducted with a 4-year-old, preschool student with multiple disabilities (physical and language disabilities) who received services in a special education program at a regular elementary school. His father had indicated that having his son walk within the house without having to be carried was a priority. This study addressed the question of whether skills trained in one setting would transfer to another setting. To test this generalized question, the team identified 3 natural environments within the school and a meaningful activity for each in which the priority skill, walking, could be used. These environments and activities were (1) walking to the lunch table in the classroom, (2) walking to the toys on the playground, and (3) walking to the babysitter in the hallway at the end of the day. Baseline data for walking were established for each of these environments.

When implementation of the MOVE program began, walking was practiced only within activities in the classroom. Walking was not immediately practiced on the playground or in the hallway because of the staggered baseline design. After functional walking skills were established in the classroom setting, walking to favorite toys on the playground was introduced. Walking to the babysitter in the hallway was not introduced until functional walking skills were established on the playground. The results indicated that the walking skills that were initially established in one environment and activity were quickly generalized to accomplish other meaningful tasks in the new environments. (Whinnery & Whinnery, 2004). These findings were consistent with previous studies, suggesting that functionally oriented motor intervention promotes generalization (ie, Chandler, Lubeck, & Fowler, 1992; Horn, Jones, & Warren, 1999; Toglia, 1991).

van der Putten et al. (2005) investigated the effectiveness of the MOVE curriculum in increasing independence for children with multiple disabilities, including profound intellectual impairment. A nonrandomized, 2-group, pretest-posttest design was used. The 44 (32 experimental and 12 control) children ranged in age from 2 to 16, had estimated IQs of 25 or less, were nonambulatory, and had other secondary disorders. The 32 experimental group children attended a special education center that used the MOVE curriculum. The 12 control group children attended a similar center that did not use MOVE. These two groups were described by the authors as being clinically comparable in terms of their functions and/or skills. Premeasure and postmeasure over a 12-month period indicated that the use of MOVE was associated with greater gains in independence when performing movement activities. The authors reported the difference as "clinically relevant," with a moderate effect size.

CONCLUSION

In the past 2 decades, there has been a call for a change in motor treatment based on new understandings of motor development (Attermeier, 1991; Darrah et al., 2001; Heriza, 1991; Kamm, Thelen, & Jensen, 1990; Mahoney et al., 2004). Ongoing research supports the need to move from developmentally based models of motor intervention to functionally oriented therapy models. In spite of this, the transition has been slow and developmentally based approaches continue to be commonly used in pediatric physical therapy (Mahoney et al., 2004). In order for this transition to occur, practitioners will need more systematic guidance to apply theoretical principles to practice.

This article has proposed one program, MOVE, which provides a systematic, structured approach to applying theory to practice. This program aligns with the collaborative model advocated by Palisano (2006) in which intervention (1) is family oriented, (2) incorporates instruction and practice into daily activities and routines, and (3) promotes outcomes that are meaningful to the child and family. In addition, MOVE programming relies on behavioral principles that have been shown to be effective in early motor intervention (Horn, 1991; Horn et al., 1995).

Thus, the MOVE program can provide a structured approach to guide practitioners through the selection of priority goals, the identification of temporary supports, and the development of service programs that embed skill instruction within meaningful daily activities. Positive results from initial evaluation of the MOVE program suggest that this is a promising approach warranting further study.

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