Serving Children with Motor Delay and Disabilities
Serving Children with Motor Delay and Disability was developed under contract number: CW18477 awarded to Georgetown University Center for Child and Human Development by District of Columbia Early Intervention Program, Division of Early Learning, Office of the State Superintendent of Education.
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Introduction

Motor delays and disabilities are conditions that impact body function or structures, may limit physical activities such as crawling, walking, reaching or activities of daily living, and may restrict participation and physical activities in young children (World Health Organization, 2012). Motor delays and disabilities can range from mild to severe and may co-occur with other delays and disabilities such as visual impairment, cognitive delays, hearing loss, etc. Nationally, about 3.3 children per 1000 have permanent motor disabilities such as cerebral palsy and 6% of children have developmental coordination disorder identified around the time they reach kindergarten (Noritz, Murphy, et al., 2013). About 17.5% of children in the United States are receiving early intervention services because of motor impairment or motor delays (Hebbler, Spiker, Bailey, et al., 2007). In the District of Columbia, almost a third of children birth through 2 years of age qualified for early intervention services because of a condition that affected their motor development such as Down syndrome, spina bifida, cerebral palsy and other genetic, congenital, or traumatic conditions (personal communication, K. Morrison, DC Early Intervention, November 5, 2013). Motor development is integral to children learning and growing in other areas such as thinking and problem solving (cognition), communication, and self-help (adaptive) skill development. As a child’s motor skills develop, she/he learns to control her/his body for upright posture, become mobile, reach and grasp, and make it possible for her/him to explore her/his environment, form relationships, and get her/his needs and wants met.

Purpose of Guideline

The purpose of the Serving Children with Motor Delay and Disabilities guideline is to provide families and service providers an overview of best practices for early identification, program planning and intervention for infants and toddlers with motor delays or disabilities in the District of Columbia. The service guideline is based on the best scientific evidence available. It can be used to help families and early intervention providers to make decisions about the most appropriate assessment and intervention strategies to be used with young children with motor concerns.
Use of the Service Guideline
The information in this document is compiled from a review of research and discussion among service providers in the field on what is considered contemporary early intervention for children with motor delays or disabilities. This Service Guideline is the District of Columbia’s Strong Start program’s interpretation of its responsibility under the Infants and Toddlers with Disabilities section (Part C) of the Individuals with Disabilities Education Act (IDEA) and in accordance with the mission of the District of Columbia Strong Start program.

Providers and families are encouraged to use this guide, while keeping in mind that the care provided should always be tailored to the individual child. The decision to follow any particular recommendation should be made by the family and the provider based on the circumstances of the individual child and his family.

The primary reasons for developing a service guideline for young children who have motor delays and disabilities are to:
- Provide an informational resource for professionals
- Encourage consistency in service delivery across providers
- Enhance quality improvement in early intervention services
- Help families learn about appropriate and effective service delivery

Organization of the Guideline
Serving Children with Motor Delay: Service Guideline describes motor development, defines motor disorders, outlines common conditions that include motor disorders, and delineates considerations for service providers and families at each of the seven (7) steps in the Strong Start early intervention process: Referral, Initial Service Coordinator, Evaluation, IFSP meeting, Early Intervention Services, IFSP Review, and Transition.
Strong Start Road Map

A Guide through the DC Early Intervention Program

**Strong Start** is the District’s Early Intervention Program for families with children under age three who are concerned about their child’s development. Keep this “Road Map” handy to remind you of the steps for each phase. This is a voluntary program and you may withdraw at any time.

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1. **Referral**
   - Referral source or parent suspects child of having developmental delay or disability and contacts Strong Start
   - Strong Start contacts parent, informs them about program and assigns Initial Service Coordinator (ISC)

2. **Initial Service Coordinator**
   - Provides information about Strong Start
   - Informs family of rights
   - Refers family to an evaluation site

3. **The Evaluation**
   - Determines eligibility
   - Conducts family assessment (optional)
   - Gathers information for Individualized Family Services Plan (IFSP)

4. **IFSP Meeting (If child is eligible)**
   - Family identifies desired outcomes
   - IFSP team specifies early intervention services and develops written plan
   - Family agrees to services
   - Family meets with Dedicated Service Coordinator (DSC)

5. **Early Intervention Services**
   - Assistive technology devices and services
   - Audiology
   - Vision services
   - Family teaching, counseling, home visits and parent support groups
   - Medical services only for diagnostic or evaluation purposes
   - Nursing services
   - Health services
   - Occupational therapy
   - Physical therapy
   - Psychological services
   - Service coordination
   - Social work services
   - Special instruction
   - Speech-language pathology
   - Transportation and related costs

6. **IFSP Review (Six Months/Evaluate Annually)**
   - IFSP team makes decision to continue, add, modify or delete strategies, outcomes, and services based on ongoing assessments
   - If parent requests, review may happen sooner
   - Child may exit Strong Start based on assessment results

7. **Transition**
   - Plans for transition included in IFSP
   - Planning begins between ages 2 years 6 months and 2 years 9 months
   - Strong Start services end on child’s 3rd birthday

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**Areas of Development**
- Cognitive
- Physical (including vision and hearing)
- Communication
- Social/Emotional
- Adaptive development

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Don't wait and wonder.
If your child is younger than three and you have questions, call 202-727-3665 or visit www.strongstartdc.com.

Parental/guardian’s consent required for the evaluation, IFSP, provision of services in IFSP, and transition.
Motor Development

Motor development is a series of increasingly complex skills through which infants gain control over the use of their muscles for upright posture, balance, mobility, and manipulation of objects. The skills are often referred to as developmental milestones.

Movement patterns in infants appear random, with a high degree of variability. As the child develops and achieves motor milestones, his movements become more organized and are used to accomplish tasks such as exploring the environment or manipulating objects. These skills include reaching and grasping for objects, rolling over, sitting, crawling, walking, and playing games like tag or hopscotch.

Motor skills do not develop independent of other developmental domains. Rather, a child gains skills in all areas of development all the time. For example, as a child learns to use his index finger to activate a button on a toy, he is also learning that his actions cause something to happen, the cognitive construct of cause and effect.

Motor development is divided into two major areas:

• Gross Motor
  – Skills that use the large muscles of the body
  – Muscle control for maintaining posture and balance
  – Examples include head control, sitting, crawling, and walking

• Fine Motor
  – Skills that use the small muscles of the body
  – Dexterity of arms and hands
  – Examples include reaching for and grasping toys, manipulating objects, and scribbling on paper

Typical Motor Development

Typical motor development tends to occur in an orderly, predictable manner. Variations in the progression of developmental skills and the rate at which children achieve skills exist. Motor milestones are behaviors that a child demonstrates and can be used to gauge the development of a child. In the first months of life, the attainment of motor milestones is
often the parents’ assurance that their child is developing in a typical fashion. Table 1 lists common fine and gross motor milestones and the ages by when they typically occur.

| TABLE 1: Typical Motor Development Milestones* |
|-----------------|-----------------|-----------------|
| **BY AGE**  | **GROSS MOTOR**  | **FINE MOTOR**  |
| 3 mths  | • Supine kicking movements  | • Reaches and grasps with eye-hand coordination  |
|         | • Rolls prone to supine  | • Finger play in mouth  |
|         | • Pulls to sit with minimal head lag  |  |
|         | • Propped sitting emerges  |  |
| 6 mths  | • Reaches for objects with one hand in prone  | • Brings objects to midline  |
|         | • Rolls supine to prone  | • Holds bottle with both hands  |
|         | • Sits independently  | • Rakes for small objects  |
|         | • Pivots in circle in prone  |  |
| 9 mths  | • Transitions in and out of sitting to quadraped or prone  | • Transfers objects  |
|         | • Pulls to stand with support  | • Controlled release of objects  |
|         | • Raises self to sit  | • Radial digital grasp  |
|         | • Crawls/creeps on hands and knees  |  |
| 12 mths | • Pulls to stand or stands up through quadraped  | • Pincer grasp  |
|         | • Rotates or pivots while sitting  | • Rolls a ball  |
|         | • Walks with hand held  | • Scoops with spoon  |
|         |  | • Finger feeds  |
| 15 mths | • May begin to squat  | • Holds two cubes in same hand  |
|         | • Stands alone for extended periods  | • Builds 2-3 cube tower  |
|         | • Stoops to pick up object and returns to stand  | • Flings ball with elbow extension  |
|         | • Stands from floor without support  |  |
|         | • Climbs into adult chairs  |  |
|         | • Walks independently  |  |
|         | • Walks backward a few steps  |  |
| 18 mths | • Creeps/creaplis down steps  | • Turns book pages several at a time  |
|         | • Carries object while walking  | • Builds tower with 3-4 cubes  |
|         | • Walks to side a few steps  | • Removes pegs from board  |
|         | • Heel strike emerges during gait  | • Attempts to place pegs in board  |
| 24 mths | • Stands on one foot briefly  | • Builds 5-7 cube tower  |
|         | • Steps over low barrier/obstacle  | • Places pellet in bottle  |
|         | • Walks up steps using step-to pattern and one-hand support  | • Turns doorknob  |
|         | • Jumps down from bottom step  | • Imitates motor activities  |
|         | • Kicks small ball forward  |  |
|         | • Throws ball overhand  |  |
| 30 mths | • Jumps off floor with 2 feet  | • Imitates straight, horizontal, and circular crayon/marker strokes  |
|         | • Imitates walking on tiptoes  | • Tripod grasp emerging  |
|         | • Climbs on tricycle  |  |
| 36 mths | • Easily propels tricycle with feet on floor, may pedal  | • Imitates plus sign drawing with marker  |
|         | • Jumps over 1-2 inch object  | • Attempts to cut with scissors  |
|         | • Positions arms in anticipation to catch ball  | • Hand preference emerging  |

*Adapted from Long & Toscano 2002; McCarthy 2006
**Atypical Development: Signs and Characteristics**

Children may learn skills outside of the typical developmental progression or they may perform skills in a different way than is typical. Often these behaviors are a variation of typical development. They may also indicate a sign of concern. Table 2 describes some signs of atypical development and the ages at which they may signal a concern.

<table>
<thead>
<tr>
<th>TABLE 2: Motor Behaviors that may be of Concern*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BY AGE</strong></td>
</tr>
</tbody>
</table>
| 3 mths | Arching of back  
Inability to right head at end of pull to sit |
| 6 mths | Unable to extend arms fully and toward midline in supine  
Unable to sit erect, even with support  
Inability to achieve midline head position in supine or sitting  
No evidence of movement in prone  
Inability to bring thighs/legs to hands in supine |
| 9 mths | Commando crawl or bunny hop instead of quadruped creeping  
W-sit as the only sitting position |
| 12 mths | Inability to transition among sitting positions  
Pulls to stand using arms only  
Inability to stand on flat feet  
Trunk and extremity stiffness, laxity, or instability that interferes with standing |
| 15 mths | Moves around environment using bottom-scooting, bunny hop, or rolling |
| 18 mths | Does not walk independently |
| 24 mths | Falls often while walking or running  
Narrow or wide base of support in standing |
| 36 mths | Not walking or falls often when walking  
In-toeing or excessive external rotation  
Avoids arts and crafts projects  
Wide or narrow base of support when walking |

*Adapted from Long & Toscano 2002

**Conditions Commonly Associated with Motor Impairments**

Motor difficulties in infants and toddlers are evident in many conditions. Below are some common congenital, genetic, neuromuscular and traumatic conditions that are associated with motor impairments in young children. This list does not include all conditions that may put young children at risk for motor difficulties.

**Congenital**

**Prematurity** occurs when a baby is born before 37 completed weeks of gestation. Premature births can be classified by the gestational age at birth or by low birth weight. Preterm births account for 9.6% of all live births worldwide (Xiong, Gonzalez & Mu 2012). Nationally, about 12%, or 500,000, infants are born before 37 weeks every year. In the District of Columbia the incidence ranges from 8.3 % to 17.3 % depending on
race, ethnicity and poverty level (Centers for Disease Control and Prevention, 2013). Babies born prematurely may have a variety of health problems and are at risk for a variety of developmental disabilities, sensory impairments or developmental delays (Lee 2011). Survival rates of babies born prematurely have improved with advances in medical care, but the rate of major developmental disabilities in children born prematurely such as cerebral palsy and severe intellectual disability have not decreased (Stephens & Vohr, 2009). Evidence suggests that subtle motor and cognitive issues resulting in regulatory, attention, social, and adaptive difficulties are more common (Msall & Park, 2008). Babies born prematurely who also experience neuropathologies such as intraventricular hemorrhage (IVH), periventricular leukomalacia (PVL), and seizures are at increased risk for motor delays and long lasting motor disabilities. In general, the lower the birth weight and the more prematurely the infant is born, the greater the risk for developmental delays. A significant number of children born prematurely or with low birth weight are seen for early intervention services through Strong Start. In 2013, this group of children comprised 18% of the children who automatically qualified for early intervention in the District of Columbia.

**Osteogenesis Imperfecta (OI)** is a non-progressive genetic disorder affecting collagen production causing the bones and teeth to be brittle and break easily in childhood but fractures decrease in frequency into adulthood. There are many forms of OI and the severity of the symptoms like bone fractures varies. Complications for children and individuals with OI include muscle weakness, bone deformities and fractures, bleeding and bruising easily, dental problems, hearing loss, scoliosis, joint laxity, respiratory complications, fragile skin integrity, and short stature. Developmental impacts are primarily in the motor and adaptive areas but communication can also be affected by hearing loss and jaw function. Pain management and monitoring pulmonary health are important even with young children. Assistive technology and environmental adaptations for mobility, self-care, and care giver support are usually needed.

**Spina bifida (SB)** (Mylomeningocele or Myelodysplasia) results when the neural tube does not close completely during the early days of pregnancy. About 1500 babies are born with spina bifida each year (Centers for Disease Control and Prevention, 2011). Because the incidence of neural tube defects has been associated with folic acid intake during pregnancy, folic acid has been added to all enriched cereal grain products since 1998 (Williams, et al, 2005). Since then, the prevalence rate of spina bifida has declined by 31%. Spina bifida can be classified into aperta (visible or open lesions) or occulta (hidden lesions). Children with open lesions will undergo surgery early in life to close the lesion. Some investigators are performing surgery in utero to determine the effects of early lesion closure. Most commonly, children with SB experience paralysis in the muscles at and below the level of the lesion. The motor level is defined as the lowest intact neuromuscular segment that is functional. Children with SB often have sensory deficits that may or may not coincide with the motor level. Scoliosis, dislocation of hips, and club foot are common orthopedic conditions seen in children with SB. Hydrocephalus is common in children with SB. Children may have a ventriculoperitoneal shunt to remove the excess
cerebrospinal fluid from the brain. Some signs of shunt dysfunction include new seizures or increased frequency of seizures, fever, headache, incontinence, and decreased activity level or personality changes. Providers should also be aware that many children with SB are allergic to latex (Hinderer, Hinderer, & Shurtleff, 2012).

Torticollis is a positional deformity that occurs when the muscle on the side of the neck (sternocleidomastoid muscle) is shortened, leading to a head tilt to one side with rotation to the opposite side. Torticollis is present at or near the time of birth. Cranial deformation, hip dysplasia, brachial plexus injury, and deformities in the arms and legs can co-occur with torticollis. Children with torticollis are also at risk for developmental delay. The rate of torticollis ranges from 0.3%-16% in newborns. There are intervention guidelines specifically for infants and toddlers with torticollis. The guidelines describe strategies which include stretching, passive exercises, positioning, orthotics, and surgery (Kaplan, Coulter, & Fetters 2013).

Genetic

Achondroplasia is a genetic disorder that causes changes in bone growth. Cartilage at the growth plate of the long bones is slow to turn to bone. Children with achondroplasia have typical stature in their trunk but shortened limbs, large head with prominent forehead, and small hands and feet with shortened digits. Children with achondroplasia have typical cognitive function but are born with low muscle tone and are at risk for health conditions like hydrocephalus, dental problems, ear infections, hearing loss, spinal cord compression, and orthopedic issues including poor limb and spinal alignment. Motor and adaptive skill development is primarily affected but communication and social and emotional areas can be affected as well. Assistive technology and environmental modifications are often important to maximize access to home, school and the community.

Down syndrome (DS), also called Trisomy 21, is a genetic disorder characterized by having a third chromosome 21. Down syndrome occurs in about 1 out of every 691 babies born in the United States (Centers for Disease Control and Prevention, 2011). Common medical conditions associated with DS include congenital heart malformations, hearing loss, hypothyroidism, vision loss, and atlantoaxial instability (AAI). Low muscle tone, ligamentous laxity, feeding difficulties and intellectual disabilities are also features of Down syndrome that impact developmental progress (Msall, DiGaudio, & Malone, 1991).

Spinal muscular atrophy (SMA) and muscular dystrophy (MD) are a group of rare genetic muscle diseases that affect the neuromuscular system causing progressive degeneration of muscles (Muscular Dystrophy Association, 2014). Spinal muscular atrophy involves the loss of nerve cells in the spinal cord causing weakness in muscles and loss of muscle function. There are several types and in the most severe forms (SMA Type 1), the symptoms are seen in early infancy and the less severe forms (SMA Type 2 or 3) are seen in early childhood. The most common form of muscular dystrophy, Duchennne (DMD), affects mostly boys (girls are genetic carriers) and children with this form are missing the protein
dystrophin critical to maintain muscle function. Symptoms develop in early childhood and progress through adolescence with a loss of mobility and self-care and eventually compromised respiration. The impact of the childhood onset muscular dystrophies is primarily to motor development, but children with SMA or muscular dystrophy may also have hydrocephalus and global developmental delays that require monitoring and an array of services. As the disease progresses, monitoring of health including cardiopulmonary health, joint contractures and scoliosis formation become increasingly important. Assistive technology and environmental modifications become more critical to maintain or promote independent functioning at home, school, and in the community.

**Neuromuscular**

**Cerebral Palsy (CP)** is a non-progressive motor disorder that results from injury to the fetal or infant brain during the first 2 years of life. Injury to the brain can result from hypoxia, ischemia, maternal infections, or congenital or traumatic insult during the prenatal, perinatal, or postnatal period of pregnancy. Other risk factors for CP include premature birth, atypical uterine growth, multiple births, and genetic factors (Wright & Wallman 2012). The progression of motor abilities and function in infants and toddlers with CP varies greatly from person to person. There are different methods to describe a child with CP (Table 3). One method is to describe the type of muscle tone a child demonstrates; another is to describe the body parts that are affected; the third method is to classify the child based on his or her functional limitations.

**TABLE 3: Characteristics of CP**

<table>
<thead>
<tr>
<th>TONE</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spasticity</td>
<td>Hypertonic, increased muscle tone, decreased voluntary muscle control</td>
</tr>
<tr>
<td>Athetosis</td>
<td>Slow, writhing movements of the arms and legs, arms are often more involved and can involve muscles around the mouth</td>
</tr>
<tr>
<td>Ataxia</td>
<td>Decreased balance, lack of proximal muscle control, legs are often more involved than arms, very unstable gait</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DISTRIBUTION</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemiplegia</td>
<td>One side of the body affected, arms often more involved than legs</td>
</tr>
<tr>
<td>Diplegia</td>
<td>All extremities affected but the legs are significantly more affected, spasticity often present in the legs</td>
</tr>
<tr>
<td>Quadriplegia</td>
<td>All extremities affected but the arms are more involved than the legs, intellectual disability common</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEVERITY</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Ambulates independently; may need support to maintain balance on occasion</td>
</tr>
<tr>
<td>Moderate</td>
<td>Ambulates with assistive device, may have learning disabilities or other functional impairments</td>
</tr>
<tr>
<td>Severe</td>
<td>Uses wheeled mobility devices and other adaptive equipment and/or communication systems, may require significant amount of physical assistance with daily tasks</td>
</tr>
</tbody>
</table>

*Wright & Wallman 2012*
The Gross Motor Function Classification System (GMFCS) is used to describe CP in terms of the functional abilities of the individual. It is a five-level system categorized by age that describes the function of the person in sitting, walking, and using wheeled mobility (Palisano et al., 1997; Palisano et al. 2008). Appendix A describes the GMFCS levels in detail.

**Generalized Hypotonia** refers to reduced or low muscle tone throughout the body. Muscle tone is the degree of tension a muscle has when it is at rest. Hypotonia may be associated with disorders such as Down syndrome or cerebral palsy, but it may also be the only impairment observed and may have no clear etiology. This is often referred to as Benign Congenital Hypotonia (BCH). BCH is commonly seen in early intervention because delays in motor skills are a common feature. There is no clear consensus for diagnostic criteria for BCH. A survey of physical therapists and occupational therapists identified the following characteristics of children with hypotonia: decreased strength, decreased activity tolerance, delayed motor skill development, rounded shoulder posture, leaning onto supports, hypermobile joints, increased flexibility, and poor attention and motivation (Martin, Inman, Kirschner, et al., 2005). Guidelines for intervention are scarce. The Hypotonia Wheel was developed to guide intervention in children birth to three years old with hypotonia (Darrah, O’Donnell, Lam, et al., 2013).

**Traumatic**

A **brachial plexus** injury indicates birth trauma to the lower cervical and upper thoracic nerve root and coverings that innervate the arm. The condition varies in severity from affecting parts of the arm and hand to paralysis in the whole arm. Brachial plexus injury usually follows a difficult birth where the arm and shoulder girdle became overstretched, tearing the nerve covering and causing nerve compression resulting in swelling and bleeding around the area of injury. An infant's arm and shoulder are immobilized for the first week to ten days after birth to allow healing of the injury and then intervention begins to increase movement in the arm and promote arm use and motor development. Depending on the severity, arm function may return with early intervention and nerve regeneration within the first year of life. More severe involvement may require surgery and result in permanent reduction of arm and hand function.

**Traumatic brain injury (TBI)** describes injury to the brain that occurs because of physical force and that is not due to birth, disease or infection. In young children, TBI occurs because of falls, motor vehicle accidents, physical abuse, or recreation related accidents. The brain is injured in more than one place because the initial forces to the head cause bleeding and swelling reactions that damage brain tissue more diffusely. Sometimes TBI is accompanied by spinal cord injuries. The severity varies greatly and is determined by the structures and scope of the brain areas injured, but often all areas of development are affected by TBI. Vision, hearing and motor impairments may be present as well as difficulty with communication, memory, learning, executive function, and behavior. Children with TBI may have seizures, loss of balance and coordination, increased muscle
tone (spasticity) and attention problems. The amount of developmental delay and recovery from TBI also varies greatly with each child. Some recover fully; while others have life-long difficulties that require ongoing care.
Approaches to Intervention

Early intervention strategies for infants and toddlers with motor concerns include a variety of methods and approaches. Interventions focus on the child’s needs by embedding strategies into naturally occurring learning opportunities. Providing services in these natural environments are considered best practice in early intervention.

Family members and other caregivers are critical to establish meaningful outcomes and intervention strategies with their EI provider team members. The focus of intervention for children with motor delays and disabilities is to promote mobility; to promote function within daily routines and family expectations; to promote independence; and to promote accessing their environment.

Early intervention services are provided to children and their families in ways that help families maximize their children’s development, consistent with federal law:

- Within the family’s natural environments (the home and community routines, activities and settings in which children without disabilities participate);
- With the active participation of the family;
- In the language or mode of communication used by the family; and
- With respect for the family’s culture, beliefs and values

Principles of Early Intervention

The following principles should guide families and service providers in developing an effective intervention plan for young children experiencing motor delays, disabilities, or disorders.

The District of Columbia Early Intervention Program, Strong Start, supports and complies with the federal law and regulations that require early intervention services to be family centered, community-based, and provided in the natural environment, to the maximum extent appropriate. Because interventions in the child’s natural environment are more successful in increasing spontaneous skill development and generalization than intervention provided in clinic settings, a naturalistic approach to intervention is preferred.
According to the *Workgroup on Principles and Practices in Natural Environments* (2008) there are seven principles that guide the delivery of early intervention services within the natural environment and meet the IDEA requirements to provide family-centered, community-based, evidence-based early intervention services:

1. Infants and toddlers learn best through everyday experiences and interactions with familiar people in familiar contexts.
2. All families, with the necessary supports and resources, can enhance their children’s learning and development.
3. The primary role of a service provider in early intervention is to work with and support family members and caregivers in children’s lives.
4. The early intervention process, from initial contacts through transition, must be dynamic and individualized to reflect the child’s and family members’ preferences, learning styles and cultural beliefs.
5. IFSP outcomes must be functional and based on children’s and families’ needs and family-identified priorities.
6. The family’s priorities, needs and interests are addressed most appropriately by a primary provider who represents and receives team and community support.
7. Interventions with young children and family members must be based on explicit principles, validated practices, best available research, and relevant laws and regulations.

**Natural Environments**

Natural environments are more than places. The critical component of early intervention practice is to embed services and supports into naturally occurring learning opportunities. For example: Coaching a mother to use techniques to help her son pick up, hold a spoon, fill it with yogurt and get it to his mouth during breakfast in the kitchen at their home so that he can learn to feed himself and enjoy a meal with his family. Interventions occurring within the context of a naturally occurring learning activity create opportunities for the child to learn and practice skills that promote participation, relationship building, and getting their needs and wants met.

**Cultural and Linguistic Considerations**

Infants and toddlers with motor delays and disorders cannot always function as expected in their daily routines. What is expected is often related to the cultural expectations of young children. When working with families, it is important to understand the developmental expectations of the family’s culture in relation to acquiring and using motor skills such as feeding, sitting, walking, dressing, bathing, etc. Understanding the culture and preferred language of the family of children receiving early intervention services is important for discerning delays from cultural expectations and to construct strategies for intervention that respect the family’s beliefs and expectations.
Strong Start Approach to Service Delivery

Strong Start believes that developmental growth is nurtured through relationships. Strong Start reflects and values the importance of parent and child, family-to-family, family and community, and family and provider relationships. Services:

- Support the development of relationships among families, their children, their communities, and people who provide early intervention service;
- Regard families as team members;
- Operationalize the plan that is developed based on the child’s individualized needs as well as the family’s concerns, priorities, and resources.

Team members who provide early intervention services are:

- Committed to provide integrated, coordinated services in collaboration with each other;
- Share responsibility and accountability for how the plan is implemented with the family;
- Qualified as delineated by federal regulations; and
- Follow professional codes of conduct and practice acts.

Early Intervention includes (but is not limited to) a variety of activities:

- Working directly with the child;
- Promoting a positive parent-child relationship as the core of intervention efforts;
- Identifying activities and daily routines that are natural learning opportunities for the child;
- Coaching the family to promote the child’s acquisition of a variety of skills;
- Sharing knowledge of child development with families;
- Coordinating the intervention activities that are provided within the EI team; and
- Networking and consulting with community providers based on the family’s needs.
The Early Intervention Process in DC

Considerations for Children with Motor Delays and Disabilities

Strong Start, the DC Early Intervention Program is a district wide, comprehensive, coordinated, multidisciplinary system that provides early intervention services for infants and toddlers with disabilities and developmental delays and their families. The federal, Individuals with Disabilities Education Act (IDEA), Part C, along with the District of Columbia Public Law 1-2-119 mandate that infants and toddlers with disabilities and their families receive coordinated services early enough to make a difference. These services must be flexible, culturally responsive, and most importantly, meet the needs of the child and the family.

The Strong Start DC Early Intervention Program serves as the single point of entry for infants and toddlers in Washington DC whose families have concerns about their development.

There are seven steps in the early intervention process in the District of Columbia. This section outlines considerations for serving children with motor delays or disabilities at each step in the DC Early Intervention process. For details of the Strong Start process see the Strong Start Road Map, http://osse.dc.gov/publication/strong-start-road-map.

An example child and family, Aliyah A., is used throughout the segments to highlight the considerations for children with motor delays and disabilities. Background information about Aliyah A. and her family is in Appendix B.

Segment 1: Referral

The intake specialist who receives the referrals and contacts families will note whether or not there are initial concerns about a child’s motor development and collect any previous documentation of medical and or social risk factors for motor delays or disabilities such as prematurity and history including motor concerns or services related to motor delays.
For children with motor concerns, an early intervention provider with expertise in motor development should be part of the multidisciplinary team during the eligibility evaluation process (Segment 3 below).

EXAMPLE: A call came into Strong Start from Aliyah As hospital-based physical therapist. The office faxed the intake form and supporting medical documents. The intake specialist Myra C. noted that the child was 13 months and the family's primary concerns were in the area of physical development. Myra transferred the information to the service coordinator, Jasmine C., to arrange an eligibility evaluation.

Segment 2: Initial Service Coordination
Each family is assigned an initial service coordinator (ISC) who conducts a family assessment to determine the concerns, priorities and resources for the family and child. When gathering this information with families who have children with motor delays and disabilities and their families, or suspect that their child is having difficulties because of sensorimotor concerns, consider the following questions:

- Who is providing care (all caregivers)?
- Where does the child spend their day?
- Ask about difficulties or barriers to the child participating in routines or the family efficiently completing routines because of the child’s motor needs such as mobility, positioning, reaching and grasping. Routines can include dressing, bathing, toileting, feeding, getting in and out of the home, etc.
- What type of transportation is used (car, bus, Metro, walking, bicycle). Is the transportation safe and is the family satisfied with it?
- What type of positioning or seating is used for the child and how it is working?
- Ask if the family uses any assistive technology to help with routines and how it is working
- What are the leisure time, community, or physical activity routines for the child and family and are there difficulties or barriers with these routines?
- What are the important events (birthdays, weddings, cultural or religious events, etc.) for the family within the next year and does the family anticipate any difficulties or barriers to participating?

EXAMPLE: The ISC, Jasmine, contacted the family and spoke to Aliyah’s mother, Ms. Anderson. Jasmine set up a time for a multidisciplinary eligibility evaluation with an occupational therapist and speech therapist from ABC Therapy in the family’s home in one week. Jasmine asked the above questions and found that Ms. Anderson wanted support for bathing and dressing as these are most difficult for her to manage. She is able to carry Aliyah most places and so far Ms. Anderson thinks this works for her except when she has other things to carry (groceries, packages). They mainly use buses and the metro to get around but sometimes use a grandmother’s car. They use a high chair and bouncy chair to help position Aliyah and she plays on a blanket on a bed or the floor at home sometimes. Aliyah is cared for by her grandmother, Grandma G. (Ms. Anderson’s mother), three days a week while her mother works part time. Aliyah’s grandmother has trouble lifting her into a chair for meals at her home and is most concerned about Aliyah’s chewing and eating. Grandma G.
Segment 3: Eligibility Evaluation and Determination

A multidisciplinary evaluation with at least two early interventionists is required to determine eligibility for Strong Start. It is recommended that a child suspected or identified with a motor disorder or condition have one evaluation team member with expertise in motor development. Often this is an occupational therapist or physical therapist. The evaluation team submits their recommendation for eligibility and the Strong Start determines eligibility based on the following criteria (see Strong Start, DC Early Intervention Program, IFSP Manual for complete eligibility determination instructions).

1. **Diagnosed Physical or Mental Condition with a High Probability of Developmental Delay:**
   If the child has a diagnosed physical condition that has a high probability of resulting in a developmental delay. For a complete list of conditions that determine eligibility for early intervention in DC, see the Strong Start List of Established Conditions.

2. **A Developmental Delay**
   - If the child has at least 25% delay in two or more or a 50% delay in one or more of the 5 developmental domains (cognitive, communication, social or emotional, adaptive, or physical), as measured and verified by appropriate diagnostic instruments and procedures
   - If the delay is in the physical domain, indicate whether this delay manifests in fine motor, gross motor, or in both areas.

3. **Clinical Opinion of Atypical Development or Behavior (Informed Clinical Opinion)**
   Infrequently, standardized instruments cannot be completed because they: (1) are not applicable due to an infant’s age or significant illness; or (2) require significant adaptation for a child to perform the items, thereby invalidating the results. When this is the case, the informed clinical opinion of at least two qualified professionals from different disciplines may be used to substantiate the equivalent delay of 25% in two or more 50% in one or more areas of development.
   - If the eligibility is based on informed clinical opinion
     - Record the names of the clinicians performing the evaluation; and
     - Record the summary statement of the informed clinical opinion that is provided from the evaluation report.

**Determining Developmental Delay: Considerations for Children with Motor Disabilities**

To determine delay in fine and gross motor, assessment procedures include

- Family assessment information from the Initial Service Coordinator (Segment 2: Initial Service Coordinator)
- Observation of the child in their environment
- Use of standardized tools
**Standardized Tools**

Many tools have been published to determine if a child is performing motor skills as expected for his or her age or is demonstrating a motor delay or a motor related impairment. These tools are often a component of a comprehensive examination of the child or an evaluation to determine if he or she is eligible for early intervention as described in Part C of IDEA. Some tools are designed to gather information in a variety of developmental domains: social/emotional, cognitive, adaptive, communication and motor and other tools gather information specifically on fine or gross motor skill development. This section will describe a sample of specific tools that include or focus on motor skills in children the birth to three. See the Strong Start, DC Early Intervention Program, Approved Assessment Instruments for a complete list of approved tools.

<table>
<thead>
<tr>
<th>DEVELOPMENTAL DOMAIN/TYPE</th>
<th>TOOL</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td><strong>GLOBAL</strong></td>
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<tr>
<td>Norm Referenced</td>
<td>Battelle Developmental Inventory 2nd Ed (BDI-2)</td>
<td>Assessment of skill development across 5 developmental domains (adaptive, personal-social, communication, gross/fine motor, and cognitive) from birth to 7 years 11 months old. Provides a developmental quotient in each area comparing a child’s performance with his or her peers. Items are scored structured, interview or observation based on a 3-point scale (Newborg 2005).</td>
</tr>
<tr>
<td>Norm Referenced</td>
<td>Bayley Scales of Infant and Toddler Development 3rd Ed (BSID-III)</td>
<td>Designed to identify young children with developmental delay and provide information for intervention planning. The test measures cognitive, adaptive, communication, motor, and social-emotional skills in children 1 to 42 months of age (Bayley 2005).</td>
</tr>
<tr>
<td>Norm Referenced</td>
<td>Mullen Scales of Early Learning</td>
<td>Designed to assess development in children birth to 5 years, 8 months. It includes scales to measure fine motor, gross motor, visual perception, receptive and expressive language. Each individual scale provides T-scores, percentile ranks and age equivalents. Standard scores percentile ranks can be calculated for composites (Mullen 1995).</td>
</tr>
<tr>
<td>Norm Referenced</td>
<td>Pediatric Evaluation of Disability Inventory (PEDI)</td>
<td>Assessment of capability and performance of functional activities in self-care, mobility, and social function. The test was designed to be used for children 6 months to 7.5 years of age, but can also be used for children with disabilities who are older than 7.5 years of age. The test consists of 127 functional skills in 3 domains: self-care, mobility, and social function. Items are scored a 0 or 1 through a structured interview with parents or by observation of the child. Scores yield standard scores and scaled scores (Haley, et al 1998).</td>
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<tr>
<td>DEVELOPMENTAL DOMAIN/TABLE</td>
<td>TOOL</td>
<td>DESCRIPTION</td>
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<tr>
<td>MOTOR SPECIFIC</td>
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<tr>
<td>Norm Referenced</td>
<td>Alberta Infant Motor Scale (AIMS)</td>
<td>Measure of gross motor skills for children from birth through independent walking (approximately 0-18 months). The test is appropriate for infants born pre- or full-term. The AIMS consists of 58 items that the provider observes to assess movement in four positions: prone, supine, sitting, and standing and yields a composite score that can be converted to a percentile (Piper 1992).</td>
</tr>
<tr>
<td>Norm Referenced</td>
<td>Peabody Developmental Motor Scales-2nd Ed (PDMS-2)</td>
<td>Examines fine and gross motor skills in children 0-72 months of age. Gross motor subtests include reflexes, stationary, locomotion, and object manipulation skills. Fine motor subtests include grasping and visual motor integration. Items are scored on a 3-point scale. Raw scores are converted to age equivalents, standard scores, composite quotients, percentiles, or z-scores. (Folio &amp; Fewell 2000).</td>
</tr>
<tr>
<td>Criterion Referenced</td>
<td>Gross Motor Function Measure 66 (GMFM)-66</td>
<td>Measures change over time in gross motor skills of children with cerebral palsy. The test is made up of gross motor skills that a child who is typically developing can perform by the age of 5 years. The GMFM aims to measure how much of a task a child is able to complete rather than how well the child performs the task. The test consists of 66 items that are scored on a 4-point likert scale. A longer version with 88 items is also available. Results from the GMFM can help determine a child’s Gross Motor Function Classification System (GMFCS) level (Russell, et al 2002). Data also suggests this test is useful in monitoring gross motor development in children with Down syndrome (Russell, et al 1998).</td>
</tr>
<tr>
<td>Norm Referenced</td>
<td>Test of Infant Motor Performance (TIMP)</td>
<td>Motor assessment of infants 34 weeks post-conception age to 4 months post-term (corrected age). The test examines postural and selective control of movement needed for performance of motor skills in early infancy. The test consists of 13 observation items that are scored on a pass-fail basis and 29 elicited items that are scored according to standardized format. A corresponding screening tool, the Test of Infant Motor Performance Screening Inventory (TIMPSI) is also available (Campbell 2005).</td>
</tr>
<tr>
<td>Norm Referenced</td>
<td>Toddler and Infant Motor Evaluation (TIME)</td>
<td>Assessment tool that can be used for evaluating children with motor delays, develop intervention programs for children with motor delays, and determine efficacy of treatment. The test consists of five subtests including: mobility, motor organization, stability, functional performance, and social/emotional abilities. The test also includes three optional subtests (component analysis, quality rating, and atypical positions) that are particularly helpful for describing children with cerebral palsy. The TIME can be used with children birth to 42 months and provides standard scores for each subtest. (Long &amp; Tieman 1998).</td>
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</table>
EXAMPLE: The eligibility evaluation was a team effort with the OT Kenya, speech-language pathologist Kris, and the ISC Jasmine. Kenya and Kris chose to use the BDI-2 to collect information about Aliyah’s present levels of development compared to children her age. They also observed Aliyah move, play, and eat a snack with her mother Ms. Anderson and Grandma G. present. The ISC, Jasmine, collected information about the family’s resources, needs, priorities and concerns with the family interview two days before the evaluation. Aliyah’s routine is to wake at 6:45 am, be dressed and fed and spend the day with her mother or Grandma G. (M, W & F), have lunch, play, have dinner and a bath with bed time at 8:00 pm. Aliyah’s family describes her as a happy and social child. Her favorite things are music and playing with her cousins. Bed routines are going well. Feeding and lifting Aliyah are difficult for Grandma G. Dressing and bathing routines are difficult for Ms. Anderson. Standing and walking were the priorities for Ms. Anderson and Grandma G. was concerned about Aliyah’s eating more solid foods. Kenya and Kris found that Aliyah has strengths in her cognitive skills and social-emotional development. They observed atypical movement patterns affecting her reaching, standing, and eye-hand coordination; difficulty eating and using her oral-facial muscles for making sounds and chewing/moving food in her mouth; and a 50% delay in adaptive and physical developmental areas (motor, growth parameters for weight) as well as a 25% delay in her communication skills (expressive). The evaluation team recommended assessment of assistive technology to help with lifting, feeding and standing. Linkages to community playgroup and library activities were given as well as linkages to child care and a local women’s employment group to support Ms. Anderson’s goal to further her employment. They recommended Aliyah be found eligible for early intervention and an Assessment, Evaluation and Programming System (AEPS) assessment was scheduled to further determine her needs for program planning. The team also recommended linkages back to her pediatrician for referrals to specialists to determine if her atypical movement patterns and developmental delays have an underlying cause.

Segment 4: IFSP Meeting and Development
The following are important aspects to consider when creating outcomes, strategies, and service decisions with families that are impacted by motor delays and disorders

Outcome Considerations

• Priorities, concerns and resources
• Strengths, interests, routines and activities desired/expected to participate in
• Present levels of development and what skills the child has or needs to meet the possible outcomes identified by the team
• How does the discussion about motor expectations and limitations impact participation and outcomes being discussed?
• What assistive technology will be required to assist the child and family in meeting the desired outcomes?
EXAMPLE: Considering the family concerns and priorities (standing, walking, feeding, lifting), Aliyah’s strengths (social, happy, loves music, playing), her present levels of development, the impact and limitations of her motor delays on participation in her bathing, dressing and meal routines, the team (Ms. Anderson, Grandma G., Jasmine, Kenya & Kris) came up with the following outcomes:

1. Aliyah will walk in the hallway from her room to the bath tub holding onto one of her mother’s hands (10 steps) and stand at the tub to place at least three bath toys into the water at bath time each night.
2. Each night after her bath, Aliyah will put her arms into her pajama top and step into the legs of her pajama bottoms while holding onto her mother or the wall for support.
3. Aliyah will feed herself with her fingers cut up soft fruit and soft cooked vegetables at lunch each day with Grandma G. or mom while listening to her favorite music.
4. Aliyah will easily and safely get onto and off her chair for lunch using a step stool and Grandma G.’s hand.

(See Segment 5 for assistive technology considerations: toys with large handles/easy to grab; bath seat; evaluation for walking supports such as shoe inserts or braces, stable walking toys, step stool)

Strategies

Strategies used by families to promote motor learning and participation are important parts of the IFSP plan. Team members need to consider strategies within the child and family’s routine that will promote participation, support posture and positioning, be age appropriate, and help the child be successful by taking a small step toward meeting the outcomes. Be very specific in your description of the strategies to the team and family.

EXAMPLE: For Outcome #1 Aliyah will walk in the hallway from her room to the bath tub holding onto one of her mother’s hands (10 steps) and stand at the tub to place at least three bath toys into the water at bath time each night

- After her clothes are removed for her bath, practice walking to the bathtub holding both of her hands while singing a song (marching song, song you create, her favorite songs). You can start walking from the doorway of the bathroom to the tub and each night try a few steps further away from the tub.
- Have toys in a basket up on a step stool by the bathtub. Aliyah can take them out and throw them into the tub while holding onto you and/or the bathtub before the bath
- Use the bath ring seat when you place Aliyah in the tub to help her sit and play with the toys she chose using both of her hands.
- Label and say out loud the names of the toys or her actions (splashing, wiping, throwing) as she plays and you bathe her. See if she will repeat the words you say and give her a smile, laugh and repeat the word again if she says it to encourage her to do it again
- During playtime after lunch, place the shopping cart push toy (with the two large rice bags in the bottom) near Aliyah while she is standing at the couch so that she can fill it with toys. Place her hands on the push toy and encourage her to walk behind it with your help. If she is steady, you can remove your hands and let her push it herself while you are close and ready to catch her if she falls or goes too fast.
Services Type, Method, Frequency and Intensity—General Guidelines for Decision-Making

Infants and toddlers with motor disorders and delays require team members with expertise in motor development and adaptive skills to meet their outcomes. Often team members such as occupational and physical therapists have the expertise needed, but teams also may choose to have services from the speech-language pathologist, infant-toddler special educator, assistive technology service providers, orientation specialists or others. Decisions about what team member has the expertise to support the family to meet the outcomes are decided by the team. Additionally, the team will have to consider the method the provider will use to deliver services including consultation, direct services (individual or group), or by monitoring.

Decisions regarding service delivery type, method, frequency and intensity should be made after careful consideration of several factors. Factors to consider include the following (adapted from Hebbler, Malik & Taylor, 2010):

- Complexity of IFSP outcomes
- Needs and complexity of the child for learning new skills
- Needs and complexity of the family-stressors, current level of confidence in their knowledge and skill in supporting their child, culture and language, social supports, preferences for learning new skills
- Number of environments the child is required to participate in
- Family and/or caregiver availability for level of service including daily and family routines of the child
- Child’s age
- If applicable, previous level intervention type, frequency and intensity including successes and barriers

**EXAMPLE:** The team considered the factors for determining service type, method and frequency. The IFSP outcomes were not complex and were embedded into the routines of the child and family’s day that they were most concerned about. Aliyah does need more practice and is slow to process new patterns of movement, sometimes resisting efforts to walk. The family is confident in their ability to practice during the routines identified in the outcomes, especially when the early intervention provider shows them and lets them practice when they come to the house. The family would like to check in with at least one provider each week to make sure they are on track with the practice—their preference is one week at the home and one week at Grandma G.’s.

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<tr>
<th>TYPE</th>
<th>SERVICE DESCRIPTION</th>
<th>SETTING</th>
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<tbody>
<tr>
<td>Physical Therapy – PT with expertise in adapting toys, bracing, and seating</td>
<td>Sessions – 1 individual Frequency – weekly Intensity – 60</td>
<td>Home – one week at Ms. Anderson’s and one week at Grandma G.’s</td>
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<tr>
<td>Speech-language Therapy – SLP with expertise in promoting feeding and strengthening oral-motor skills for eating and talking</td>
<td>Sessions – 2 individual Frequency – monthly Intensity – 45 min</td>
<td>Home – at Grandma G.’s, mom felt that she will learn from Grandma G. what to carry over at home for feeding routines</td>
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Segment 5: Early Intervention Services for Children with Motor Disorders

Early intervention contemporary practice tells us that our purpose is to build capacity of the family to promote skill development, remediate impairments, and to encourage participation. We also help families integrate assistive technology and other supports to compensate for motor impairments that are barriers to participation. Considerations for interventions for children with motor delays and disabilities to meet their outcomes includes

- Natural environments (place, routine, learning opportunities) and model of service delivery
- Amount/type of practice required
- Specific intervention strategies to be used
- Assistive technology

Providing Services in Natural Environments

Young children learn as they engage with their environment during their every day experiences. New skills are learned best within a familiar context that allows for ample opportunities for practice. Any intervention approach that is selected should take into account how young children learn. Table 4 describes a variety of models of early intervention that need to be considered.

<table>
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<tr>
<th>TABLE 4: Models of Early Intervention in the Natural Environment</th>
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<tbody>
<tr>
<td><strong>MODEL</strong></td>
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<tr>
<td>Activity-Based Motor Intervention</td>
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<tr>
<td>Activity Based Intervention (ABI)</td>
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<td>Contextually Mediated Practices (CMP)</td>
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| Developmentally Appropriate Practice (DAP) | Promotes early care and education within an environment that offers content, materials, activities, and methodologies that are coordinated with a child’s level of development and for which the individual child is ready. DAP considers three dimensions of appropriateness:  
  • Age appropriateness  
  • Individual appropriateness  
  • Appropriateness for the cultural and social context of the child | (NAEYC 2009) |
TABLE 4: Models of Early Intervention in the Natural Environment

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<tr>
<th>MODEL</th>
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| Family Guided Routines Based Intervention (FGRBI) | Focuses on the development of intervention that accommodates family preferences, priorities, activities, and schedules. Includes steps to ensure natural environment practices are considered in all aspects of early intervention including:  
  • Introducing the concept of natural environments to the family, collecting information about activities and routines through a routines based assessment,  
  • Connecting the assessment information to the program plan,  
  • Involving the caregiver(s) in teaching and monitoring progress.                                                                    | (Woods, 2012)               |
| Interest-Based Child Learning              | This model builds on a child’s interest and assets as the focus of intervention and is based on the idea that a child’s interest in an activity will increase engagement which in turn will promote adult responsiveness and encouragement supporting the development of socially-adaptive functional capabilities and additional practice. Practice builds competence which in turn will promote use of the skill to explore the environment which will lead to mastery. Success is based on child’s increased opportunities to participate in socially and culturally meaningful activity. Interests of the child can be determined across contexts and tools have been designed to systematically identify interests and learning opportunities within the context of the family and caregivers. | (Raab, 2005; Wilson & Mott, 2006) |
| Participation-Based Services               | The goals of participation-based services are to 1) promote a child’s participation in family and community activities and routines and 2) facilitate developmental competence and learning. In a participation-based approach, early intervention professionals provide intervention for a child by teaching caregivers how to use two primary types of child interventions to promote their participation and learning:  
  • Adapting the environment, materials, or the activity/routine, including the use of assistive technology  
  • Embedding individualized learning strategies within family routines (Colyvas, Sawyer, & Campbell, 2010)  
Like other models this approach requires interventionists to collaborate with families to identify which activities and routines are going well or not so well. | (Campbell & Sawyer 2007; Campbell & Sawyer 2009) |
| Parents Interacting with Infants (PIWI)    | Triadic Practices: Because the parent-child relationship is the critical foundation for learning; PIWI uses a structured method for group-based early intervention. Facilitators expand knowledge and ability of caregivers within the context of activities and routines. | (TaCTICS 2000; McCollum, et al 2001; Bsau, et al, 2010) |
TABLE 4: Models of Early Intervention in the Natural Environment

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<tr>
<th>MODEL</th>
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| Resource Based Intervention Practices           | Strategies focus on mobilizing and providing resources and supports to families to help them reach outcomes. Early intervention providers:  
• Assist families to identify formal and informal supports/resources  
• Identify sources and locations of formal and informal supports/resources  
• Build the capacity of families/individuals to build the capacity of the community to be responsive to individual family interests and priorities  
This model has been shown to:  
• Increase knowledge of families and providers of the availability of community resources  
• Increase the capacity of the family to problem-solve  
• Promote the development of resource-exchange networks  
• Increase parental satisfaction with resources  
• Increase parenting knowledge and skills  
• Enhance parental perceived control over resource procurement  
• Promote child developmental progress |
| Routines-Based Intervention (RBI)               | Routines Based Intervention stresses the importance of engagement, independence, and social relationships within a naturally occurring child activity. Because, intervention to infants and toddlers is a collaborative process often including multiple caregivers, the importance of caregiver satisfaction is stressed. | (McWilliam 2004) |

Amount and Type of Practice

Since interventions are embedded into a child’s naturally occurring routines, the team needs to consider the amount and type of practice that would improve motor development and best meet the outcomes. The literature on how children learn motor skills has identified five concepts related to practice that are important to be aware of when developing an intervention plan specific to promote motor skill development. Table 5 applies these principles of practice to early intervention.

Intervention Strategies

There are many intervention strategies used to promote motor development in children. The selection of intervention strategies should be determined by the provider in collaboration with the family based on the best evidence available, family preferences, and provider experience. Table 6 describes considerations for the service provider when choosing specific intervention strategies for children with motor delay or disabilities to meet the IFSP outcomes and promote participation.

Most service providers learn skills and use their expertise to remediate or establish function, but there are a variety of purposes to consider when deciding on an intervention plan. The
### Table 5: Practice*

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<tr>
<th>PRINCIPLE/CONCEPT</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
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<tbody>
<tr>
<td>Practice Specificity</td>
<td>Practice should take place under conditions that are comparable to the conditions that the skill will be used in</td>
<td>• Intervention occurs in natural environment settings where skill is to be performed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Intervention occurs within daily routines (context) where skill is to be performed</td>
</tr>
<tr>
<td>Amount of Practice</td>
<td>Repetition is necessary</td>
<td>• Embedding strategies within naturally occurring routines allows for frequent practice opportunities throughout a child’s day</td>
</tr>
<tr>
<td>Length of Practice Sessions</td>
<td>Shorter active practice sessions with longer rest breaks improve performance of skills.</td>
<td>• Embedding strategies within naturally occurring routines allows for increased, short opportunities to practice several times throughout the day with rest breaks in between practice</td>
</tr>
<tr>
<td>Practice Variability</td>
<td>Changing skill demands leads to better retention of skills than constant practice in the same manner</td>
<td>• Opportunities to practice same skill within context of multiple routines (e.g., grasping—during mealtimes, playtimes, bath time, dressing, etc.) • Opportunities to practice skill a variety of different ways (e.g. learning to drink from cup using a variety of different cups available)</td>
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</table>

*Descriptions based on Gordon & Magill 2012

### Table 6: Considerations for Choosing Specific Interventions

<table>
<thead>
<tr>
<th>Alter Context</th>
<th>• Select a context (location, routine, learning activity) where the child can perform within their skills and abilities • Change the context to promote the skill and apply to more than one context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapt</td>
<td>• Adapt the context and task demands to support performance • Enhance contextual features to provide cues so tasks become more possible to perform</td>
</tr>
<tr>
<td>Compensate</td>
<td>• Use of assistive technology, adaptive equipment or other devices to allow a child to perform a skill when he or she is not capable of or has yet to master a skill • Can be used to prevent further impairment or disability as they are often used to bypass a barrier to the performance of a desired outcome</td>
</tr>
<tr>
<td>Prevent</td>
<td>• Prevent occurrence of maladaptive performance • Anticipate problems and change course of events to have better outcomes • Prevent the development of secondary impairments or disabilities in children with known difficulties</td>
</tr>
<tr>
<td>Promote/Create</td>
<td>• Create situations that promote more adaptable performance in context • Enrich contextual/task experience to improve performance • Make best use of environment to enhance performance</td>
</tr>
<tr>
<td>Remedial/Establish/Restore Skills/Abilities</td>
<td>• Identify skills and barriers to performance • Design intervention to improve skills and abilities • Restorative: find what is wrong and correct it</td>
</tr>
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</table>
goals of the intervention strategies are to promote a child’s ability for social interaction and parent-child interaction, self-care, play and mobility. Adaptation, prevention and anticipation of problems and barriers, altering the environment to promote success, and compensation with assistive technology are all important foci of service delivery. A service provider may choose more than one or shift focus as needs and priorities change.

When choosing evidence-based intervention strategies, providers and families should consider the following (adapted from New York State Clinical Practice Guideline: Motor Disorders http://www.health.ny.gov/community/infants_children/early_intervention/docs/guidelines_motor_disorders_assessment_and_intervention.pdf):

- Is the intervention likely to accomplish the outcomes of intervention plan?
- Are there any potentially harmful consequences or side effects associated with this intervention?
- What positive effects of the intervention would we hope to see?
- Has the intervention been validated scientifically with carefully designed research studies of young children who have a motor disorder?
- Can this intervention be integrated into the child’s current environment?
- What is the time commitment for the family/caregiver and provider? Is it realistic?
- Does the parent or caregiver find the strategy acceptable?
- Is there a cost to the family?
- What are the pros and cons of this intervention? What do other parents and professionals say about it (both pro and con)?
- Does the provider of the intervention have knowledge or experience using the strategy for issues associated with motor disorders?

**Assistive Technology**

Assistive technology is considered and used to support a child in participating and adapting the context or environment to promote success and meet their outcomes. Assistive technology is any device, service, strategy, or practice that is applied to reduce the problems faced by individuals with disabilities (Cook & Polgar, 2008). Assistive technology can be low tech (pencil and paper, picture communication board) to high tech (wheelchair, splint, etc.) All teams must consider if assistive technology and services are required for a child to meet outcomes. For children with motor disorders, assistive technology is commonly used to support positioning or improve mobility.

**Positioning Tools**

Orthoses and Prosthetics: Orthotic devices are products that are added to the body to support the position of a joint and enhance the function of the arms, legs, or body of an individual to help achieve a desired outcome. A prosthetic device is one that is added to the body in place of a missing limb or body part to achieve a desired outcome. There are
**TABLE 7: Descriptions and Uses of Orthotics**

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>DESCRIPTION</th>
<th>USE</th>
</tr>
</thead>
</table>
| Hand or Wrist Splint or Orthosis | Soft or hard material that slips over lower part of the hand, wrist and sometimes up forearm | • Open thumb/fingers/hand to support use for daily activities  
• Prevent tight finger or wrist tendons |
| Shoe Insert | Placed in shoe and is usually not visible | • Provide arch support  
• Control for mild to moderate pronation of foot |
| Supramalleolar Orthosis (SMO) | Comes just above the malleoli (ankle) | • Provide stable positioning to foot  
• Control for moderate to severe pronation or supination |
| Ankle Foot Orthosis (AFO) | Crosses the foot and ankle joints  
Stops just below the knee joint  
May be solid ankle or hinged | • Provides stability to foot and ankle joints  
• Assist with toe clearance  
• Decrease toe walking  
• Decrease crouching |
| Knee Ankle Foot Orthosis (KAFO) | Crosses the ankle, foot, and knee joints | • Provides stability to foot, ankle, and knee joints  
• Decrease knee hyperextension |
| Hip Knee Ankle Foot Orthosis (HKAFO) | Crosses the hip, knee, ankle, and foot joints | • Provides stability to the hip, knee, foot, and ankle joints  
• Allows for upright posture with hip joints extended |
| Reciprocating Gait Orthosis (RGO) | Cable system that facilitates hip extension during stance phase and hip flexion during swing phase of gait | • Facilitates hip extension and hip flexion during gait  
• Reduces energy expenditure as compared to KAFOs |

* *Cascade Practitioner Resource Guide and Hinderer, Hinderer, & Shurtleff, 2012*

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**TABLE 8: Common Seating & Adaptive Positioning Devices for Children with Motor**

<table>
<thead>
<tr>
<th>POSITION</th>
<th>ISSUE</th>
<th>SAMPLE DEVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prone</td>
<td>Child unable to lift head in prone</td>
<td>• Towel roll or crescent pillow under chest (Boppy or other brand)</td>
</tr>
<tr>
<td>Supine</td>
<td>Child unable to bring hands to midline; hips in abduction/external rotation</td>
<td>• Towel roll, crescent pillow, commercial nesting products to encourage midline positioning</td>
</tr>
</tbody>
</table>
| Sidelying | Child unable to maintain sidelying position | • Towel rolls or nesting products to assist with positioning  
• Commercial sidelyer products available (Tumbleforms Grasshopper) |
| Sitting | Child unable to sit without support or able to sit alone, but without proper positioning | • Use towel rolls or pillows to adjust position in regular chair  
• Increase back support to regular chair  
• Recline chair slightly to adjust for head control  
• Commercial activity chair products (Special Tomato, Tumbleforms, Lekky) |
| Standing | Child unable to stand without support | • Commercial standers available (Rifton, Easy Stand, etc.) |
several different types of orthotic devices used with infants and toddlers. Table 7 describes different devices and examples of when they might be necessary.

Seating and Adaptive Positioning Devices: These devices may be used to help a child achieve a desired position such as sitting or standing that he or she cannot achieve and/or maintain on his own. For example, a chair may be adapted to provide the necessary support the child needs in order to sit upright as he or she interacts with the environment. Table 8 describes some common examples of positioning devices used with children with motor disorders.

Functional and Adaptive Tools: there are many tools to assist children with motor disabilities in feeding, dressing, bathing, toileting, etc.

<table>
<thead>
<tr>
<th>ROUTINES</th>
<th>DEVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding</td>
<td>Cups: • Cut out cups&lt;br&gt;• Handle cups&lt;br&gt;• Lid and spout cups&lt;br&gt;• Straws&lt;br&gt;Spoons: • Built up handle&lt;br&gt;• Bent handle&lt;br&gt;• Soft spoons with shallow bowls&lt;br&gt;Plates, Bowls: • Raised edge&lt;br&gt;• Scoop dishes&lt;br&gt;• Suction bottom/ non-skid&lt;br&gt;Feeding assist and mechanical feeding devices</td>
</tr>
<tr>
<td></td>
<td>Dressing • Stocking and sock aids&lt;br&gt;• Extended shoe horns&lt;br&gt;• Elastic shoelaces&lt;br&gt;• Button and zipping devices</td>
</tr>
<tr>
<td></td>
<td>Bathing • Bathing chair&lt;br&gt;• Grab bars&lt;br&gt;• Mitts for washing</td>
</tr>
<tr>
<td></td>
<td>Toileting • Toilet seat inserts&lt;br&gt;• Toilet chairs&lt;br&gt;• Wiping aids</td>
</tr>
</tbody>
</table>

**Mobility Devices**

Mobility devices are those that help a person move throughout their environment. These may be crutches, walkers, gait trainers, or adaptive strollers, or wheelchairs. Crutches, walkers, and gait trainers help a child walk when they require varying degrees of support. Crutches provide the least amount of support. Two types of crutches are axillary crutches and forearm crutches. Forearm crutches may be used with toddlers without cognitive delays who have spina bifida. These are often used in conjunction with bracing or orthotic devices.
Walkers provide more support. Walkers may be anterior or posterior. Posterior walkers are often used in children with disabilities because they promote an upright posture rather than a forward leaning posture, they also allow a child to move closer to other children or a table or desk. Walkers may have 0, 2, or 4 wheels. Walkers often have other add-ons to provide pelvic stability or adaptations for handles if needed. A gait trainer is a device that is similar to a wheeled walker. They have many different options for support and control.

Wheelchairs or adaptive strollers are examples of wheeled mobility for children with motor disorders. A wheelchair may be a manual chair that is propelled by the child or pushed by an adult or may be a power chair that is controlled by electronic systems. Features of any wheelchair are typically customized to meet the needs of the individual. A variety of seating systems are available. Adaptive strollers are also available to provide additional supports that are not available in standard commercial strollers. Adaptive strollers can be made larger than commercial strollers and can be used for children when a standard commercial stroller is outgrown.

**Considerations for Assistive Technology**

- Who will be involved in making decisions about the AT and following up with the family?
- Context and environment the AT will be used
- Family and caregiver preferences, knowledge and comfort using AT and what training will be needed
- Plan for trying AT and taking data to determine usefulness
- Plan for determining costs and payment, ordering/obtaining the AT, and tracking use or making modifications
- Be specific in type of AT and how it will be used on the IFSP

For more information about making decisions about assistive technology see the Assistive Technology Program for the District of Columbia (ATPDC) (202-547-0918 or http://www.atpdc.org) or the following resources

- Early Childhood Technical Assistance Center: Assistive Technology http://ectacenter.org/topics/atech/atech.asp
- Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) http://www.resnaprojects.org/index.html
- Tots-n-Tech http://tnt.asu.edu
EXAMPLE: Assistive technology considerations for Aliyah to accomplish her outcomes may include toys with large handles/easy to grab; bath seat; adapting her existing seating for meals so that she can get into the seat with assistance; evaluation for walking supports such as shoe inserts or braces, stable walking toys or mobility devices, and step stools. NOTE: Remember assistive technology can be off the shelf, typical child equipment and not necessarily custom therapeutic equipment. Families prefer and accept the more easily accessible AT. They also prefer choices, training, and follow up (AT Services).

Segment 6: IFSP Review
The purpose of the IFSP review is to determine 1) the degree to which progress toward the IFSP outcomes is being made and; 2) whether modification or revisions are needed. For children with motor delays and disabilities considering the following will assist with the IFSP review team to determine if outcomes and/or services need to be modified or changed:

- Child’s progress on IFSP outcomes
- Updated information about the family and child including priorities, concerns, strengths/needs, routines, preferences, interests and activities the child is expected to participate in
- Any assessments of motor development required have been completed and discussed with the family prior to the review and included a team member with expertise in motor development
- Data about the use and success/barriers of any assistive technology has been collected, discussed and documented
- Any new circumstances for the child and family are discussed (changes in health, child care/early education, transportation, home life/living situation, routines)
- Any future child or family events that the child may be participating in that impact mobility, play, self-help, learning or transportation

Segment 7: Transition
Children transition out of early intervention because of family preference, age, or family move. For children with motor delays and disabilities, there are some considerations to include in the process. For a full description on transitions in early childhood in the District of Columbia, see the District of Columbia Office of the State Superintendent of Education, Early Childhood Transition Guidelines http://osse.dc.gov/sites/default/files/dc/sites/osse/publication/attachments/Early%20Childhood%20Transition%20Guidelines.pdf.
**Timeline for Transition in Strong Start**

<table>
<thead>
<tr>
<th>2 Years</th>
<th>2 Years 6.5 Months</th>
<th>2 Years 7 Months</th>
<th>2 Years 8 Months – 2 Years 11 months</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART C</strong></td>
<td><strong>PART B</strong></td>
<td><strong>PART C</strong></td>
<td><strong>PART B</strong></td>
<td><strong>PART C</strong></td>
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</table>

**Considerations for Transitions for Children with Motor Disabilities**

- Progress on IFSP outcomes discussed and documented
- Parent preferences for preschool or learning program
- Child’s interests and preferences for learning, play and physical activity
- Eligibility evaluation for special education and related services includes fine and gross motor development assessments, motor performance such as gait and balance by providers with expertise in motor development
- Program expectations for child and program routines (arrival and departure routines, meals, transitions in activities of the day, toileting)
- Assistive technology needs
- Transportation options and needs (getting on/off bus, adapted car seat, wheelchair ties etc.)
EXAMPLE: Now Aliyah is 2.6 years and has been diagnosed with cerebral palsy. Her mother is working full time and now has a car. Aliyah has been at a child care center and receiving early intervention services of speech-language therapy twice per month for continued communication support and chewing harder foods. She is also receiving PT two times per month to keep up on her shoe inserts and walking around the crowded classroom safely. Ms. Anderson wants her in a preschool environment and to make sure she is ready for Kindergarten considering Aliyah’s delays in adaptive and motor development persist. Her biggest concerns are about her art and pre-writing abilities and speaking as clearly as the other children. She is also concerned that is takes Aliyah a long time to do things like eat and get dressed. Ms. Anderson thinks that Aliyah is ready for the transition and is getting too used to being the big kid at child care, trying to be the teacher some days. Aliyah will be evaluated for her eligibility for special education services next week. Early Stages has all of the latest assessment information and medical documents from the Strong Start team and family. Kenya, Kris and Jemma (Dedicated Service Coordinator) and the family talk about the new priorities and recommend a switch from direct physical therapy services to occupational therapy services (one time per week) (PT will continue to consult for AT support) to address these concerns and prepare Aliyah for her preschool transition. They also discuss Aliyah’s needs for more time for activities such as meals and snacks, classroom transitions and playground activities and what adaptations she will need to meet the expectations of the new preschool routines.

Extend IFSP Option

Children who are in early intervention program in the District of Columbia and are eligible for Part B services (special education and related services) may chose to continue with the early intervention program until age 4 or entrance into preschool. The children and families will develop/update an IFSP that also includes pre literacy and numeracy skills and receive the appropriate services as determined by the IFSP’s outcomes. For more information about this option, see the Office of the State Superintendent, Specialized Education Policies and Regulations http://osse.dc.gov/service/specialized-education-policies-and-regulations.
References


REFERENCES


APPENDIX A

Levels of the Gross Motor Function Classification System


Before 2nd Birthday

**Level I**—Infants move in and out of sitting and floor sit with both hands free to manipulate objects. Infants crawl on hands and knees, pull to stand and take steps holding on to furniture. Infants walk between 18 months and 2 years of age without the need for any assistive mobility device.

**Level II**—Infants maintain floor sitting but may need to use their hands for support to maintain balance. Infants creep on their stomach or crawl on hands and knees. Infants may pull to stand and take steps holding on to furniture.

**Level III**—Infants maintain floor sitting when the low back is supported. Infants roll and creep forward on their stomachs.

**Level IV**—Infants have head control but trunk support is required for floor sitting. Infants can roll to supine and may roll to prone.

**Level V**—Physical impairments limit voluntary control of movement. Infants are unable to maintain antigravity head and trunk postures in prone and sitting. Infants require adult assistance to roll.

Between 2nd and 4th Birthdays

**Level I**—Children floor sit with both hands free to manipulate objects. Movements in and out of floor sitting and standing are performed without adult assistance. Children walk as the preferred method of mobility without the need for any assistive mobility device.

**Level II**—Children floor sit but may have difficulty with balance when both hands are free to manipulate objects. Movements in and out of sitting are performed without adult assistance. Children pull to stand on a stable surface. Children crawl on hands and knees with a reciprocal pattern, cruise holding onto furniture and walk using an assistive mobility device as preferred methods of mobility.
**Level III**—Children maintain floor sitting often by “W-sitting” (sitting between flexed and internally rotated hips and knees) and may require adult assistance to assume sitting. Children creep on their stomach or crawl on hands and knees (often without reciprocal leg movements) as their primary method of self-mobility. Children may pull to stand on a stable surface and cruise short distances. Children may walk short distances indoors using an assistive mobility device and adult assistance for steering and turning.

**Level IV**—Children sit on a chair but need adaptive seating for trunk control and to maximize hand function. Children move in and out of chair sitting with assistance from an adult or a stable surface to push or pull up on with their arms. Children may at best walk short distances with a walker and adult supervision but have difficulty turning and maintaining balance on uneven surfaces. Children are transported in the community. Children may achieve self-mobility using a power wheelchair.

**Level V**—Physical impairments restrict voluntary control of movement and the ability to maintain antigravity head and trunk postures. All areas of motor function are limited. Functional limitations in sitting and standing are not fully compensated for through the use of adaptive equipment and assistive technology. Children have no means of independent mobility and are transported. Some children achieve self-mobility using a power wheelchair with extensive adaptations.
APPENDIX B
Example Child and Family, Aliyah A.

Aliyah is 13 months old. She was born full term weighing 6 pounds 5 ounces. Although the pregnancy was without problems delivery was quite difficult. Ms. Anderson, Aliyah’s mother, was in labor for 22 hours before her obstetrician decided to perform a C-section. Allison was in respiratory distress and she experienced hypoxia in the neonatal period. She was stabilized in the delivery room. She only needed to stay in the NICU for five days. She was discharged to home in what the physicians considered “good shape”. The pediatric resident noted that her muscle tone was “within normal limits”, “primitive reflexes were present and well developed” and range of motion was “full.”

The Andersons became concerned about Aliyah ‘s development at about 6 months of age when she was not rolling nor sitting when placed. The pediatrician referred her to a physical therapist. Aliyah has been receiving physical therapy (PT) for about 5 months. The physical therapist is becoming quite concerned about Aliyah’s overall development and has decided to refer her to the Strong Start program.

The Service Coordinator from Strong Start completed a family interview at the Anderson’s home and arranged a multidisciplinary team eligibility evaluation. The team used the Battelle Developmental Inventory, Second Edition (BDI-2) to determine developmental status and a vision and hearing screen was completed.

According to the referral received from the physical therapist to Strong Start, Aliyah has been a real puzzle as her movement patterns tend to be very inconsistent. She is a delightful child who is saying a few words but her articulation is poor and she is having difficulty eating solid foods. The therapist also told the program that the family is really interested in helping Aliyah learn to stand as she is more than 1 year old.

Although Ms. Anderson was very nervous about the evaluation, the eligibility evaluation went very well and Aliyah performed to the best of her ability. According to the report generated by the team (an occupational therapist and a speech language pathologist) Aliyah has some clear developmental strengths and some areas of development that need to be worked on. She passed her vision screening and hearing screening. Her development as assessed by the BDI-2 is:
• **Personal-Social:** Aliyah has an age-equivalent of 10 months. She interacts with adults by cooing, babbling, and playing games such as “peek-a-boo”. Allison appears to be friendly with familiar people, but she is beginning to be wary of strangers when they approach her.

• **Adaptive:** Aliyah has an age-equivalent of 5 months. Although Aliyah can hold a bottle and drink when held in a semi-reclined position, she has more difficulty holding her bottle when placed in supported sitting or held more upright. She appears to get tired and her arms don’t seem “strong” enough to hold her bottle. She is just beginning to pick up some food items with her hands from her tray and bring them to her mouth. She will also eat semi-solid food from a spoon. Ms. Anderson reports that it seems to take a long time to feed Aliyah.

• **Communication:** Aliyah has an age-equivalent of 9 months. She is beginning to say a few words such as ‘Momma’, ‘Dada’, ‘Ba’ for bottle, and ‘rrr’ for Rough the dog. She appears responsive to the words and expressions that she hears. She can follow simple directions like “wave bye-bye”, “come”, “give me” and will respond appropriately to simple questions like “Where’s Dada?”, “Where’s Rough”, “all gone”.

• **Cognitive Ability:** Aliyah has an age-equivalent of 12 months. A strength for Aliyah is in the cognitive or problem-solving area of development. She clearly demonstrates object permanence and the understanding of cause and effect tasks. She appears quite inquisitive, exploring her environment and new environments with her eyes. She really enjoys making the bell sound on her “cell phone” by hitting the call button.

• **Motor:** Aliyah has an age-equivalent of 6 months. The motor area is an area of difficulty for Aliyah. She will sit on the floor by herself when placed but has difficulty playing with toys. She will move along the floor either by rolling or pulling herself with her arms. She will, however, hold a crawling position when placed. She enjoys being held in standing and will hold onto furniture when placed. When standing, Aliyah appears to compensate for low muscle strength by locking her knees. Occasionally she will extend up onto her toes. Her fine motor skills are more advanced than the gross motor skills. She can pick up a Cheerio using a pincer grasp; she bangs two small blocks together; will point with one finger and reach out with one hand to grasp at objects and toys. She enjoys playing with toys that require dumping, dropping into a bucket, and making stirring motions.

The speech therapist also noticed that Aliyah drooled quite a bit, held her mouth opened and generally described her facial muscles as being hypotonic. The occupational therapist agrees with the physical therapist that Aliyah’s movements are atypical. Sometimes she seems stiff when you hold her and other times her mother describes her as floppy.