Guidelines for Best Practices in Determining Eligibility Based on Children’s Communication Skills

The goal of these “Guidelines for Best Practices in Determining Eligibility Based on Children’s Communication Skills” is to offer the evaluation team support in their decision-making regarding a child’s need for early intervention services based on communication development.

In Wisconsin, communication is defined in HFS 90 [HFS 90.08 (7)(c)3.] as follows:

*Communication development, as evidenced by understanding, expression, quantity and quality of speech sounds or words, and communicative intent through gestures. Communication development includes the acquisition of communications skills during pre-verbal and verbal phases of development; receptive and expressive language, including spoken, non-spoken and sign language means of expression; oral-motor development; auditory awareness skills and processing; the use of augmentative communication devices; and speech production and awareness.*

To determine eligibility the team must consider a number of components of communication including:

- **Receptive language** - understanding, comprehension, receptive language, auditory awareness skills and processing;
- **Expressive language** - expression, production, social language (pragmatics);
- **Speech, voice, fluency** - quantity and quality speech sounds and words; and,
- **Oral-motor development** - the structure and function of the speech mechanism for feeding and speech development.

In these guidelines:

- Each communication component is *defined* and *developmental information is offered*;
- A list of *recommended practices* for evaluation is provided;
- Several *methods and tools* for evaluation are listed;
- *Considerations* related to eligibility, including use of informed clinical opinion in decision making and interpreting results are discussed; and
- References, readings, and websites are provided.

These guidelines are written to be useful to the entire team, including parents, but some components are specifically intended for speech-language pathologists. The guidelines were developed to help individuals who work with young children and their parents consider the many facets of a comprehensive communication evaluation.
Receptive Language

Receptive language is a term that is synonymous with language comprehension or understanding of what is spoken, written, or signed. It refers to the child’s ability to get meaning from language. The development of receptive language for the spoken word is dependent on the development of auditory perception and auditory processing skills. Auditory perception refers to the identification, interpretation, or organization of sensory data received through the ear. Auditory processing refers to the ability to fully utilize what is heard.

Receptive language has its foundations in the infant’s social interactions. The infant learns to recognize the human voice, to differentiate speech from nonspeech sounds, and to begin to associate meaning to the sounds heard during the first months of life. Understanding words generally begins with understanding commonly spoken, familiar people and object names or routines (e.g., bye). In the first year of life, children come to understand words related to people and objects that are present in their environment. In the second year of life, the child begins to understand words spoken without the support of context. For example, when the caregiver says, “Go get your shoes” the child may go to another room to retrieve them. At the end of the second year, children are beginning syntactic understanding of two-word relations and early question comprehension begins. Table 1 is a summary of receptive language development in typically developing children.

<table>
<thead>
<tr>
<th>Approximate Age Range</th>
<th>Receptive Language Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-12 months: Comprehension of routines</td>
<td>Understands a few words in context (e.g., plays peek-a-boo when mom says words and models gestures, responds to direction “splash” if in tub)</td>
</tr>
</tbody>
</table>
| 12-18 months: Lexical guides to context-determined responses | Understands single words for objects in immediate environment  
Will get an object if told to when object is in view  
Will perform some actions (e.g., kiss, hug, pat) with verbal instruction alone  
Knows names of familiar people  
Average receptive vocabulary size:  
12 months: 3 words  
15 months: 50 words  
18 months: 100-150 words |
| 18-24 months: Lexical comprehension but context determines sentence meaning | Understands two-word combinations similar to those produced including:  
Action-object  
Agent-action  
Possessor-possession  
Entity-location  
Action-location  
Understands words for objects that are out of view  
Does not process three-term relations (e.g., agent-action-object) fully  
Average receptive vocabulary size: 150-500 words |
| 24-42 months: Context-influenced comprehension | Understands three-term relations (agent-action-object) but has difficulty using word order to identify agent versus object in improbable (e.g., Baby feeds mother) or neutral (e.g., Horse pushes cow) sentences  
Understands who, what, where, and whose questions |
| 42-48 months: Emerging syntactic comprehension | Understands word-order cues to agent-action-object relations  
Understands how questions  
Average receptive vocabulary size: 1,000-3,000 words |

Expressive Language

Birth to 18 Months

A child learns to use language to interact with others and to communicate more efficiently and effectively. The form and complexity of the child's communication skills change substantially during the first three years of life. Additionally, research has consistently demonstrated that a child begins to communicate long before producing his or her first word.

At birth, the child’s behavior is best described as nonintentional (i.e., not purposeful or goal-directed) and noncommunicative. In fact, the word, “infant” comes from the Latin “infans,” which means, “not speaking” (Owens, 1996). Until the age of approximately 9 months, the typically developing child's behavior is considered nonintentional (not purposeful) and noncommunicative (lacking communicative intent); however, the primary caregivers respond as though the child's behaviors are intentional and communicative. For example, when the infant goos and coos, the caregiver is likely to respond as though the infant is conveying a message. Such responses from the caregiver are important to the child's learning to communicate nonlinguistically via the use of eye contact, gestures, and vocalizations (in isolation and in combination). As the child progresses through this stage of development, his or her behavior becomes increasingly more intentional (i.e., purposeful and goal-directed). The infant’s prelinguistic behavior is used primarily for four purposes: relief from discomfort; attainment of desired ends; reestablishment of proximity; and initiation, maintenance, and termination of an interaction (McLean & Synder-McLean, 1978).

Gradually, the child expresses these purposes through the use of nonlinguistic and then linguistic communicative behavior. Beginning at approximately 9 months of age the child continues to use nonlinguistic behaviors, but uses the behaviors to intentionally communicate a message. By the age of approximately 12 to 18 months, the child has begun to use single words to communicate messages that had previously been communicated nonlinguistically. Word combinations begin to emerge when the child is approximately 18 to 24 months old, reflecting beginning use of grammar.

Appendix 1 provides a summary of expressive language development for typically developing children from birth to 18 months.

18 to 36 months

During this period, children progress from producing single words to using simple sentences to express a variety of meanings. They also express a greater range of communicative intentions (greeting, requesting, commenting). Although there is considerable variability of vocabulary size in young children, this variability greatly decreases during the third year of life. The communication development in this period is dramatic and for ease of discussion, the period is discussed in two stages.

18 to 24 months:

Paul (2001) describes a significant increase in the frequency of both nonverbal and verbal communication in children between 18 and 24 months of age. In addition, children increasingly use words over preverbal communication. The child of about 18 months produces an average of two communicative acts/per minute to express an intention through words, gestures or vocalizations; a
child of 24 months produces an average of five. (Wetherby, Cain and Walker, 1988; Paul and Shiffner, 1991). The communicative intentions that are expressed most frequently include requesting information, answering questions, and acknowledging what was said. The ability to combine words is one of the hallmarks in language production typical of the 18 to 24 month range.

**Other notable aspects of children’s language in this range:**

**Vocabulary Size**

<table>
<thead>
<tr>
<th>Approximate Age</th>
<th>Approximate Number of Words in Expressive Vocabulary</th>
</tr>
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<tbody>
<tr>
<td>18 months</td>
<td>50</td>
</tr>
<tr>
<td>20 months</td>
<td>150</td>
</tr>
<tr>
<td>2 years</td>
<td>20-300</td>
</tr>
</tbody>
</table>


**Two-word combinations emerge to express meaningful relationships including** (Brown 1973):

- Agent-object: “Me ball”
- Agent-action: “Mommy eat”
- Action-object: “Eat cookie “
- Action-locative: “Throw chair” (Throw it onto the chair)
- Entity-locative: “Baby bed” (Baby is in the bed)
- Possessor-possession: “Mommy shoe”
- Demonstrative-entity: “This ball”
- Attribute-entity: “Big ball”
- Recurrence: “More milk”
- Non-existence: “No cookie”
- Negation, Disappearance: “Cookie all gone”

**Range of Mean Length of Utterance (MLU) in morphemes**

*An MLU is the smallest unit of meaning, e.g. “ball” equals one morpheme, “balls” equals two morphemes.

- At 18 months: 1.0-1.6 morphemes
- At 21 months: 1.1 – 2.1 morphemes

**24 – 36 months:**

Major developments in children’s language at this stage include: talking about absent events and objects; using language in pretend play; using grammar; and beginning to participate in conversations.

**Vocabulary Size**

300-1000 words (Reed, 2005)

**Expansion of meaningful relationships**

- Greets adults spontaneously
- Relates experiences from recent past
- Uses polite language (please, thank you)
- Use of spatial terms (in, on, under)

**Developing Grammar**
During this stage, children use phrases and short sentences and begin to incorporate the following grammatical features:
- *Ing (added to verbs), plural nouns end with /s/*,
- *In/on spatial terms*
- *Negation: no, not, can’t, don’t*
- *Simple questions*
- *Gonna, wanna, gotta, hafta + verb*
- *Am, is and are used with verbs*
- *Be verbs used inconsistently (is, are)*
- *Over-generalized past tense verbs appear (e.g., ”jumpted”)*

**Mean Length of Utterance (MLU): Ranges**
At 24 months: 1.5 – 2.2 morphemes
At 27 months: 1.9 – 2.4 morphemes (a variety of two–three word phrases and sentences emerge)
At 30 months: 2.0-3.1 morphemes
At 33 months: 2.5-3.5 morphemes
At 36 months: 2.5-3.9 morphemes
SPEECH SOUNDS

Children’s ability to produce sounds and make their speech clear develops quickly over the first three years of life. The way children speak is more than the words, gestures, and expressions they use. What sounds they make and how they make the sounds influences their ability to be understood by others.

Speech sound development proceeds over time during the infant and toddler years. In infancy, there are stages of normal non-cry development (See Appendix 2). As children develop, so does their ability to master vowels and consonants of the language. There is a range when individual children may master particular sounds. Kent (1999) summarizes the approximate ages of speech sound mastery (75% or better) based on several studies of children’s acquisition of consonant sounds:

- **Group 1**: [m n h p f] 2-5 years
- **Group 2**: [j k d w b t g] 2-6 years
- **Group 3**: [s r l t] 3-7 years
- **Group 4**: [voiced and voiceless th dz v z] 4-7 years

Children’s speech sound development is affected by their ability to coordinate the oral motor system (i.e., lips, tongue, palate, larynx, respiration) and to learn the underlying rule system related to sounds (i.e., phonology). According to Linder (1993), by two years of age 50%-65% of words will be understood by unfamiliar adults. By the age of three most children’s speech is understandable to familiar adults and about 75% of utterances produced by 3-year-olds are intelligible to unfamiliar listeners (Vihman & Greenlee, 1987).

In Table 2 below, Sanders (1972) summarizes children’s acquisition of consonant sounds.
Sander's (1972) Consonant Acquisition

Average age estimates and upper age limits of customary consonant production. The solid bar corresponding to each sound starts at the median age of customary articulation; it stops at an age level at which 90% of all children are customarily producing the sound.

**VOICE**
Voice is sound produced by the vibration of the vocal folds and modified by the resonators (e.g., sinus cavities) and shaped by the articulators (e.g., lips and tongue). Voice characteristics include pitch, volume, and quality.

**FLUENCY**
Young children learning language demonstrate normal developmental disfluencies (interruptions to the flow of talking), which most often disappear as their expressive language skills mature. These developmental disfluencies are characterized by:
- hesitations,
- interjections of sounds, syllables, and words
- word and phrase repetitions.

This characteristic of speech and language development is considered to be normal and therefore does not require any type of intervention, except to allay the parents’ fears and concerns by explaining this course of normal development.

Differentiating children whose stuttering-like disfluencies (SLD) will naturally resolve versus those whose stuttering will persist is an important question. The Illinois Longitudinal Study (Yairi & Ambrose, 2005) focused on this question and followed 89 children with an average age of onset 33 months. Several findings about which children persisted in stuttering included: 1) about 20% of children persisted in their stuttering which is consistent with other data; 2) their age of onset was slightly later; 3) girls tend to resolve their stuttering and did so faster than boys; and 4) predictions of who will recover based on measuring stuttering-like disfluencies alone is difficult. They suggest that the best predictor is a decrease in all SLD types, which approach normal limits within 6 to 8 months following onset.

**ORAL MOTOR SKILLS**
Speech requires a command from the central nervous system to move and control more than 100 muscles. Development of the oral motor system depends then on the maturation of the central nervous system. The oral motor system undergoes a long period of development and may not be complete until early adolescence. Critical periods occur, it appears, when certain neural, musculoskeletal, environmental and cognitive changes occur in the child, which in turn promote the growth and functioning of the oral motor system.

The following are examples of how the changes in the anatomy and physiology of the infant over the first year of life affect vocal output. Little is known as to what effect, if any, crying has on later speech development.
- From birth to 3 months of age, the infant's vocal output is:
  - nasalized
  - short in duration
  - vowel-like in nature due to vocal tract size and shape
- At 3 months, when in a sitting position, the infant assumes adult-like use of the ribs and abdomen.
By 7 months:
- breathing patterns are essentially adult-like
- the lower jaw grows down and forward
- the larynx moves rapidly downward
- the upper airway assumes more mature dimensions
- swallow becomes more mature as the tongue draws backward rather than forward
- eruption of the front teeth may increase tongue retraction
- lip, tongue and jaw movements become more independent in early chewing
- consonant (C) - vowel (V), VC and VCV productions appear in a single expiration.

From 3 to 9 months:
- the jaw becomes independent of the lower lip and tongue
- a full range of vowels are produced
- voiced/voiceless contrasts are produced
- there are first variations in pitch
- the infant can produce nasal versus non-nasal consonants

From 12 to 24 months:
- The emergence of words coincides with the completion of myelination of the major neural pathways believed important to speech
- A period of stabilization in musculoskeletal growth occurs

Kent (1999) provides the major milestones and conclusions about the development of the three major speech motor control subsystems (i.e., respiratory, laryngeal, upper airway/speech production). Some of this information is highlighted below:

**Respiratory Subsystem:**
Newborn  
Diaphragm of newborn has bellows-like displacement  
Rest breathing rate is 30-80 breaths per minute
2 months  
Alveolar development begins
3 years  
Respiratory function not closely geared to linguistic requirements until this age  
Rest breathing rate is 20-30 breaths per minute

**Laryngeal Subsystem**
Newborn  
Laryngeal position is high in the neck, so the laryngopharynx is relatively short  
Vocal folds are 5-7 mm long
Birth-3 years  
A child’s larynx does not yet possess a vocal ligament, and the cartilaginous portion of the folds is proportionately large. During this period the larynx descends in the neck as the laryngopharynx takes form

**Upper Airway**
Birth  
Newborn vocal tract anatomy resembles that of a nonhuman primate  
The larynx descends  
Primary dentition emerges at about 6 months; the dental arcade establishes boundaries and points for articulation for the tongue
1 year  
First primary molars achieve occlusal contact at about 16 months; this occlusal event marks the appearance of a stable jaw closing pattern
2 year  
Rapid growth of the lips between age 1 and 2
3 year  
Laryngopharynx well developed
Recommended Practices for Communication Evaluation to Determine Eligibility for the Birth to 3 Program

Communication evaluation should be completed within a multidisciplinary context that evaluates the child across all developmental domains. It is recommended that communication evaluation include consideration of the child's:

- hearing ability and hearing history
- history of speech-language development
- expressive and receptive language performance (syntax, semantics, pragmatics, phonology)
- speech
- oral-motor functioning and feeding history
- voice (quality, pitch and loudness)
- fluency (rate and flow of speech/language)

When communication delays are the primary concern of the parent or referring source, a speech-language pathologist should be a member of the team.

In evaluating a child who has a possible communication delay, it is important that the evaluation team not rely solely on test scores but gather and use information from observations, interviews and records as well as their clinical judgment. Evaluation tools and procedures should be individualized age-appropriate, and culturally sensitive for the child and family.

It is recommended that the evaluation of young children with possible communication delays include both standardized tests and alternative evaluation approaches. Standardized tests are important because of the objectivity and structure they offer to the evaluation process, even though standardized test scores alone are insufficient to make a determination of delay. Alternative approaches, such as an analysis of samples of the child's speech and language, are important because many dimensions of communication are not easily measured using standardized tests (such as pragmatics, discourse, voice, fluency, and oral-motor skills).

It is recommended that an evaluation of a child with a possible communication delay include the following components:

- standardized tests of expressive and receptive language
- samples of spontaneous speech and language collected in natural contexts
- observations of communicative interactions
- interviews with caretakers

**Standardized tests of expressive and receptive language** are recommended as part of the evaluation. It is important that these tests be appropriate for the age, language, socio-economic status, etc, and include both norm-referenced and criterion-referenced measures, as described below:

- norm-referenced measures compare the child's performance to an appropriate peer group (matched for age, culture, and language)
- criterion-referenced measures compare the child's performance with an established level or predetermined standard
Samples of the child’s spontaneous speech and language should be collected in natural contexts. The language samples are used to determine language level and to describe language form, content, and use. Language measures derived from spontaneous language samples may be useful as a quantitative method for assessing language problems in young children. The sample can also be used to make decisions about speech development including developing a sound inventory, completing a babbling analysis, categorizing sound errors and/or patterns of errors, and making judgments about intelligibility.

Another important component of the evaluation is the observation of the primary caregiver’s communicative interactions with the child. Language is a social tool for the child; thus, it is important to examine the child’s communicative environment. Observation of the communicative behavior of the caregiver and child will be used to determine the characteristics of the communicative environment that might influence the child’s communication (e.g., opportunities for the child to communicate, communicative behaviors of others during interactions with the child) as well as ways in which the child’s communication skills might influence his/her communication environment. These observations can also be organized to gain information about the child’s ability to understand language e.g., vocabulary, directions, etc.

Interviews with caregivers are essential. The caregivers’ concerns and comments about the child’s communication abilities, strengths, and challenges are critical to the evaluation process. These interviews can be conversational in tone but should be organized to gain the caregiver’s perspective across all areas of communication.

In each evaluation for determining eligibility based upon the child’s communication skills, it is necessary to rule out hearing loss as a contributing factor. For example, otitis media with effusion is commonly associated with reduced hearing acuity. When present at critical milestones of speech and language development, the otitis media with effusion can negatively affect the child’s communication development. A child of any age can have a hearing evaluation. The nature and importance of an audiological evaluation should be discussed with the child’s family and physician and referrals should be made as appropriate.
Evaluation of Receptive Language

A child with communication delays or disorders might have difficulties with receptive language function. Consequently, it is important to assess the child’s receptive language skills. Such an assessment should address (1) the child’s ability to attach meaning to single words and to word combinations, and (2) the extent to which the child relies on nonlinguistic cues to attach meaning to linguistic input.

There are few standardized measures of receptive language available for children from birth to three years of age. (See Appendix 3 for a list of Evaluation Tools and Methods.) Some receptive language assessments are based primarily on parent report. Receptive language measures based on parent report can be less reliable than measures of expressive language because of the variability in the caregivers’ interpretations of the questions (Dale, 1991). Other measures use primarily elicitation tasks in which the child is instructed to respond to verbal instructions. Many young children do not respond to such tasks because the tasks are somewhat structured and contrived rather than naturalistic.

Therefore, to supplement the findings of standardized receptive language measures, the speech-language pathologist (SLP) should incorporate informal assessments of the child’s receptive language skills. Through observation of the child, the SLP can determine the child’s skills in understanding single words and word combinations with and without the support of nonlinguistic cues. The SLP can observe the child’s responses during interactions with family members and other caregivers. In addition, informal tasks, such as those described by Miller and Paul (1995) can be used to assess the child’s comprehension of single words and specific semantic relations, grammatical forms, and syntactic constructions. It is important to remember that a child’s incorrect response or lack of response does not conclusively indicate comprehension difficulties.
**Evaluation of Expressive Language**

The evaluation of expressive language in young children can be less complicated than receptive language because this more readily observed. The key to evaluating expressive language is collecting and analyzing authentic samples of the child’s use of expressive language. The language samples should be obtained through observations during interactions with parents, family members and other caregivers. The evaluation of expressive language between birth and 36 months of age should focus on a variety of behaviors, including:

- **prelinguistic behavior** (behavior that does not include true words; can be intentional or nonintentional);
- **nonlinguistic communicative behavior** (behavior that is intended to convey a message through the use of nonverbal behavior only); and
- **linguistic communicative behavior** (behavior that is intended to convey a message through the use of true words).

Children with a language delay may be producing few, if any, intelligible words. The language sample focuses on the child’s use of prelinguistic, nonlinguistic and early linguistic behaviors. For the emerging and developing language stages, sample analysis includes the size and extent of vocabulary, the intentions expressed, the basic semantic roles (the various meaning relationships expressed), and grammar development.

Standardized assessments of expressive language can be used to supplement the results of the language sample analysis. Such assessments can include parent report and/or elicitation tasks. The context for elicitation tasks tend to be structured and less naturalistic than the context for a language sample. However, standardized assessments can provide additional information about the child’s expressive language skills. (See Appendix 3 for a list of Evaluation Tools and Methods.)

**Evaluation of Speech**

Many factors influence and can interfere with the development of intelligible speech in young children. A child’s speech development and intelligibility can be affected by: 1) hearing loss; 2) speech motor control problems; 3) delays or disorders of the sound system; 4) cranial facial anomalies; 5) voice disorders; and 6) fluency problems. If a child’s speech intelligibility is decreased, the evaluation should measure how much the clarity of the message is affected and attempt to disambiguate the factors contributing to the decreased intelligibility.

**Methods for Evaluation of Speech Intelligibility**

There are several ways to quantify speech intelligibility depending on the age and the amount of speech produced by the child.

1. **Percent Intelligible Words** – This intelligibility measure is generally derived from analysis of spontaneous speech that is audio taped. A useful method is to obtain a 100 word sample and calculate the percent of intelligible words by having an unfamiliar listener write down the words understood.

\[
\frac{\text{# of intelligible words}}{\text{# of total Words}} \times 100 = \text{Percent of Intelligible Words}
\]
2. **Percentage Consonants Correct** (PCC) – (Shriberg and Kwiatkowski, 1982b) compares child's pronunciation with the adult form in terms of the proportion of correct consonants to the number of possible consonants.

\[
\frac{\text{# of correct consonants}}{\text{# of consonants}} \times 100 = \text{PCC}
\]

Their scale classifies a level of delay based on percentage of consonants correct:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Percentage of Correct Consonants (PCC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>85-100% PCC</td>
</tr>
<tr>
<td>Mild-moderate</td>
<td>65-85% PCC</td>
</tr>
<tr>
<td>Moderate to severe</td>
<td>50-65% PCC</td>
</tr>
<tr>
<td>Severe</td>
<td>less than 50%</td>
</tr>
</tbody>
</table>

3. **Speech intelligibility 5-pt rating scale** (Ray, 2000) – This measure uses a 5-point rating scale to determine level of intelligibility

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Normally intelligible</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>Minimally impaired</td>
<td>70 - 90%</td>
</tr>
<tr>
<td>2</td>
<td>Mildly impaired</td>
<td>50 - 70%</td>
</tr>
<tr>
<td>1</td>
<td>Moderately impaired</td>
<td>30 - 50%</td>
</tr>
<tr>
<td>0</td>
<td>Severely impaired</td>
<td>10 - 30%</td>
</tr>
</tbody>
</table>

**Methods for Evaluation of the Speech Sound System**

In making a decision about whether a speech delays exists, it is important to collect a sample of the child’s speech. With infants and toddlers this sample is generally collected in a play situation while interacting with the caregiver, speech-language pathologist or other early interventionist. The speech sample is collected similarly to the collection of the language sample. It is analyzed from a different perspective i.e., instead of looking at word use and grammar, speech sounds and how they are produced are analyzed. For children between two and three years of age, a standardized measure (e.g., *Goldman-Fristoe Test of Articulation –2*) may be used to collect an inventory of speech sounds. See Table 2, “Sanders (1972) Consonant Acquisition,” for a summary of speech sound mastery.

One resource for evaluating the early speech sound development of infants and toddlers is the *Language Production Scale* from "Assessing Prelinguistic and Early Linguistic Behaviors in Developmentally Young Children" by Olswang, L., Stoel-Gammon, C., Coggins, T., and Carpenter,
P., 1987. This scale includes methods for completing a babbling analysis to measure the phonetic complexity of babbled utterances. An outline of the information about this scale is found in Appendix 4. Another portion of the scale is the Early Meaningful Speech Analysis which is based on a sample of 100 fully or partially intelligible utterances produced by the child. From this sample relevant analyses are completed to: 1) describe the child’s phonetic inventory; 2) compute PCC (described above); 3) measure occurrence of simplification patterns or phonological processes; 4) count the number of different words produced; and 5) measure length of utterance and word meanings expressed.

**Methods for Evaluation Speech Motor Control System**

Another potential cause of speech intelligibility problems in infants and toddlers is weakness and/or coordination difficulties of the speech motor control system (SMCS). Caregiver interviews and observation of the child in conjunction with elicitation tasks can be useful in determining whether the SMCS is contributing to speech delays or a breakdown of intelligible speech. Signs that implicate the SMCS as a contributing factor to the intelligibility concerns include:

1. **Respiration:**
   a. short phrases only in older children (3+ years)
   b. inappropriate pausing within phrases
   c. decreased loudness
   d. excess variation in loudness or monoloudness
   e. audible or frequent inspiration

2. **Phonation**
   a. monopitch or excess pitch variation
   b. inappropriate pitch level for age, size or sex
   c. lack of prosody (melody of the speech)
   d. vocal fry (gravelly, rough voice)
   e. falsetto
   f. harshness
   g. breathiness

3. **Resonation:**
   a. hypernasality (sounds like air comes through the nose)
   b. hyponasality (sounds like a cold in the nose)

4. **Articulation:**
   a. unintelligible speech
   b. slurred speech

5. **Other indicators:**
   a. drooling
   b. feeding problems
   c. gross and/or fine motor problems

There are two major types of speech motor disorders that affect speech production and influence intelligible speech. These speech motor disorders are dysarthria and developmental apraxia of speech (DAS). Below are definitions for each of these speech motor disorders, associated characteristics and methods to include in evaluation.

1. **Dysarthria** a **collective term for a group of** motor speech disorders resulting from neuromuscular dysfunction. There are different types of dysarthria affecting one, several or all major subcomponents of speech production: respiration, phonation, resonance and articulation. In infants and toddlers dysarthria is frequently associated with cerebral palsy or
progressive neurological disease (Marquardt, 2000). Some characteristics often used for diagnosis include:

- General motor and postural delays
- Low muscle tone or hypotonia
- Fine motor timing deficits
- Decreased primitive reflexes
- Rough voice production
- Voicing errors & vocal fold vibratory irregularities
- Variability in formant transition patterns
- Difficulty maintaining adequate intra-oral pressure
- Imprecise consonant productions
- Persistent speech sound distortions
- Speech timing errors (Leddy, et.al, 2003)

2. Developmental apraxia of speech (DAS)

Developmental apraxia of speech (DAS) is defined as an inability or difficulty with carrying out purposeful, voluntary movements for speech in the absence of a paralysis of the speech musculature. Most definitions focus on the articulatory aspects of the disorder and the inability to sequence speech movements (Strand, 1998). There is controversy as to whether DAS exists as a specific deficit because speech is a complicated fine motor activity that is continuously interactive with cognitive and linguistic processing.

Strand (1998) and Shriberg, Aram, & Kwiatkowski (1997) indicated that speech-language clinician “don’t have good diagnostic markers” related to Developmental Apraxia of Speech (DAS); however, a differential diagnosis (to determine whether the intelligibility problem is due to other factors than DAS) is essential. Some characteristics often used for diagnosis include:

- receptive language skills are superior to expressive language skills
- frequent phoneme omission errors
- inconsistent phoneme errors
- presence of vowel errors
- increase in errors with longer units of output
- simple syllable shapes noted
- connected speech poorer than single words
- function words and bound morphemes omitted
- difficulty with sound sequencing and diadochokenetic (i.e., rapid, alternating movements) rates
- groping and/or trial and error behavior
- methathetic errors (transposition of sound or syllable in words)

A factor frequently associated with DAS is disturbance with prosody, including slower rate, inappropriate or longer pauses, reduced stress variation, and errors in syllabic stress.
Methods for evaluation for Dysarthria and DAS
The following communication evaluation information should be collected:

1. Family history
2. hearing status
3. evaluation of language comprehension
4. evaluation of language production
   ✓ collect a language sample
5. evaluation of phonologic and phonetic inventory (segmental)
   ✓ collect speech sample
   ✓ assess ability to sequence sounds using a hierarchy of difficulty
   ✓ determine type and pattern of errors
   ✓ observe volitional versus nonvolitional productions
6. evaluate suprasegmental factors (prosody/melody of speech)
7. evaluate automatic (e.g., counting, rhyme) vs. spontaneous speech
8. evaluation of the structure and function of the mechanism
   ✓ elicit nonspeech movements
   ✓ check the ability to produce sounds associated with the mechanism
   ✓ evaluate diadochokentic (i.e., rapid, alternating movements) rates

Cranial Facial Anomalies – Cleft Lip & Palate
For children with an identified cleft lip and/or palate the speech-language pathologist must determine the extent to which the cleft contributes to the child’s articulation or phonological errors and overall intelligibility. Approximately one in about 800 babies is born with a cleft lip or palate. Roth and Worthington (1996) define cleft palate and or lip as a congenital malformation that results from the failure of oral structures at midline to fuse during the first trimester of pregnancy. Children with cranial facial anomalies are generally followed by an interdisciplinary team with expertise in these disorders. Surgery for cleft lip is generally done when the infant is about 10 weeks old. Repairing a cleft palate is a more extensive surgery and is usually done when babies are between nine to 18 months of age.

Canady, Karnell, and Marsh (1999) report that children with a cleft lip only, with no other problems, should have normal or close to normal speech development. They further state that approximately 80% of infants born with clefts of the palate develop normal speech once their palates are repaired. Additionally, children with clefts of the palate are at increased risk for language and cognitive delays or disorders. With the cleft of the palate the most significant speech problem may be velopharyngeal incompetence resulting in audible nasal emission, hypernasality, and articulation errors especially of fricatives (e.g., f, s, z), affricatives (e.g., ch, sh) and plosives (e.g., p, b, m).

Submucosal clefts in children may go undetected at birth and often are difficult to detect in children of any age. Hypernasal resonance may be the hallmark for this type of cleft. An oral motor evaluation is essential and the palate should be palpated (midline from front to back of palate) to determine whether the submucosal cleft exists. Submucosal clefts are the most common association with syndromes and a referral for genetic counseling may be warranted.
Methods for evaluation of children with cranial facial anomalies
The following communication evaluation information should be collected:
1. medical and surgical history
2. hearing status
3. feeding evaluation at birth
4. evaluation of language production
   ✓ collect a language sample
5. evaluation of phonologic and phonetic inventory (segmental)
   ✓ collect speech sample
   ✓ determine type and pattern of errors
   ✓ observe volitional versus nonvolitional productions
6. evaluate suprasegmental factors (prosody/melody of speech)
7. evaluation of the structure and function of the mechanism
   ✓ elicit nonspeech movements
   ✓ check the ability to produce sounds associated with the mechanism

Considerations for Evaluating Voice
If voice concerns arise or are already documented via medical history, consideration of outside referral for evaluation may be appropriate. Evaluation of a child with vocal concerns will involve a case history (previous voice and speech history; medical information and testing, behavioral factors), otolaryngological report and recommendations pertaining to appropriate leading to counseling and planning. Depending upon the child’s past medical contacts and the nature of the concern, the appropriate specialty (Otolaryngology, Speech Pathology, and other medical specialties) may apply. See Appendix 5 for more detailed descriptions of voice characteristics and pathologies.

Considerations for Evaluating Fluency
The incidence of children under the age of three who are diagnosed as having stuttering-like disfluencies (SLDs) is difficult to determine. The incidence of preschool children (age 2 through 5) is considered to be less than 1%. With the mean age of onset being 32.76 months, a significant number of the less than 1% would be over the age of three, leaving a very small number of children under the age of three. The first step in early identification is to be able to make the differential diagnosis between normal developmental disfluencies and stuttering-like disfluencies.

Evaluators should collect a thorough child and family history to determine:
✓ the presence of stuttering among other family members
✓ the exact age of onset of stuttering
✓ the amount of time since the stuttering began
✓ the number of SLDs per 100 syllables demonstrated during evaluation
✓ type of stuttering behavior at onset
✓ changes in the behavior since onset

This information is critical to making sound decisions regarding eligibility.

Following a multidisciplinary evaluation, referrals may be appropriate to determine underlying or associated medical, genetic, environmental factors
Late Talkers

In young children, language skills change dramatically during the child’s first three years. It is important to recognize that it is often difficult to determine the reason for or extent of a communication disorder in young children, particularly less than 24 months of age with no other apparent developmental concerns. Some children, in absence of any other developmental problems, may eventually catch up to their peers and thus may seem to “outgrow” their communication delay. (New York State Department of Heath, Early Intervention Program, Clinical Practice Guideline, Quick Reference Guide, Communication Disorders, Assessment and Intervention for Young Children)

One area of discussion among experts in the field of speech-language pathology is the extent to which speech and language intervention is necessary for young children age 18 to 36 months who have an expressive language delay but no other developmental problems. The term, “late talkers” is one of the terms that have been used to describe these children. To date, no clear predictors have been established to indicate long-term outcomes for “late talkers” (Ellis Weismer, 2000, p. 161).

An important consideration is that there is a certain degree of variation in the timing of language development in typically developing children in this age range. Some experts maintain that children with milder language delays may catch up with typically developing peers by 48 months of age, especially if efforts are made to facilitate language development, such as increasing social interactions and involvement in play groups. However, experts also suggest that beginning speech and language therapy by 24 months is important for those children who have more severe delays and those who appear at increased risk for continued delays.

Several studies suggest that many children who only have an expressive language delay at 24 months (but have some words and no other apparent developmental problems) will gradually “catch up” to a functional language level that is more typical of their peers. (Fischel, et al., 1989; Paul, 1991; Paul and Alforde, 1993; Rescorla and Schwarz, 1990; Thal and Tobias, 1994) One of these studies (Rescorla and Schwartz, 1990) found that children at age 24 months who had a vocabulary of fewer than 30 words continued to have problems in the future. In contrast, in the group of children with milder delays (such as a 30-50 word vocabulary, or over 30 words but no word combinations), some continued to have problems, but a large percentage also caught up with typically developing peers at 4 to 5 years of age.

While no single known factor can reliably predict later language status even for well-defined groups of children and certainly not for an individual child, (Ellis Weismer, 2000, Thal & Katich, 1996), Olswang, et al. (1998) identified several factors noted in these studies that appeared to predict which children with language delays at 18 to 24 months would still have delays at 36 to 48 months old. These predictors of future language delay are listed in Table 2 below. Based on this evidence, Olswang (1998) has suggested using these predictors to determine which language-delayed 24 month olds are likely to attain normal language development on their own, and which children are likely to have ongoing language problems and would benefit from speech/ language intervention. The Birth to 3 Program has incorporated many of these considerations into the chart on page 21.

(Adapted from Clinical Practice Guideline, Quick Reference Guide, Communication Disorders, Assessment and Intervention for Young Children, New York State Department of Heath, Early Intervention Program)
Table 2

Predictors and risk factors of language change in toddlers

<table>
<thead>
<tr>
<th>PREDICTORS</th>
<th>NON-SPEECH</th>
<th>RISK FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPEECH</strong></td>
<td><strong>PLAY</strong></td>
<td><strong>Otitis Media</strong></td>
</tr>
<tr>
<td>Language Production</td>
<td>Primarily manipulating and grouping</td>
<td>Prolonged periods of untreated otitis media</td>
</tr>
<tr>
<td>• Small vocabulary for age</td>
<td>• Little combinatorial and/or symbolic play</td>
<td></td>
</tr>
<tr>
<td>• Few verbs</td>
<td></td>
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<tr>
<td>• Preponderance of general all-purpose verbs (GAPS) such as “do”, “make”, “want”, “go”</td>
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<td></td>
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<tr>
<td>• More transitive verbs</td>
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<td></td>
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<tr>
<td>• Few intransitive and ditransitive verb forms such as “give ball”</td>
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<tr>
<td><strong>Language Comprehension</strong></td>
<td><strong>Gestures</strong></td>
<td><strong>Heritability</strong></td>
</tr>
<tr>
<td>• Presence of 6-month comprehension delay</td>
<td>Few communicative gestures, symbolic gestural sequences, or supplementary gestures</td>
<td>Family member with persistent language and learning problems</td>
</tr>
<tr>
<td>• Large comprehension-production gap with comprehension deficit</td>
<td></td>
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</tr>
<tr>
<td><strong>Social Skills</strong></td>
<td><strong>Parent Needs</strong></td>
<td></td>
</tr>
<tr>
<td>• Presence of 6-month comprehension delay</td>
<td>Parent characteristics:</td>
<td></td>
</tr>
<tr>
<td>• Large comprehension-production gap with comprehension deficit</td>
<td>• Low SES</td>
<td></td>
</tr>
<tr>
<td><strong>Phonology</strong></td>
<td>• Directive more than responsive interaction style</td>
<td></td>
</tr>
<tr>
<td>• Few prelinguistic vocalizations</td>
<td>• Parent concern: Extreme</td>
<td></td>
</tr>
<tr>
<td>• Limited number of consonants</td>
<td></td>
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</tr>
<tr>
<td>• Limited variety in babbling structure</td>
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<tr>
<td>• Less than 50% consonants correct (substitution of glottal consonants and back sounds for front)</td>
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<td>• Restricted syllable structure</td>
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<td>• Vowel errors</td>
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<td><strong>Imitation</strong></td>
<td><strong>Imitation</strong></td>
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<td>• Few spontaneous imitations</td>
<td>Few spontaneous imitations</td>
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<tr>
<td>• Reliance on direct model and prompting in imitation tasks of emerging language forms</td>
<td></td>
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</tr>
</tbody>
</table>

Olswang, L. B., Rodriguez, B., Timler, G. (1998). Recommending Intervention for Toddlers with Specific Language Learning Difficulties: We May Not Have All the Answers, But We Know a Lot. *American Journal of Speech-Language Pathology, 7*
Eligibility for a Child Who Shows Greater than 25% Delay Only in the Area of Expressive Language

<table>
<thead>
<tr>
<th>Receptive language delay &gt;25%</th>
<th>Intelligibility concerns (voice, fluency, &amp; quality of speech sounds)</th>
<th>Frustration during communication</th>
<th>Regression in child's communication over the past three months</th>
<th>Oral motor concerns</th>
<th>Family history of language impairment</th>
<th>Birth or health history associated with increased risk of poor language development(^1)</th>
<th>Communication environment is not conducive to facilitating language acquisition(^2)</th>
<th>Recommendation</th>
<th>Eligible</th>
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<tr>
<td>No</td>
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</table>

\(^1\)Examples: congenital infection, ototoxic medications, chronic otitis media, craniofacial anomalies

\(^2\) Examples: Few conversational initiations, interactions with adults more than peers, difficulty gaining access to activities, parent interaction style more directive than responsive

\(^3\) Each of these factors would help the team in determining whether the child should be eligible for early intervention services. When the child displays a delay only in expressive language and there are no other factors present, a “watch and see” approach is recommended.

“Watch and see” means that
1. The child is not found eligible for early intervention at this time
2. Parents are provided suggestions for activities and community resources to promote language development and for monitoring of their child’s progress
3. The child is screened within three months to assess progress in communication and in other developmental areas (Screening by the speech language pathologist (SLP) is recommended depending on the age of the child. A developmental specialist may be an appropriate screener with guidance from the SLP)
4. If communication concerns persist, eligibility will be reconsidered.
CHILDREN FROM HOMES IN WHICH ENGLISH IS NOT THE PRIMARY LANGUAGE

Many families are living in the United States with limited or no English skills. At the same time, there are a number of resources being developed to meet the needs of these families. Wisconsin’s Birth to 3 Program respects individual differences and requires that programs communicate with families in their preferred language, to the extent possible. A child and family’s proficiency in English should be considered before any evaluation is conducted. This consideration will give the clinician information regarding evaluation protocols and tests to use, and whether a monolingual clinician, bilingual clinician, or a monolingual clinician using an interpreter would be “best practice” when conducting an evaluation.

Early Identification
It is important to ask more than whether or not the parent can speak English. More appropriate inquiries should explore how often English is spoken to the child and how often the parent talks to child in the non-English language.

The evaluation team should consider the use a standardized test if a valid instrument exists in the family’s language. There are few choices available. Many instruments are literal translations of English tests that have not been validated for use in other languages. The use of non-standardized assessment, interviews, and observation are generally preferred methods. Appendices six and seven cite several references and websites for evaluation tools and methods for children who are English language learners.

Since a child should be assessed in the primary or dominant language of the home [HFS 90.08(7)(d)1], the eligibility criteria are the same as for a native English-speaking child. The child would have to show a significant language delay in their primary or dominant language. Wisconsin’s Birth to 3 Program does not serve children if they are only significantly delayed in their second language. Other programs may be available to enhance those skills.

When assessing bilingual children, it is important for clinicians to be cognizant of second language acquisition. Second language acquisition is similar to, although not identical to, first language acquisition and because acquisition is a developmental process, children need adequate time to acquire a second language: 1-2 years for conversational skills (grammar, basic vocabulary, pronunciation), and 5-7 years to develop the academic linguistic proficiency (literacy, problem-solving, and critical thinking skills) needed for academic success (Moore & Beatty, 1995.) The development of competence in English is a function of the level of competence previously developed in the first language (Ortiz, 1994.)

It is the responsibility of the Birth to 3 team to raise families’ level of awareness about second language acquisition and bilingual issues and how they can best support their child’s development. The parents should be supported for acknowledging the importance of the child’s language development and then encouraged to communicate with the child in their native language, to enhance the child’s intellectual, cognitive, and linguistic development (Moore & Beatty, 1995). Learning a second language is easier for children if they have a good language base in their first language. (Erickson, 1992) According to Ortiz (1994), “…the native language is the foundation upon which English competence is built.”
Guidance for using an interpreter during communication evaluations

An interpreter is under the supervision of the speech pathologist at all times. An interpreter’s activities should be reviewed and assigned by the clinician. The following “best practice” list should be considered when using an interpreter (Moore & Beatty, 1995):

- Interpreter should receive training in basics of evaluation (role of the interpreter, functions of the SLP and interpreter, testing protocols), intervention, and conferencing.
- In evaluation, the interpreter should have an understanding of the rationale, procedures, and information that is obtained from tests.
- Interpreter should have a high degree of proficiency in both English and minority language.
- Interpreter should have high school diploma, adequate communication skills, and the ability to relate to clinical population.
- Interpreter should understand both mainstream American culture and the culture of the child and family.
- Interpreter should not be a family member or family’s friend unless they have had proper training.

It is important to remember that all reports, correspondences and the IFSP must be translated into the family’s language. Skilled verbal interpreters are not necessarily also skilled written translators.
STRATEGIES FOR CHILDREN FOUND NOT ELIGIBLE FOR THE BIRTH TO 3 PROGRAM

While evaluation and team consensus may indicate that the child is not eligible for early intervention services at this time, the child and the family may benefit from additional information. Sharing resources and strategies for facilitating speech development may be appropriate.

The following actions may be appropriate depending on the family’s interests:

- Give the family information regarding normal speech language development (Examples: How Does Your Child Hear and Talk? and Activities to Encourage Speech and Language Development, American Speech and Hearing Association (ASHA) www.asha.org/public/speech/development/)
- Give the family information about how to facilitate and monitor their child’s language development in the home.
- Give the family a list of community resources available or activities to foster language development
- Connect the family to parent training activities (e.g., Hanen program www.hanen.org)
- Encourage the family to call the Birth to 3 Program again to re-refer if they have questions or do not feel their child is making progress in 3-6 months.
- Encourage the family to enroll the child in community playgroups if appropriate.
References


Appendix 1
A Summary of Expressive Speech and Language Development
For Typically Developing Children
Birth to 18 months

Newborn:
− Cries
− Produces noncrying speech-like sounds, usually during feeding
− Smiles reflexively

One Month:
− Cries for assistance
− Produces pleasure sounds
− Smiles spontaneously
− Makes eye contact with primary caregiver

Two Months:
− Produces gutteral or “throaty” cooing
− Smiles unselectively

Three Months:
− Produces single syllable (consonant-vowel) cooing
− Responds vocally to the speech of others
− Produces primarily vowel sounds
− Smiles selectively (familiar people)

Four Months:
− Begins to babble, producing strings of consonants
− Varies pitch
− Smiles at person speaking to him/her

Five Months:
− Produces “vocal play” to experiment with sounds
− Imitates some sounds
− Responds differently to smiling and scolding

Six Months:
− Babbles, producing strings of consonant-vowel combinations (reduplicated babbling)
− Vocalizes to express pleasure and displeasure
− “Squeals” when excited

Seven Months:
− Continues to produce reduplicated babbling
− Demonstrates “vocal play”
− Produces several sounds in one breath
− Imitates gestures of another person

Eight Months:
− Continues to produce reduplicated babbling
− Continues “vocal play”
− Imitates gestures and intonation patterns of another speaker

Nine Months:
− Produces adult-like intonation patterns
− Imitates coughing, hissing, tongue clicking, “raspberries”
− Produces sequences of vowel-consonant-vowel (VVC) and CVC syllables in which adjacent and successive syllables are different (variegated babbling)
− Uses conventional gestures (e.g., waving, pointing)
- Uses eye contact, gestures, and vocalizations (nonlinguistic behaviors) alone or in combination to express communicative intents
- Participates in communication games (e.g., “How big is ____? SO BIG!!”)

**Ten Months:**
- Imitates sounds produced by another speaker if the infant has already produced the sounds spontaneously on his/her own
- Continues to produce sequences of vowel-consonant-vowel (VCV) and CVC syllables in which adjacent and successive syllables are different (variegated babbling)
- Continues to use conventional gestures (e.g., waving, pointing)
- Continues to use eye contact, gestures, and vocalizations (nonlinguistic behaviors) alone or in combination to express communicative intents
- Produces syllable sequences with adult-like intonation patterns (jargon)

**Eleven Months:**
- Imitates intonation patterns, facial expressions, etc.
- Continues to use conventional gestures (e.g., waving, pointing)
- Continues to use eye contact, gestures, and vocalizations (nonlinguistic behaviors) alone or in combination to express communicative intents
- Produces sound sequences that are not true words, but demonstrate an understanding of the relationship between sound sequences and meaning (phonetically consistent forms, e.g., consistent use of “ada” to mean “boy”)

**Twelve to Fourteen Months:**
- Continues to imitate intonation patterns, facial expressions, etc.
- Continues to use conventional gestures (e.g., waving, pointing)
- Continues to use eye contact, gestures, and vocalizations (nonlinguistic behaviors) alone or in combination to express communicative intents
- Continues to use jargon
- Produces phonetically consistent forms
- Produces first true words
- Mixes words with jargon

**Fifteen to Eighteen Months:**
- Uses jargon and words in conversation
- Produces approximately six words (15 months) to 50 words (18 months) that consist primarily of CV or VC combinations (e.g., “ba” for “ball” or “up”)
- Begins to produce two-word combinations (18 months)
- Refers to self by name
- “Sings” and hums
- Plays question-answer with adults

Based on Owens, R. J, (1996) and Paul, R (2001)
Appendix 2

Stages of Normal Noncry Vocal Development in Infants/Toddlers

1. Proctor (1989) combines five investigations which propose stages of vocalizations and outlines five stages where there appear to be qualitative differences distinguishing stages:
   a. Stage 1 (0-2 months):
      (1) more crying and discomfort sounds than noncry sounds
      (2) predominating noncry sounds are vegetative (reflexive), neutral, and mainly vocalic (vowel-like) in nature
   b. Stage 2 (2-4 months):
      (1) marked decrease in crying after 12 weeks
      (2) vocalic sounds predominate, but consonant-like sounds are introduced
      (3) combining of consonantal (C) and vocalic (V) segments (coo or goo)
      (4) glottal Cs heard
   c. Stage 3 (4-6 months):
      (1) increased number of C segments produced
      (2) more variation of V productions
      (3) consistent production of CV syllables
      (4) variation of intonational contours
   d. Stage 4 (7-10 months):
      (1) canonical, repetitive, or reduplicated babbling (i.e., CV or CVC-like structure)
      (2) consistent variations of intonational contours
      (3) early nonreduplicated CV syllables
      (4) utterances produced with full stop
   e. Stage 5 (10-14 months)
      (1) variegated babbling (advanced form of reduplicated babbling)
      (2) variety of CV and CVC combinations with sentence-like intonation
      (3) approximations of meaningful single words
   f. Proctor provides a system of evaluating early noncry vocal development based on these stages.

2. Kent (1999) discusses some of the difficulty with the use of stages as described by Proctor above (e.g., different classifications are not completely congruent in the ages assigned to the stages or even the characterization of the stages). Kent does offer recognize distinctive vocal behaviors appearing within the first 9 months:
   a. Stage 1 (about 2 months) transition from simple phonation to combining phonation with some aspects of articulation. Infants use supralaryngeal constrictures.
   b. Stage 2 (about 3 to 5 months) there is an expansion of exploratory, vocalic development and primitive articulation. Sound changes at this stage correlate with anatomical in the vocal tract (e.g., laryngeal framework separated from the nasopharynx).
   c. Stage 3 (about 7 to 9 months) is associated primarily with babbling.
   a. 3 to 6 months: vowels [E I ^] glottals [h ? ] and velars [g k].
   b. 6 to 12 months: vowel to consonant ratio smaller; consonants: voiced stops (bilabial and apical; nasals (bilabial and apical) spirant [h], and glide [w]; vowels: central, mid-front, and low front; alveolars and bilabials predominate while in the first 6 months glottals and velars predominate.
   c. 12 to 18 months: inventory size does not increase markedly; from 8 to 18 months an average of 6 consonants from the set [ b d g t m n h w l ]; most consonants are in the syllable initial position.
   d. 18 to 25 months: inventory size grows; 2 year old has an inventory of 10-20 consonant sounds; more consonants in syllable-initial position; syllable-final position are often voiceless.

4. Stoel-Gammon (1985) collected longitudinal samples on 34 normally developing children. Samples were analyzed for range and types of consonantal phones produced at 15, 18, 21 and 24 months. Separate inventories were kept for word initial and final position:
   a. Consonantal phones in the initial position were primarily:
      (1) stops
      (2) nasals, and
      (3) glides.
      (4) By 24 months voiceless stops, velars and a few fricatives were added.
   b. Consonantal phones in the final position were primarily:
      (1) voiceless stops, and
      (2) alveolars
   c. There was a tendency for voiced stops to appear in initial positions and for /t/ and /r/ to appear in the word final position.
   d. There was a highly similar pattern across subjects.
### Appendix 3

**Evaluation Tools and Methods**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Use</th>
<th>Author</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Language Milestone Scale (ELM)</td>
<td>Screener. Normed. Yields percentiles</td>
<td>James Coplan</td>
<td>SuperDuper Publications, Greenville, South Carolina, 19-</td>
</tr>
<tr>
<td>Mac Arthur Communicative Developmental Inventory</td>
<td>Screener. Parent-report instruments used to determine child’s comprehension and production vocabularies for using words and gesture and production vocabulary for word combinations; from first non-verbal gestural signals through expansion of early vocabulary to grammar.</td>
<td>Fenson, Dale, Resnic, Thal, Bates, Harung, Pethick, &amp; Reilly</td>
<td>Singular Publishing. 1993</td>
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<tr>
<td>Tool</td>
<td>Use</td>
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<tr>
<td>Clinical Assessment of Language Comprehension</td>
<td>A series of non-standardized tasks to assess young children’s receptive language</td>
<td>Jon F. Miller &amp; Rhea Paul</td>
<td>Brookes, 1995</td>
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<tr>
<td>Goldman-Fristoe Test of Articulation-Second Edition</td>
<td>GFTA-2 is a systematic means of assessing an individual’s articulation of the consonant sounds of Standard American English. It provides a wide range of information by sampling both spontaneous and imitative sound production, including single words and conversational speech.</td>
<td>Ronald Goldman &amp; Macalyne Fristoe</td>
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**References for Evaluation Tools and Methods**

**Evaluation Tools and Methods**


**Language sampling**


**Production**

**Pragmatics**


**Comprehension**
Appendix 4

Language Production Scale

1. Designed to examine the vocalizations and verbalizations of children 9 to 24 months of age.
2. Two major parts to the scale:
   a. prelinguistic utterances i.e., babbling
   b. early meaningful speech i.e., linguistic productions
3. Administration
   a. 30 minute sample
   b. 4 sets of toys (tea party, farm, nurturing, transportation)
   c. Examiner presents each set one at a time attempting to elicit labels and each set is played with for 8 minutes.
   d. Parents are instructed to comment, gloss and be non-directive.
4. Babbling Analysis
   a. 50 vocalizations of children who produce fewer than 10 words during data collection are used for analysis.
   b. 50 consecutive utterances that met the following criteria were analyzed:
      (1) judged to be non-meaningful,
      (2) vocalization contained at least a voiced vocalic element or a voiced syllabic consonant,
      (3) produced or an egressive air stream, and
      (4) judged to be "speech-like"; it could be a grunt but not a cry, cough or scream.
   c. utterances were segmented when bounded by a second of silence on either side, by vocalizations not meeting criteria 1-4 above, or by parental report.
   d. each babble was assigned to one of three levels:
      (1) Level I - the utterance is composed of voiced vowel(s), voiced syllabic consonant(s), or CV syllables(s) in which the consonant is a glottal stop, /h/, /j/, /w/ and voiced vowels are always classified as level I.
      (2) Level II - the utterance is composed of CV, VC, or CVC syllable(s) with a single consonantal type. Disregard voicing difference.
      (3) Level III - the utterance is composed of syllables with two or more consonantal types. Disregard voicing differences.
   e. Scoring the Sample:
      (1) Use last 15 minutes of samples and classify 50 babbled utterances as Level I, II, or III. Use first 15 minutes if not enough babbles.
      (2) Count the number of occurrences at each level.
      (3) Figure the mean level of babbling by multiplying the number of Level I utterances x 1, the number of Level II utterances x 2, the Level III utterances by 3, and dividing the total by the number of babbled utterances.
      (4) The score provides a measure of phonetic complexity of babbled utterances.
Appendix 5

VOICE

The speech component of the young child’s communication evaluation should address voice production (elements such as phonation [the ability to produce voice], pitch, loudness, quality and prosody). Voice and resonance disorders are commonly seen in the pediatric population, which receives speech-language pathology services. (Johnson and Jacobson, 1998) In the general population, estimates for the incidence of voice and resonance problems in children range from 6 to 9 percent. Voice disorders have a variety of causes; voice disorders in children can be organic (physical) and either congenital or acquired.

Producing Voice
Phonation is the production of sound via a vibrating mechanism (the vocal folds) and shaping of the oral cavity by placing of the articulators (lips, tongue). Phonation attempts typically result in adequate voicing and duration for speech. When problems in resonance are noted, the quality of phonation should be assessed.

Perceptual Characteristics
Perceptual characteristics of the voice involve and are influenced by airflow, the loudness that is achieved, vocal fold mechanics and phonation. When vocal fold mechanics are involved, the following may be perceived: hoarseness, breathiness, glottal fry or hard glottal attacks, diplophonia, and inappropriate loudness, whispered speech (aphonia—lack of vocal fold vibration) or dysphonia (abnormal vocal quality in the absence of a vocal fold pathology).

Vocal Pathology Conditions
A variety of vocal pathologies can occur in children. Usually vocal pathologies are perceived by abnormalities in the quality or efficiency of the voice during speech. Examples include: roughness, strain, nasality, unusual prosody (rhythm, inflection, pacing), effort in speaking, breathiness, abnormal duration (maintaining sound). Vocal fold nodules can occur due to misuse of the voice. When nodules are present, pitch or loudness may be affected and typically both vocal folds are usually affected.

When airway obstruction is the problem, there may also be a condition of the larynx such as a laryngeal web, hemangioma, subglottic stenosis or bilateral vocal fold paralysis.

Resonance Characteristics
Hypernasality is typically perceived as too much resonance in the nasal cavity during speech. This difference in voice quality is a result of velopharyngeal incompetence (VPI) of the soft palate, but can also occur through a large fistula (opening) in the palate resulting in inappropriate nasal sound during speech. Hypernasal voice may also increase in connected speech due to the additional demands it places on the velopharyngeal mechanism.

Other forms of resonance abnormality include hyponasality and denasal speech. A reduction in nasal resonance during speech occurs as a result of blockage in the nasopharynx or entry to the nasal cavity, called “cul-de-sac resonance”. Muffled speech can occur in a child with very large tonsils and adenoid hypertrophy with mixed resonance (i.e., when both hypernasal and hyponasal speech are produced), indicating velopharyngeal incompetence and significant nasal air blockage.
Other Conditions

- When airway obstruction is the problem, there may also be a condition of the larynx such as a laryngeal web, hemangioma, subglottic stenosis or bilateral vocal fold paralysis. A laryngeal web, a congenital abnormality, is usually determined soon after birth. In this condition there is a lack of tissue separation of the vocal folds, in the embryonic stage. Due to airway restrictions this can be life threatening. Hoarseness, lack of voicing and inspiratory stridor may be noted.
- Conditions involving vocal cord paralysis are associated with other neurological conditions or trauma, particularly cardiac conditions or nervous system lesions.
- The quality of speech depends on vocal cord approximation. In cases of subglottic stenosis, a narrowing of the airway from the vocal folds down to the cricoid area below the glottis occurs. This is the case when the laryngeal mechanism is damaged by intubation, thus affecting voice quality. Breathiness, hoarseness, restricted pitch and reduced loudness of the voice may occur.
- A papilloma is a neoplastic growth that is thought to be caused by a virus. Papillomas are the most common form of tumors of the larynx in children and occur between ages two and four, typically.
- Subglottic stenosis involves a narrowing of the airway from the vocal folds to the cricoid area below the glottis.
- The subglottic hemangioma condition involves a congenital mass of blood vessels resulting in labored breathing and feeding problems, with hoarseness or breathiness symptoms.
- Dysphonia due to the presence of a tracheostomy may be experienced. Changes in vocal production will be noted. Speech may be produced depending on sufficient airflow between the tracheostomy tube and trachea for phonation.
- The Passy-Muir valve is a one way-trach valve that allows manual closure of the tracheostomy tube during speech. This can facilitate voicing by forcing airflow around the trach tube and up to the larynx. If the tracheostomy tube is narrow compared to the size of the trachea, this may allow sufficient airflow between the tracheostomy tube and the trachea for phonation.

References


Appendix 6

Additional References


Culturally and Linguistically Appropriate Services, University of Illinois at Urbana-Champaign, Champaign, IL [http://clas.uiuc.edu/](http://clas.uiuc.edu/)


Appendix 7

Websites

Communication and Communication Evaluation

ASHA http://www.asha.org/default.htm

WSHA http://www.wisha.org/


- Differential Assessment of Autism and Other Developmental Disorders (Richard and Calvert) (age 2-8)

  - Publisher: Academic Therapy Publications = http://www.academictherapy.com/

- GFTA-2 Goldman-Fristoe Test of Articulation-2 (age 2-21)
  - Publisher: American Guidance Service AGS = http://www.agsnet.com/

  - Publisher: The Riverside Publishing Company = http://www.riverpub.com/

- REEL-3 Receptive-Expressive Emergent Language Test – Third Edition (Bzoch, League) (age B-3)
  - Publisher: Pro-Ed = http://www.proedinc.com/

- The Rossetti Infant-Toddler Language Scale (Rossetti) (age B-3)
  - Publisher: Linguisystems = http://www.linguisystems.com/age.php?age=1

  - Publisher: Academic Therapy Publications = http://www.academictherapy.com/

- TELD-3 Test of Early Language Development (Hresko, Reid, Hammill) (age 2-7)
  - Publisher: Pro-Ed = http://www.proedinc.com/

- PLS-4 Preschool Language Scale-4th Edition (B-6:11)

- MICS (Raack)
  - Publisher: (?) Community Therapy Services = http://clas.uiuc.edu/special/evaltools/cl01610.html

Including ELL (English Language Learners) parents in their child’s education:

http://www.gse.harvard.edu/hfrp/projects/fine/resources/digest/parents.html

http://www-tcall.tamu.edu/newslettr/jun98/jun98e.htm

Assessment of ELL children includes:

http://www.cal.org/resources/faqs/rgos/special.html

Involving Immigrant Parents of Students with Disabilities in the Educational Process
(Includes assessment)

http://journals.cec.sped.org/EC/Archive_Articles/VOL.34NO.5MAYJUNE2002_TEC_Article-9.pdf

http://www.ncela.gwu.edu/enews/outlook/2002/08.htm
Evaluation and Instructional Services for ESL Program/Special Education Students
http://www.slc.sevier.org/esleval.htm

Educating Students With Limited English Proficiency (LEP) and English Language Learners (ELL)
http://www.pde.state.pa.us/k12/cwp/view.asp?A=11&Q=45272&eslNav=%7C4974%7C

Bilingual Special Education
http://www.teachervision.fen.com/page/6048.html

Learning Disability or Language Development Issue?
http://www.everythingesl.net/inservices/special_education.php

Sites for Spanish Speaking Families
Bebe Web - La Pagina del Bebe http://almez.pntic.mec.es/~lperez18/
Cyber Padres - Informacion de todo para Padres http://www.cyberpadres.com/
El Primer ano Del Bebe http://www.uwex.edu/ces/flp/parenting/spanish.html
Huggies in Mexico http://www.huggies.com.mx/
Mi Pediatra http://www.mipediatra.com/
Reading Rockets http://www.colorincolorado.org/
The Education Trust http://www2.edtrust.org/edtrust/spanish