Growth and Development — Anticipatory Guidance

Arthur N. Feinberg

INTRODUCTION

The goals of this chapter are to illustrate that children are works in progress and that growth and development span over time. We will review how children mature and discuss numerous tasks they accomplish as they grow. We provide a brief section on growth with some guidelines for the office-based pediatrician to monitor. In the developmental section we will follow aspects of motor (gross and fine), adaptive, language and personal-social over a timeline and then discuss theories and concepts of psychosocial development. In the third section, we will discuss anticipatory guidance as it relates to development. In the fourth and final section, we discuss the best manner in which to gather and convey this information to children and families. The style of writing is intentionally informal to emphasize the importance of conversation with families when discussing these topics.

MONITORING GROWTH

Growth occurs most rapidly in-utero. It is important to assess a newborn, not only for weight, but also for appropriateness of weight for
gestational age. Figure 1 illustrates the normal newborn gestational growth charts. As a rule, newborns appropriate for gestational age, even if premature, will ultimately experience “catch-up” growth, whereas small-for-gestational-age newborns may remain small. Figure 2 demonstrates a growth chart that the clinician should monitor for premature newborns. In addition, growth charts are available for children with conditions such as chromosomal abnormalities, e.g., Down or Turner syndromes, spina bifida and others. It is important to use the most current CDC (US Centers for Disease Control and Prevention) growth charts from 2000 to monitor the

Fig. 1. Percentiles of intrauterine growth in weight, length, head circumference and weight-length ratio.
growth of male and female children. The charts assay length, weight and head circumference over time, height for weight, as well as body mass index (BMI) over time. One can calculate BMI online and often the calculations are in an electronic medical record. When monitoring growth, follow the individual’s percentile lines. Healthy children will grow according to their genetic potential; therefore, it is important to ascertain parental size and their childhood growth patterns. A normal newborn may measure larger than his/her ultimate size and height — weight and head circumference may gravitate toward a new percentile line that it will then follow. Some children, like their parents, may be “late bloomers,” who will grow slowly initially, but will catch up with peers later. Other children with short parents will always follow a low percentile on a growth chart throughout, and thus fit a pattern of constitutional growth delay. As a rule, if growth over time fails to follow a percentile line over time.

**Fig. 2.** Premature growth chart.
(i.e., flattens) further investigation is necessary. Figures 3a and 3b illustrate a normal length-for age, weight for age and head circumference for age for a male child age 0–3 years of age. Consult the CDC growth charts for other age groups and genders.

It is more accurate and helpful to assess growth as growth velocity. As a rule, growth velocity is about 25 cm/yr in the first year of life and 10 cm/yr in the second year. From ages 3–4 it is 7 cm/yr, from ages 5–7 it is 6 cm/yr and from age 7–puberty it is 5 cm/yr. At puberty, the average rate of a growth spurt is 10.3 cm/yr. It is abnormal for a boy not to experience puberty or a growth spurt by age 14, or for a girl not to experience this by age 13. Figure 4 is a typical growth velocity chart.

A FEW TIPS

There are some simple day-to-day guidelines for monitoring growth throughout childhood:

- It is important to measure infants on a hard flat surface, stretched out maximally and with perpendicular surfaces at the head and feet. Children who stand should be on a flat stationary surface (e.g., a floor) rather than on a movable scale.
- Newborns will lose up to 10% of birth weight in the first 3–4 days of life, and will then gain about 20–30 g/day for the first six months of life. They should regain birth weight by two weeks of age.
- An infant will usually double the birth weight by 6 months and triple it by one year.
- A four year old weighs about 40 pounds (18 kg) and is about 40 inches (100 cm) tall.
- Consider medical evaluation if a child falls below the third percentile for any growth parameter, especially if the growth line is flattening or if growth velocity is decreasing. However, a child with more than two standard deviations from the norm for head circumference will probably not have any pathologic cause for this.
Fig. 3a. Length for age and weight for age — Boys 0–36 months.
Fig. 3b.  Head circumference for age and length-for weight — Boys 0–36 months.
Fig. 4. Growth velocity chart.
If the child demonstrates a normal growth pattern for length, but not weight (either under- or overweight) the problem is unlikely to be of endocrine origin.

If a child demonstrates a failing pattern for length, consider either genetic or endocrine problems.

A child with growth delay otherwise asymptomatic and developing normally is unlikely to have an organic cause. Probe further into familial growth patterns.

It takes severe nutritional deprivation to affect the length of a child, and greater deprivation to affect head circumference.

If a recorded measurement appears different from that of the overall impression of the child, reassess, as errors often occur.

DEVELOPMENT

Introduction

The most important concept of development lies in its fluidity, which comes naturally to children but not necessarily to the individual studying them. Much information available to clinicians “pigeon-holes” developmental landmarks into categories such as gross motor, fine motor, adaptive, language and personal-social. Elegant research has led to the discovery and elucidation of several aspects of psychosocial development including maturational, behavioral and learning, psychosexual, socio-cultural and ecological theories. We discuss the high points of many psychosocial theories and concepts of development. Although it is important not to rely upon reading “laundry lists” to patients when assessing development, we view mastery of this subject as analogous to practicing a musical piece. It is necessary for the practitioner to rehearse and master all the individual passages (i.e., the boxes in the table), but it must not stop there. The performer or provider must be able to internalize the sequences of the musical piece or the developmental timeline. If this does not occur, the result is a boring
experience and a waste of time and money for both the patron and the patient.

**Developmental Skills**

We summarize the well-known sequences of gross motor, language, adaptive and personal-social skills in Table 1.

<table>
<thead>
<tr>
<th>Developmental Timeline Ages 2–9 Months Skills Related to Age</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gross motor</strong></td>
</tr>
<tr>
<td>Lifts head (prone)</td>
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<tr>
<td>Lifts to chest (prone)</td>
</tr>
<tr>
<td>Rolls over front to back</td>
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<tr>
<td><strong>Fine motor</strong></td>
</tr>
<tr>
<td>Losing grasp reflex</td>
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<tr>
<td>Primitive pincer grasp</td>
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<tr>
<td><strong>Adaptive</strong></td>
</tr>
<tr>
<td>Follows past midline</td>
</tr>
<tr>
<td>Feeds self with fingers</td>
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<tr>
<td><strong>Language</strong></td>
</tr>
<tr>
<td>Coos</td>
</tr>
<tr>
<td>Reciprocal vocalizations</td>
</tr>
<tr>
<td><strong>Personal-social</strong></td>
</tr>
<tr>
<td>Regards object</td>
</tr>
<tr>
<td>Smiles</td>
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<td>(Continued)</td>
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Table 1. (Continued)

<table>
<thead>
<tr>
<th>Age</th>
<th>Skills Related to Age</th>
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<tbody>
<tr>
<td></td>
<td>Developmental Timeline Ages 12–24 Months</td>
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<tr>
<td></td>
<td>Ages 12–24 Months</td>
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<tr>
<td></td>
<td>Skills Related to Age</td>
</tr>
<tr>
<td>12 mo</td>
<td>2–3 steps</td>
</tr>
<tr>
<td>15 mo</td>
<td>Walks</td>
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<tr>
<td>18 mo</td>
<td>Runs (totters)</td>
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<tr>
<td>24 mo</td>
<td>Stairs (holding)</td>
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<tr>
<td></td>
<td>Kicks ball</td>
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<tr>
<td></td>
<td>Jumps up</td>
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<tr>
<td></td>
<td>4–6 cube stack</td>
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<tr>
<td></td>
<td>Vertical line</td>
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<td></td>
<td>Developmental Timeline Ages 3–6 Years</td>
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<tr>
<td></td>
<td>Skills Related to Age</td>
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<tr>
<td>3 yrs</td>
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<td>4 yrs</td>
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<td>5 yrs</td>
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<td>6 yrs</td>
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<tr>
<td></td>
<td>Pedals tricycle</td>
</tr>
<tr>
<td></td>
<td>Broad jumps</td>
</tr>
<tr>
<td></td>
<td>Stands 1 foot for 3 sec.</td>
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<tr>
<td></td>
<td>Walks up and down stairs</td>
</tr>
<tr>
<td></td>
<td>Hops</td>
</tr>
<tr>
<td></td>
<td>Stands 1 foot for 3 sec.</td>
</tr>
<tr>
<td></td>
<td>Skips</td>
</tr>
<tr>
<td></td>
<td>Tandem walks</td>
</tr>
<tr>
<td></td>
<td>Hops</td>
</tr>
<tr>
<td></td>
<td>Rides bicycle</td>
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</tbody>
</table>

A. N. Feinberg
A FEW TIPS

- Most children are normal. In fact, 94% fall within two standard deviations of the norm. It is important for the practitioner to understand this in order to make a judgment as to which findings to pursue.
- Gross motor development generally progresses from the head down and fine motor development from the midline out. Language progresses from throat noises to delicate movements of the tip of the tongue.
- Development progresses, but not necessarily evenly. Let the child lead the way. Everything a child does in this progression
will have a ripple effect on his/her environment and will elicit a response.

- Both children and their parents have positive instincts. Guide and support them; do not try to alter them. The human race survived many years before pediatric residencies, fellowships and board certification existed. Even maladaptive behavior has value and the clinician must explore this in the context of the family’s whole story.
- Children have detectible basic natures and live in an environment that can modify them (nurture). Be careful not to jump on either a nature or a nurture bandwagon.

Applying the above axioms, there are many theories of development. Some of them emphasize how children get from stage to stage. Others emphasize important stages of development. Some theories address both. Each theory adds new insights into child development and the practitioner should not adopt one “pet” theory but draw on the many choices available from all of them.

DEVELOPMENTAL THEORIES

We now address the theories on how children move from stage to stage.

MATURATIONAL THEORIES

Children will pass from stage to stage one way or another, not necessarily at the same times. Internal factors (nature) play a predominant role in the sequencing. There has to be appropriate physical maturation and an “inner readiness” to move on to the next stage. The evolutionary history of humankind may manifest itself in individual adaptability. When responding to an individual child, the caregiver should consider the child’s readiness to respond.
PSYCHOSEXUAL THEORIES

Children pass through stages of development by mastering drives and instincts that ultimately lead to meeting social expectations. Emotions, which may or may not be within the child’s consciousness, shape this process. These feelings occur before verbal ability develops and maintain their influence on future behavior. The child resolves these stages through interactions with loved ones. The original Freudian concepts described the three main components of the personality, the “id,” the “ego” and the “superego.” Erikson expanded the Freudian concepts to a lifetime experience. It included a wider social milieu than merely the “loved ones” of the Freudian concept. In common with Freudian concepts, each person’s life history shapes his individuality, but the social context of a wider world is more influential.

BEHAVIORAL AND LEARNING THEORIES

First, the main thrust of these theories is the powerful influence of social environment on learning and behavior. Children learn from what they see and experience. These theories subscribe much less to determinism than maturational and psychosexual theories. Behavioral change is due to experience, especially positive experience. The behaviorists rely less on nature and emphasize reinforcers (individual and social) that relate directly to the maladaptive behavior needing modification (nurture).

Whereas Freud and Erikson emphasize the influence of individuals and society on deep-seated innate emotions of children, behavioral and social learning theories ascribed to Pavlov, Skinner and Bandura emphasize learning by positive and negative reinforcement (feedback), and Piaget expanded behaviorism to a more active process. The child now assimilates information, tests it (often with error), but eventually creates a new level of understanding, consistent with his level of maturity. Second, we discuss stages of development. Stages of development are nothing new
and appeared in Shakespeare’s famous “Seven Stages of Man” soliloquy of Jaques in “As You like It.”

In Freudian theory, infancy is the “oral” stage of development, ages 2–4 represents the “anal stage” where much of the child’s life revolves around elimination function. Ages 4–6 represent the “phallic” stage, or the earliest sexual manifestation of behavior. After age six to adolescence, children are in the “latency” phase where the previous stages are ostensibly “on hold.” Subsequently, the rekindling of sexual tensions occurs in adolescence. Much human psychopathology, according to the Freudians revolves around the resolution or lack of thereof of these stages.

In Erikson’s psychosocial stages of development, children must master eight levels. From birth to 18 months, the main issue is trust, from 18 months to 3 years autonomy vs. shame and doubt are the order of the day. At ages 3–6, children deal with initiative and guilt and from 6–11 years industry and inferiority. The major tasks for adolescence are identity versus role confusion, and those for young adulthood are intimacy. The tasks for adulthood center on productivity and advancement and old age deals with decline and despair.

Piaget’s stages delineate how a child understands the world. In the first two years of life, this is a sensorimotor experience. From ages 2–6, the child is in the “preoperational” stage based on processes that derived from the child’s self-centered perceptions. They are unable to distinguish external reality from their own internal needs. From ages 5–11, they develop the ability to reason about external objects, perceive the changes in them and even begin to recognize patterns of change. They can learn and apply simple systems of rules and tend to adhere to them rigidly. They begin to become less self-centered and can see things from another’s point of view. From the age of 12, they are in the “formal operations” stage where they begin to think abstractly, can recognize possibilities and probabilities and develop inductive and deductive reasoning. Some of the most memorable precious quotes from our young family members over which we reminisce stem from a child’s lower position on the “learning curve” of a given Piagetian stage of
development. Some illustrations of a typical four year old that has not quite made it to the point of leaving the “self-centered” stage: (1) Father: “Alex, that’s not fair.” Alex: “But it’s fair for me!” (2) Lisa: “Daddy, I’ll make you a deal.” Father: “Yes…” Lisa: “You let me go to school without my raincoat.” Father: “And…” Lisa: “Well, that’s the deal!” Many of the great American athlete and sage, Yogi Berra’s quotes are of a similar nature. An example of a “pre concrete operational” quote is “Cut my pizza in four pieces instead of six, I’m not that hungry.” An example of being not quite ready for formal operations is “If you come to a fork in the road, take it.” Table 2 below outlines Freud, Erickson, and Piaget’s stages of development over a timeline.

More recent concepts remind us that intelligence is complex. There is more to it than a mere IQ number. It is adaptability and several different types of intelligence may help us get where we need to go. Examples are verbal, mathematical, spatial, musical, kinesthetic (athletic), naturalistic (understanding of animals and plants), personal and social (understanding feelings, motivations and strengths and weaknesses of self and others). Assessing a child’s multiple intelligences is the hallmark of the writings of Mel Levine. Oliver Sacks analyzes extremes in types of intelligence in his work on Temple Grandin, the legendary figure in animal husbandry who is autistic, thus low in personal and social intelligence but is possessed of extremely high naturalistic intelligence.

ANTICIPATORY GUIDANCE

In this section, we will discuss anticipatory guidance during the traditional well child examinations.

Prenatal Visit

Prenatal visits can be most useful to establish rapport with a family and to ascertain important knowledge about the upcoming baby. Obviously, a careful medical history is most helpful in assessing newborn risk. What were the results of prenatal screening? Also,
Table 2. Summary of developmental theories as a timeline (ages 0–30) and their issues related to age.

<table>
<thead>
<tr>
<th>Age → Theory ↓</th>
<th>0–18 mo</th>
<th>18 mo–3 yrs</th>
<th>3–6 yrs</th>
<th>6–12 yrs</th>
<th>12–17 yrs</th>
<th>17–30 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREUD</td>
<td>Oral</td>
<td>Anal</td>
<td>Oedipal</td>
<td>Latency</td>
<td>Genital</td>
<td>Young adult</td>
</tr>
<tr>
<td>ERICKSON</td>
<td>Basic trust vs. mistrust</td>
<td>Autonomy vs. shame and doubt</td>
<td>Initiative vs. guilt</td>
<td>Industry vs. inferiority</td>
<td>Identity vs. role confusion</td>
<td>Intimacy vs. isolation Generativity vs. stagnation</td>
</tr>
<tr>
<td>PIAGET</td>
<td>Sensorimotor</td>
<td>Symbolic preoperational</td>
<td>Intuition preoperational</td>
<td>Concrete operational</td>
<td>Formal operational</td>
<td>Formal operational</td>
</tr>
</tbody>
</table>

Source: Adapted from Dixon and Stein (2006).
include “housekeeping” items such as the new nursery, cribs, and car seats.

Another less tangible, but an equally important consideration is mother’s potential for a successful bond with the new baby. It is critical to assess the mental health of both mother and the family unit as this will directly reflect on infant well-being. All babies are born into a “family” whether it is a single mother or a group home, thus, maternal support systems are critical to ascertain. Will extended family participate in the care of the infant? Will the father be involved, financially as well as emotionally? Is mother working outside the home, and, if so, will she be going back? Has the family given thought to day-care? Have mother and father grown up with good role models for parenting? If so, do they mesh with each other?

Do not forget siblings (sibs). The birth of a new baby will have a profound effect on an older child who may feel displaced and display changes in behavior, either testing limits or regressing to clingingness or previous tantrums. The provider should impress on parents that this “bad behavior” is usually normal and that fence mending can be critical at this stage. Often older sibs perceive that mother has abandoned them and having the father look after the new baby while mother gives the older child “special time” can be most helpful. If the older sibling displays hurtful behavior toward the baby, further counseling is imperative. It is important to raise this subject at all well-child visits and to include the older siblings in the examination of the baby.

Is the family eager about the arrival of the new baby? Has the pregnancy gone smoothly? Be certain that a difficult pregnancy has not caused any hard feelings in the mother. Does the family realize that newborns are not always a pleasure? They fuss, they are messy and require their needs be met instantaneously. It is critical that a newborn cannot be “spoiled” and, in fact needs to know that their parents are there and available at all times to establish the important “basic trust” as discussed in the Erickson schema above. Does mother plan to breastfeed? Have the parents attended any prenatal classes? Do they have access to instruction for nursing, now and after birth?
The First Newborn Visit

All newborns receive a physical examination and standard newborn assessments for gestational age and neurologic maturity. Details of these are available in any textbook of pediatrics.

We will base this discussion upon the assumption of a normal newborn. The initial parental reaction to a newborn can yield some important information. Does the child’s appearance match the pre-conceived notions of the parents? Parents should be aware that not all newborns are pink, smooth, chubby and affable. Intrauterine positioning can make their heads and extremities quite misshapened. It is important to point out that newborns change dramatically in the first few days of life. Are the parents and baby beginning to bond? Does there appear to be a good fit? It is important to listen to parents’ comments about the baby. Is there the appropriate amount of eye contact and talking? Even things said in jest are meaningful (“He looks just like your cousin Bob; what a loser he’s going to be!”)

It is quite understandable after a difficult delivery or Caesarean section that a mother may not appear to be bonding with the baby because of pain, discomfort or side effects of medications. A mother displaying persistent disinterest in the baby or disinterest in talking about the baby is a “red flag” which the provider should take very seriously. A prolonged neonatal hospital stay may have a profound influence on bonding.

What is the basic nature of the baby? Some are more alert or engaging than others. Some are fussy; some are placid. Some take well to feeding, others are slower to catch on. It is important to apprise the family that a newborn will take in very little during the first 1–2 days of life, and, in fact, may lose up to 10% of birth weight in that time. Full term babies are more likely to be self-regulating and it is important for parents to feed the baby to meet his/her needs. Sometimes smaller babies may require awakening to feed. Lactation consultants at most hospitals are crucial in preparing and encouraging the nursing process.

It is important to assess the baby’s readiness for discharge from the hospital, since cost constraints now limit a hospital stay for
48 hours, or, in the instance of a Caesarian section, 72 hours. Make sure safety counseling is complete and the baby is sleeping on its back. Also, be certain that the family has a car seat that they are using properly. Always arrange for follow up within two days of discharge.

The One and Two-Month Visit

These visits are critical for assessing how the maternal-infant dyad is getting off the ground. New parents need to know that one cannot “spoil” an infant in the first six months of life and the baby must have his/her needs met quickly so that basic trust develops early. Once this occurs, the baby will tolerate better future brief parental absences. A fussy baby can be very taxing to new parents and empathy and understanding from the physician can go a long way. Try to assess the frustration levels of the parents. How are they managing it? Can they get occasional “time off?” Do they spell each other? Is there a good constructive support system from grandparents? How much experience has the father had in the care of babies; is he actively involved? If not, is it due more to his lack of interest or unwillingness of the mother and family to accept him as a member?

How does one assess how the baby is doing? It goes far beyond simple measurements and yes/no questions. Most term infants should be gaining about 20–30 g/day and head circumference should have increased by 1–2 cm at the one-month visit. Most newborns sleep a lot (12–18 hours/day) and, when awake, fuss a lot. Body language can be most revealing. Most parents want to give their child the best opportunities in life. However, is there anything in the family’s past or present situation that may be interfering with this? Are there any environmental exposures which may be detrimental (cigarette smoke, pets)? What is the psychological state of the caregivers? At this point, it may be difficult to distinguish common “baby blues” from true post-partum depression, but it is important to follow up. More providers are availing themselves of standard questionnaires for maternal depression (Edinburgh) at all two-month exams. Are the mother and baby relaxed or tense? Does
holding the infant have a calming effect? Do mother and baby have
good eye contact? A new baby may have occasional disconjugate eye
movements in the first six months. Does the baby hear and turn to
a caregiver’s voice? This is a critical question to ask at every visit. If
parents express concerns, assume they are correct and make appro-
priate referrals. They live with their children all day; we do not. They
have a much better perspective. Talking and reading to a baby are
of critical importance. All babies start incorporating language from
day one of life. In the event of a bilingual home, it is helpful if the
family speaks in their native language at home. This is the best way
for an infant to learn a language. The infant will learn its native lan-
guage in due time. In spite of the fact that an infant may confuse
both languages at first, this will eventually resolve itself and the ben-
efits far outweigh any problems with this approach. Is feeding going
well? Is there mutual satisfaction at the end of the feeding? If baby
is nursing, prescribe Vitamin D supplements, as content in breast
milk may be quite variable. It is critical to make personal observa-
tions rather than simply taking the words “OK” and “fine” at face
value. What a mother does not say may be far more revealing than
what she says.

The Four-Month Visit

Four months of age demonstrates a major spurt of neurological mat-
uration. The babies lose many of their rough edges and become
almost a pleasure to be around. Although the earliest social smile
may occur at six weeks, four month olds seem to initiate social inter-
action. They look around and smile spontaneously, whether to a
mobile or a person. Even if this is not a purposeful initiation, it
engenders a response from family members, which is definitely re-
enforcing. They also start squealing and laughing, much to the
delight of those around them. They will try to reach for and in some
instances grab for objects around them. Objects such as mobiles can
mesmerize them. By this age, all newborn reflexes are gone. The
tonic neck response is one of the last to go, so infants may have posi-
tional plagiocephaly because of lying on their backs.
Most parents believe that their babies should be sleeping through the night. Some babies do, but others still need to develop better techniques of self-soothing. Many infants will sleep at least six hours, but they may not coincide with those of the family. It is important to counsel parents to set up a routine for the baby, and to follow it. Going to sleep should be a pleasant, relaxing endeavor. Although a four month old may not be deliberately manipulating parents, it is important to let the baby cry for increasing increments of time before going in to reassure him/her. It may be possible to rearrange the sleeping period to coincide with that of the family, but it must occur gradually by moving that block of time up or back in 15 minute increments over several weeks. Feeding a baby to sleep may become a habit hard to break. In addition, starting solid feedings early does not promote sleeping through the night. Co-sleeping varies from culture to culture. In the US, it is generally discouraged because of concerns about rollovers. It is a problem when both parent and infant do not agree on the subject.

Babies may start solid foods at age four months, although ideally, if they are growing well and sleeping well, there is no need to do so. However, culture and family custom often overrule. If a family wants to initiate solid foods, always advise them to start with cereals, non-citrus fruits and vegetables (yellow or orange) and introduce one new food at a time to determine if there will be any adverse reactions.

The most important part of the four-month evaluation is to assess the interactions between parent and child. This is supposed to be a happy time in life, and if the pediatrician senses any lack of spontaneity and joy on the part of either parent or children, this definitely merits further investigation.

The Six-Month Visit

Major advances in motor development are occurring. Infants prepare themselves for sitting by assuming a tripod position. Some are already sitting alone if placed in that position. They develop the ability to grasp objects within their reach. Some may transfer objects
from one hand to the other. Some may also be able to pick up objects off a table or high chair tray with a raking motion, with or without including the thumb. More importantly, they may seek objects and go for them, thus showing the earliest signs of visual-motor coordination. Babies use both their hands equally, and if they start demonstrating “handedness” at this age, this most frequently suggests focal neurological problems. The infants also begin to demonstrate more mouthing behavior. This is good, and may be a sign that they are ready to learn to eat solid foods. However, since six-month-olds are unable to discriminate what they put into their mouths, this is the age where safety counseling begins in earnest. At this point, the major admonition to parents is “from here on do not trust this child any further than you can see him!” It is time to baby-proof” all parts of the home including basements and garages. Household cleansers, poisons, plants, medicines, electric outlets, cords and sharp objects should be unavailable to all children. Give families the phone number of the nearest poison-control center in the event of an ingestion that may occur. Any objects that the family treasures should be nowhere near the range of the child’s curiosity. Obviously, an infant of this age will not understand the concept of “no,” so allowing him/her near any family heirlooms simply begs for a bad outcome. This is the age where it is appropriate to advise the use of a playpen, to set up as a “second home” for the child. If one waits too long, or uses this as a response to adventurous behavior, the child will construe this as jail confinement, and will not like it.

Parents should initiate solid foods by age six months as milk alone will not provide sufficient calories. Babies should take breast or formula for the first year of life. After one year, do not give milk that is any less than 4% fat in order to maximize brain development up until age two. In areas where water is not fluoridated, supplementation should occur, starting with 0.25 mg/day. As many babies are in many locations (e.g. home, daycare, preschool), one must be cognizant of the content of fluoride in each setting.

There are major changes in language and social development at age six months. Babies begin to babble with labial consonant sounds, graduating from the “raspberry” cheer of five months of
age. The beginning of stranger anxiety manifests itself in long-hard skeptical looks from the baby. At this point, many have figured out the concept of parental manipulation, which can be quite trying. They may cry incessantly, but smile upon entry of the parent in the room. How a family reacts to this often yields interesting insights into their life’s experiences. Sometimes, there may be significant variances between mother and father on this subject. In counseling parents, it is best to start at a point of agreement (“curtain calls” are very annoying) and then guide them to develop a mutually agreeable strategy to deal with them. Sometimes, it may be necessary to try one parent’s approach first, but first have each parent agree to a new approach if one does not work.

Because of these changes in development, often the subject of infant stimulation arises. Most parents want to do the right thing for their children and experience constant bombardment with advertisements for toys and videos that “enhance development.” As a rule, advise parents that any video or toy should never act as a substitute for direct contact between parent and child. Ideally, the child should initiate exploration and parents should guide it. Thus, avoid foisting activities on the child, especially passive ones. Parents will ask about swimming lessons. They are good for the social contacts and perhaps for getting children used to water, but should never create the illusion that an infant is safe in the water.

The Nine-Month Visit

The best way to look at gross and fine motor development in a nine month old is that they have now developed better means to endanger themselves than at six months of age. From a motor standpoint, they can now crawl, stand up holding on and cruise around as well as develop a pincer grasp, thus allowing exploration of smaller objects at further ranges. Infant walkers may enhance locomotion, but are not safe because of the number of injuries they cause. Infants may bang objects together to the point of breaking them. They can now explore and handle finger foods and develop the sucking and swallowing coordination to manage them. It is critical
to discuss “choke foods” with parents as part of the injury-prevention inventory. It is important to let the child initiate exploration and self-feeding and it is the parents’ duty to provide safe choices. Getting into power struggles over food often begins at this age and hopefully, can be nipped in the bud if the clinician observes any inkling of this behavior.

The major personal-social agenda of the nine month old centers on object permanence and attachment. They now recognize the difference between “here” and “not here” and develop attachments to what is present. They will often have difficulty in separating from what is “here.” Babies will now search for an object that drops out of sight, may even feel a bit uneasy about it, but all is happy again when it comes back. This is the age of “peek-a-boo” where the face is covered, caregiver “disappears,” but then quickly returns much to the baby’s amusement. What becomes fascinating is the baby’s response to longer absences. Many factors play a part in this including baby’s innate adaptability, strength of attachments already made and trust. There may be external influences such as culture (some do not encourage separation from parents) and adverse circumstances such as health and environmental issues. With normal attachment, a child will become visibly upset if a parent leaves the room and an unfamiliar figure appears. The child may not stop crying, or possibly may warm up to some extent to the stranger after time. However, upon return of the parent, the child will gravitate immediately to the parent and the tension eases quickly. Signs for concern are if a child does not seem to care if the parent leaves the room, or gets angry upon the parent’s leaving the room and remains so after the parent returns. No change in affect throughout the leaving and returning of a parent also merits further evaluation. It is important to take seriously any disturbances in child attachment, the earlier the better.

This is the age where children learn the use of transitional objects that function as substitutes for a parent, provide the child with comfort, and object permanence. They are good for children, but may be of concern if used excessively and to the exclusion of normal personal interaction.
Note that language development ties in well with object permanence and attachment. Whereas a six month old may say “mama” or “dada” non-specifically, a nine month old may address each parent correctly.

The One-Year Visit

The major accomplishment at age one year is preparing to walk. This is, in spite of its automaticity in later life, a very complex task, requiring external input (visual, auditory, tactile), many internal neuromuscular adjustments (balance, proprioception), and motor output (muscle contractions and concomitant relaxations, and coordination of them). Furthermore, there is constant interplay among these modalities. Impairment of these inputs, adjustments or outputs results in delays in walking. Simple positive reinforcement when a child starts to walk (a high point for parents) goes a long way in promoting development of walking skills.

Most children, contrary to wishes of parents and grandparents do not walk at age one year. The average age is about 15 months with a two standard deviation range of 9–17 months of age. If a child is not walking by age 18 months, further evaluation is necessary. Some “red flags’ regarding walking which may suggest neurologic or orthopedic problems are: limping, asymmetry of gait, toe walking, loss of developmental progress, waddling gait, ataxic gait and refusal or inability to bear weight. Significant signs on examination including muscle tightness, or flaccidity, hyper- or hyporeflexia and scissoring require neurologic assessment.

It is necessary to dispel many myths about walking. Children do not need to crawl before they walk. Exercises or walkers do not enhance walking skills. Expensive shoes are not necessary. Orthotics are very rarely necessary and are of no use for common situations such as internal tibial torsion, femoral anteversion or metatarsus adductus, all of which are benign self-limiting conditions.

Fine motor skills at age one include good pincer grasp (as opposed to the “scissor grasp”), feeding self with fingers (they may wear a good amount of their food), and drinking from a cup with
help. They may have three words and understand a bit more. They master simple games like “peek-a-boo” and “bye-bye.” Since children can imitate what they see, sometimes they will wave “bye-bye” to themselves, because they view the palm of the hand of those initiating the activity.

From a personal-social standpoint, stranger anxiety advances, as do tantrums. Parents often ask what to do about tantrums. It is best to explore first what they do and then offer alternatives. This will have more credibility if their particular method is not working well. It is appropriate for a parent to ignore a tantrum, distract the child, or even laugh at it. It is not an option to say “no” but then allow a tantrum to wear them down into submission. If a parent is not ready to stand his or her ground on a “no” answer, just say “yes” if it is a safe option for the child. Remove the child from the difficult situation and give a “time out.” As a rule, “time out” should be one minute for every year of age.

At this visit, it is standard practice to draw blood for screening. In the United States, there is a mandate to screen all children on Medicaid for lead poisoning at ages one, two, and three. In other instances, questionnaires may help identify those at risk, but they are not entirely reliable. Due to variability in diet and the effect of iron deficiency on learning and behavior, screening at this age is also a requirement.

The 15-Month Visit

The hallmark of age 15 months is the emergence of autonomy from the nest of attachment. This becomes possible due to the emergence of several motor skills. A child can now walk independently and can reach and attain more. Fine motor and adaptive skill development allows them to feed themselves better and use a cup without help. However, this transition is never smooth, due perhaps in part to the ambivalence on the part of the child toward leaving the nest. In addition, other developmental “disconnects” make this process more difficult. Specifically, a 15 month old may begin to understand more than he/she can express. Thus, their limited
ability to communicate frustration or develop strategies to defuse it leads to worsening tantrums. They see more, desire more and can try to attain more, but do not have the ability to delay their gratification. They do not have any concept of danger or fear of it and will react negatively if thwarted from an activity that may be harmful to them.

Parental response to this newfound desire for independence may exacerbate tantrums. Excessive anxiety or anger or unrealistic expectations of what a child this age is capable of understanding can be problematic. The child will be “into everything” much to the dismay of parents, particularly those who cherish orderliness and neatness in their homes. Cleanliness on the part of a 15 month old is purely chimerical, and any expectations of such are entirely unrealistic and may do harm to a child if rigidly enforced. As children of this age have no concept of danger, parents will often ask reasonably and often desperately “What should I do to keep him out of harm’s way?” This is the beginning of discipline. First, one should introduce parents to the true definition of “discipline,” which is “learning.” What is the best way to keep a child safe, yet allow him/her to explore the environment? At this age, the child has a short memory, so the word “no” should come immediately at the time of the infraction. Remove the child from the dangerous situation and never allow him/her to repeat the activity. For example, if a child climbs into a fireplace, one must respond by removing the child from the situation and barricading the area so he cannot possibly repeat the activity. In this way, a parent can say “no” enforce it and thus develop credibility without being “on call” constantly to do so. The child will still not understand the concept of potential danger, but now knows there are forces beyond his control that can stop him. If a parent does this calmly, the child will accept it, albeit after several tries. For the sake of the child, one must make the environment safe for him, rather than making him safe for the environment. Thus, bathrooms, basements, garages and workshops should always be “off-limits.” Any valuable objects should be stored far out of reach. If one dares a child to break something valuable, then everybody loses. Corporal punishment at this age is of no value and only serves to instill fear
and anger. This can be a difficult concept for many well-meaning parents and may require persistent monitoring and reinforcement. It is of critical importance that parents and other caretakers be “on the same page” as to how to handle these issues. Consistency is most important, not only from parent to parent, but also from day to day.

Language and social development take significant turns at this time of life. The child will be more sociable, initiate more contact, play games (give-and-take) and will imitate. This is an important age to start screening for childhood autism, using such standardized validated screens as the M-CHAT (Modified Checklist for Autism in Toddlers). Administer this test at subsequent visits if concerns are present.

The 18-Month Visit

The 18-month visit is a continuation of developing autonomy and independence. Children should be walking at this time, and, if not this should raise concern. They begin to run, albeit in a tottering fashion, which gives them more ability to get away. From a fine motor standpoint, they can now handle a spoon and feel less dependent on others to feed them. Furthermore, they might even resent help with feeding. It is important to allow toddlers to advance their skills and to accept their lack of fastidiousness.

A major topic of conversation at this age is toilet training. It is important that this arises and gives the care provider an opportunity to explain to parents that it is unlikely that toilet training will occur very soon. The average age of urine continence is between 3 and 4 years of age, with girls training earlier by about two months. Nighttime wetting may occur in 10% of girls at age four and in 10% of boys at age five. As in all aspects of development, the child must demonstrate maturational readiness. They must demonstrate that they are losing the reflexive elimination of urine and can maintain dryness for about three hours. They must be able to realize that they have had a bowel movement (BM) and express desire to have the diaper changed. They also must show interest in the potty seat and
may even ask to use it. They need the motor ability to take off their
clothes to initiate a trip to the potty. Once they show interest, then
it is appropriate to “run with it” and encourage it. However, it is
common for children to change their minds or lose interest, and it
is important for parents not to force the issue. If children have a suc-
cessful BM or bladder void, reinforcement should be positive and
they should be happy with the accomplishment.

Another issue that revolves around independence is eating.
Some children are more “picky” than are others. It is critical to
inculcate early that it is a losing proposition to fight with children
over food. It may be necessary to delve into the parents’ past feed-
ing struggles that may have haunted their childhood. It is important
to realize that children are different; some are constitutionally thin
and do not require that much to eat. If a child is active and healthy,
and the growth is following a line, albeit lower than height, and
especially if the parent followed a similar pattern, it is important for
the parent to “back off” and let the child make the decisions.
Although teenagers with and without eating disorders may purpose-
fully wreak havoc on their health with their diet, there are no
reports of healthy toddlers doing so. Always remember that the par-
ents are in charge of food choices and it is important to counsel
them to provide healthy ones. If children demonstrate food prefer-
ences, stick with those, as repetitive as it may be. Keep introducing
other choices and offer praise when they try new things.

As with the 15-month visit, it is important to reinforce discus-
sions of safety, tantrums, discipline and “time out.” Toddlers of this
age improve their skills of imitating and parents should always
remember that children will emulate many of their routine tasks
such as plugging or unplugging electrical appliances. It is a difficult
concept for an 18 month old to understand that “if mommy does it,
why can’t I?” There may be more battles over “no” at this age.
Parents should learn to limit their “nos” to unsafe requests and
actions and to accept the fact that many of their children’s needs
may be inconvenient for them. However, once they determine that
the answer is “no” then they should stand their ground without
displaying anger.
The Two-Year Visit

This visit is useful to follow up on all the 18-month issues such as independence as they often come to a head at this point. There may be more of an interest in potty training. It is important to reinforce all the discussions from the previous well-child exam. The child has now mastered the use of a spoon and a fork, and thus can be more independent about eating. They can wash and dry hands. As parents observe their “babies” mastering tasks safely, they should relinquish control and leave it to them (sometimes a difficult concept, needing frequent reinforcement). However, two year olds are far from “on their own,” so it is nonetheless important to reiterate all the safety issues discussed in previous visits.

Speech and language are a critical part of the two-year well-child exam. This aspect of development is most predictive of future academic performance. By age two there should be a vocabulary of a minimum of 50 words, a child can put two words together, can identify many more objects than he/she may be able to articulate, can follow two-step commands and begins to use language as a tool for communication, especially to make requests. Many questions arise as to progress in language and speech development and the clinician faces important decisions as to who may need intervention. The basic questions to ask are:

- How is the child’s hearing? It is difficult to assess hearing at this age. Often, turning up the volume of a TV or sitting close may indicate compromised hearing. An audiologist can best evaluate hearing through play audiometry.
- Are there other developmental delays (motor, social, adaptive)? This is most helpful in assessing for autism, global delay (mental retardation).
- Is the child physically healthy?
- How verbal is the rest of the family? Is the child receiving adequate verbal stimulation? Although a difficult subject, it is important to assess parental literacy in an empathetic manner and utilize any community facilities to help them.
• Are there stressors going on in the home?
• Does comprehension seem on par with language output? Is the patient difficult to understand? This is important information to distinguish between speech and language delays.

Sometimes it is necessary to perform screening that is more definitive and testing if necessary (see final section of this chapter). At this point, the clinician will have to make a decision as to who has significant language delay and who is merely a “late bloomer.” If the clinician adopts a “watch and wait” approach, it is best to reassess this in six months rather than at the three-year visit.

The Three-Year Visit

There are significant developmental landmarks that a three year old should reach. From a gross motor standpoint, reciprocal motion appears and the child is able to go up and down stairs and pedal a tricycle. Linguistically, a child this age should be 75% comprehensible to all outsiders. Sentences should be as long as 5–8 words. If this has not occurred, speech and language evaluation is paramount. Frequently the child will be dysfluent in speech and it is necessary to assess risk for future stuttering. It is normal for a three year old to “think faster than they can execute” and to trip over words. Some of the risk factors for future stuttering are positive family history, continuation of dysfluency beyond age four and noticeable grimacing. If these findings are present, it is important to refer to speech therapy immediately. Otherwise, counsel parents to allow the child to finish the sentence without appearing anxious, bored or annoyed. They should not speak for the child in this situation.

The hallmarks of the three year old are imagination, symbolism and fantasy. Whereas younger children engage in “parallel play” (i.e., each child performing the same activity side by side, but not relating to each other), three year olds will be less imitative and more likely to use objects as substitutes for others. An example is the use of a banana for a telephone. Symbolism is a far more sophisticated means of communication and emerges at this age.
“house” and assigning different roles are good examples of imaginative development. Costumes and puppets are commonly used symbolic substitutes and can serve the healthy purpose of helping a child work through fears and hostilities they may have. Fears may center on separation, and although not immediately obvious may be symbolic of some reality going on in the child’s life. Parents should take children’s fears seriously and not minimize them. Although modifying the environment may temporarily eliminate the fear, it is important to consider that certain situations are inevitable in the real world and we all must learn to cope with them. Often, approaches using behavioral techniques are most helpful with gradually increasing exposure reinforced with rewards if the child copes well.

Fantasy is very important in the life of a three year old. Indeed, these are the “magic years.” Imaginary friends and fantastic stories abound. It is important to distinguish this from telling lies. It is important not to denigrate imaginary friends, but still appropriate to challenge the child with “I’d love to meet Charley. Can you bring him over for lunch? I can’t believe him unless I see him.” Children of this age are not capable of distinguishing “right from wrong” or “good from bad,” nor do they understand the “golden rule.” However, that does not absolve the parent from dealing with misdemeanors. This is an important opportunity to teach about boundaries (“his-yours” “don’t touch anyone unless they ask you.”). In addition, it can be a time to introduce other concepts like “indoor voice vs. outdoor voice.” Since three year olds have fuzzy lines between fantasy and reality, it is important to probe into their fears and always to consider the possibility that some may stem from television and other media. Parents should always be aware of what their children are watching on TV, from both a qualitative and quantitative standpoint.

Another hallmark of three year old development is their gullibility. They lose their skepticism, if not outright stranger anxiety and it is important to start teaching them about strangers and “checking with mommy” whenever anyone they do not know talks to them. Present in general terms and refrain from discussing danger, which may be frightening.
The Four-Year Visit

The hallmark of age four is the development of self-concept, albeit concrete and ego-based. They begin to identify themselves by physical characteristics as well as by what they do. It is possible that these concepts were already “in their heads” but now become more evident with the emergence of new skills in language including better use of nouns, verbs and modifiers. However, speech skills may be less developed and residual “baby talk” (using wrong consonants) is quite common, easily manageable with some speech therapy.

Although not capable of empathy at this age, they do begin to understand the concept of “what’s yours is not mine.” According to Piaget, this is the “initiative vs. guilt” stage. Now that they express themselves better, they can make their inner impulses more apparent to others (initiative). Accordingly, they will receive feedback from others (hopefully more positive than negative) which may mold future behaviors (guilt). Closely related to the concept of initiation is that of assertiveness. There is a thin line between assertiveness and aggression, which is a difficult concept for many adults, let alone a four year old. Children may actively go after something, or express anger when upstaged. They often become mouthy or sassy if in disagreement with someone. Parents should be aware that it is healthy for a child to disagree, but should learn to be more respectful about it. Aggressive behaviors of concern are physical harm to self, others, property or animals.

The four year old mind begins to sort things out. They discover and can express their feelings about gender and ethnic identity. With this goes the ability to become curious and to act upon it. Normal sexual curiosity manifests itself as “playing doctor” or masturbation. As children now have the ability to differentiate self from others, this is the opportunity to develop the concepts of “good touch” and “bad touch.” There are always parental concerns about sexual behavior. It is important to explore further if a child is preoccupied with sex to the exclusion of other normal activity, participates in sexual play with others of a significantly different age, acts out sex or seems to associate it with physical violence.
The Five-Year Visit

The centerpiece of the five-year visit is school readiness. The school age child is now developing acceleration of language and cognitive abilities. At age six, more mature, less idiosyncratic processes supplant the self-centered preoperational stage. This fits in well with school as it prepares the child for more contact with new and different adults and children. It is a complex time for children as they develop individualization, yet also develop skills at forming relationships, participation in group activities and following rules.

By age five, most children with biologic developmental abnormalities are identified and should have a referral for the interventions to which they are entitled. It is the time to assess for readiness, not with a medical model (what diagnostic pattern does this child follow?), but rather an individualized model (what are the child’s strengths and weaknesses?) Can the child follow directions? How is the child ready for school socially and emotionally? How is his/her attention span, memory, impulse-control, organization, delaying immediate gratification, sharing, and adaptability to new situations? Does he/she have friends? How do the parents interact with the child? What exposures has the child had? Has there been sufficient opportunity to develop motor, language and social skills? What was the course of development in the parents? Were they “late bloomers” or have they had consistent difficulty with certain tasks? What is the best school placement for the child (preschool, young-fives or kindergarten)?

The Seven-Year Visit

The second grader is leaving Piaget’s preoperational and enters the concrete-operational stage. He/she can begin to distinguish fantasy from reality. The perception of the world becomes less idiosyncratic. The child can now see more than one aspect of something and begins to perceive the impact other people and situations have upon them. This is the beginning of moral development, which, at this age consists of strict adherence to external rules. The idea of
“self-concept” emerges, not the old egocentric world, but rather self-esteem that develops because of hard work, success and failure. This is the manifestation of Erikson’s “industry/inferiority” conflict.

The major achievements between ages 5–7 are advancement in reading and arithmetic and developing coping skills. Now that the child is in school (away from home), learning and emotional difficulties become more apparent. It is beyond the scope of this chapter to discuss their diagnosis and treatment, but this is the age to address them. It is important for the practitioner to be familiar with laws that mandate special services to children with disabilities and to mobilize community, or outside, if necessary, resources for the patient’s benefit.

**Preadolescent Visit**

The commonly used term “latency period” can be misleading. Although turmoil may be less apparent, the preadolescent has many tasks to accomplish. Cognitive skills improve and children of this age begin to appreciate strengths and weaknesses in others, and hopefully, themselves. In lieu of earlier concreteness, children can now make more choices, evaluations and judgments. This opens the way for development of social skills with receiving and interpreting judgment from others. Social skills entail many fine-tuned subcomponents such as sensing others’ feelings and thoughts, social self-monitoring, appropriateness of emotional response, tactfulness and many others. Academic, social and athletic success and failure now become more meaningful to children, and it is critical to assess how this influences them. Does the child approach success or failure with anxiety, apathy or bravado? Coping mechanisms begin to develop and it is important to assess them in each individual. Some of the feedback loops in making and receiving judgment may go awry and degenerate into self-destructive behavior, marginalizing, or bullying others.

Thus, it is critical to evaluate each child individually to assess strengths and weaknesses, especially in the face of school or social difficulty. Moreover, we all live among innumerable outside
influences and it is equally important to assess the child in the context of his/her home, school, and social life. With the advent of the Internet, media has a strong influence and plays a significant role in all our lives, including those of our patients.

**RESOURCES**

Developmental assessment is becoming an integral part of day-to-day work in a practice setting. Because of the importance of early identification, the American Academy of Pediatrics (AAP) developed a policy statement for screening in 2006. There are five basic components to *developmental surveillance*, which should be flexible, longitudinal, continuous and cumulative. The provider should:

- elicit and attend to parental concerns about development,
- document and maintain a developmental history,
- conduct accurate observations of the child’s development,
- identify risk and protective factors, and
- document the process and findings from the above.

With the above in mind, the AAP has developed an algorithm for following up developmental surveillance. One should consider the above points as universal screening. As concerns arise, it may become necessary to apply other testing instruments, *developmental screening*, which is indicated at any visit where there are parental or physician concerns about the child’s development. Furthermore, the AAP recommends developmental screening at the 9-, 18- and 30-month visits, regardless of any findings on developmental surveillance.

If results of developmental screening are not concerning, then reinstate the standard developmental surveillance. If results are concerning, then the next step is *developmental evaluation* which consists of a medical diagnostic evaluation. The physician should assess for any medical problems that may explain the developmental delay and should refer the child to whatever community resources that are available to do more definitive developmental testing. If this testing reveals a developmental disorder, then the child is identified
as having special health care needs necessitating referral to appropriate agencies and specialists for care.

How does one choose developmental screening tests? Different instruments have different purposes, so it is incumbent upon the physician to fit the test to the concerns about the patient. There should be good data as to the test’s validation and studies have shown that they become more accurate and reliable as a function of the number of tests that a practitioner performs. Parents may administer the test, or in other instances, it may be practitioner-driven. It is important to assess the parents’ cognitive or linguistic capabilities as well as the practice’s ability to perform the test (experience, time, and cost). After administering the test, it is incumbent upon the pediatrician to be familiar with all local and other resources available to the child and family for further evaluation and treatment.

What tests to choose? Many screening tests are for the purpose of general developmental delay for the general primary care population. They include the ASQ (Ages and Stages Questionnaire), the PEDS (Parents/ Evaluation of Developmental Status). The LDS (Language Development Survey) identifies language delay in the general population. Others, such as the BINS (Bayley Infant Neurodevelopmental Screens) are for high-risk children including pre-term, low birth weight and low socioeconomic status patients. The CAT CLAMS (Cognitive Adaptive Test 1 Clinical, Linguistic and Auditory Milestone Scale) is for the high-risk population and specializes in language and cognitive development. A full list of developmental tests is available through the AAP under “Policy Statements.”

REFERENCE


BIBLIOGRAPHY