Autism vs. Brain Lesion:
Identifying and Assessing Children with Developmental Disorders

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How to Take This Course

Please take a look at the steps below; these will help you to progress through the course material, complete the course examination and receive your certificate of completion.

1. **REVIEW THE OBJECTIVES**

   The objectives provide an overview of the entire course and identify what information will be focused on. Objectives are stated in terms of what you, the learner, will know or be able to do upon successful completion of the course. They let you know what you should expect to learn by taking a particular course and can help focus your study.

2. **STUDY EACH SECTION IN ORDER**

   Keep your learning "programmed" by reviewing the materials in order. This will help you understand the sections that follow.

3. **COMPLETE THE COURSE EXAM**

   After studying the course, click on the "Course Exam" option located on the course navigation toolbar. Answer each question by clicking on the button corresponding to the correct answer. All questions must be answered before the test can be graded; there is only one correct answer per question. You may refer back to the course material by minimizing the course exam window.

4. **GRADE THE TEST**

   Next, click on "Submit Test." You will know immediately whether you passed or failed. If you do not successfully complete the exam on the first attempt, you may take the exam again. If you do not pass the exam on your second attempt, you will need to purchase the course again.

5. **FILL OUT THE EVALUATION FORM**

   Upon passing the course exam you will be prompted to complete a course evaluation. You will have access to the certificate of completion **after you complete the evaluation**. At this point, you should print the certificate and keep it for your records.

Introduction

Bobby was diagnosed at age 20 months with autism by his primary care provider. The diagnosis was not based on specific testing or diagnostic procedures, no referrals were made to specialists, and no one advocated for him or for his parents, who accepted the diagnosis with no basic understanding of the nature of autism.

Although Bobby continued to have difficulties that an informed observer might have differentiated from autism, he was thereafter labeled by all of his healthcare providers as autistic and mentally retarded. At age seven, when he became extremely ill and symptomatic, it was discovered that he had a large choroid plexus papilloma. His caregivers realized far too late that his developmental delays had been the result of the tumor and not autism. Bobby is now severely retarded and will require a high level of care for the rest of his life. His developmental disorders could very likely have been ameliorated to a great extent by early awareness and treatment of the tumor.

The intent of this course is to establish the necessity of looking very carefully at developmental disorders. Developmental delay manifests during the early years of life and often seems quite non-specific, but may have a variety of very serious underlying causes. This seems especially true with regard to autism and brain lesions, which develop among similar age groups, share some similar physiological and neurological signs, and are more common in boys. An uninformed approach to these problems can cause irreparable damage at a particularly vulnerable time in a child's life. Astute nursing observation, surveillance and advocacy can contribute to early recognition and treatment, thus limiting or preventing permanent disability in otherwise salvageable children.

Objectives

Upon completion of this course, the learner will be able to:

- Discuss normal growth and development from birth to 7 years of age.
- Identify the roles of various healthcare professionals in the assessment of developmental delays.
- Describe the role of the registered nurse in the assessment of developmental delays.
- Discuss autism and the criteria for its diagnosis.
- Distinguish between autism and brain lesion.

About the Author

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Ms. Falin has served as a member of the Otsego County Legislature in Otsego, New York. She has contributed chapters to a guidebook (Castle Connolly Publishing Company) on alternative living choices for the elderly; served on several community service boards and organized an Alzheimer's conference featuring an investigator in the Nun Study from the University of Kentucky.

She was a regional director for the Alzheimer's Association before starting her current position as a paralegal, assisting attorneys with medical malpractice cases. Ms. Falin is currently developing a business plan for her own medical-legal research and support services business.

Ms. Falin earned an Associates Degree in Nursing, from Dutchess County Community College, Poughkeepsie, NY; a Bachelor of Professional Arts in Health Services Administration from St. Joseph's College, White's Bridge, ME; and a Master of Arts in Health Advocacy from Sarah Lawrence College, Bronxville NY.

Growth and Development

Infancy through early childhood is the period of greatest growth and development for human beings. **Growth** is defined as “the progressive...increase in size of a living thing. This may be normal, as in growth of...a child, or pathological, as in...a benign or malignant tumor” (Thomas, 1973, p. G 48).

“**Development** refers to the acquisition of functional skills during childhood. Monitoring the growth and development of children is an integral part of the assessment of pediatric patients. Recording the acquisition of developmental milestones provides a systematic approach by which to observe the child over time” (Berkowitz, 1996, pp. 48-49).

The field of Pediatrics is based on the science of growth and development. It is crucial for the pediatric healthcare provider to carry out consistent surveillance, meticulous assessment, and conscientious management of all aspects of childhood growth and development. “All healthcare personnel having the responsibility for children should be familiar with the normal patterns and milestones of development and be able to recognize deviations from the norm as early as possible, so that underlying disorders may be promptly identified and given appropriate attention” (Berhman, 1992, p.13).

Disruptions in growth and development can arise from vastly different conditions, but present with similar problems. Nurses play a crucial role in monitoring growth and development, and should be aware of the contributions they can make in identifying and assessing children with developmental disorders.

Norms, Stages, and Milestones

"Normal, full term newborns enter the world capable of responding to visual, auditory, olfactory, oral and tactile stimuli" (Berkowitz, 1996, p. 49). These capabilities are the raw material for future growth and maturation. The following principles apply to all growth and development.

First, development of neonatal responses into an organized, sentient and effective relationship with the environment, as well as the development of self-perception, is governed by the brain (Gibson, 1991, p. 22). Attainment of developmental milestones reflects "the maturation of the nervous system." Primitive neonatal reflexes are controlled by the brain stem. These are involuntary motor responses that are present at birth and gradually disappear, suppressed and replaced by voluntary motor activity originating in the cortex of the brain (Berkowitz, 1996, p. 49).

Second, the sequence of development is the same in all children, although the rate or timing of development may vary from child to child. For example, all children must learn to walk before they can run, but not all children learn these skills at exactly the same age. Attainment of one milestone may not precisely coincide with another milestone expected at about the same age: a child may be able to walk down stairs before s/he develops a 50-word vocabulary, although both milestones usually occur by age 2 (Berkowitz, 1996, p. 49).

Physiological development in human infants follows a cephalocaudal (head-to-toe) pattern. Control of head movement precedes control of posture, which precedes locomotion. The infant must be able to hold its head up and turn it from side to side in order to turn over; it must be able to turn over before it can sit, crawl, stand or walk. Neurological development and muscle strength and coordination must act in concert along a logical progression. Cephalocaudal progression is also present in development of motor skills, which progress from gross to fine: "looking, reaching, contacting, grasping, handling" and purposeful manipulation of objects (Whipple, 1966, p. 398).

An infant from 1 month to 4 months of age is gaining head control. By 7 months, the infant can usually sit up by itself and by 8 to 10 months is crawling and standing. Walking is learned between 10 months and a year on average; by age three, the child can run, jump, hop, and walk on tip-toe. By age 4, the child's locomotion is well-coordinated and controlled, "lithe and graceful" (Whipple, 1966, p. 400).

Third, while biological variations in growth and development are apparent between individual children, these variations can be evaluated by means of a statistical tool, the Normal Distribution Curve (NDC). Approximately 90% of "normal" children fall within the 5^{th} to 95^{th} percentile on the NDC. Pediatricians commonly use the NDC to track physical growth, specifically weight, length and head circumference (Behrman, 1992, pp. 13-14).

Fourth, while experts generally agree that development is influenced by both biological and environmental factors such as poverty or marginal parenting skills, biologic factors alone are sufficient to "place children at risk for developmental problems and delays" (Berkowitz, 1996, p. 49).

The standard of practice for monitoring physical growth is to "routinely monitor weight, length, and head circumference...to assess the overall adequacy of a child's growth....Routine surveillance of a child's growth provides a framework for periodic discussions regarding normal growth patterns...." (Rudolph, 1996, pp. 3-4). Weight and length or height are self-explanatory measurements. Head circumference is the most complex of the three values, since "head size reflects the volume of intracranial contents including brain, cerebrospinal fluid and blood..." (Rudolph, 1996, p. 7).

Indicators for functional development are not as clear-cut as the physical markers, but are consistently recognized throughout both medical and neuro-psychiatric fields as having specific elemental components, which Berkowitz (1996) lists as:

- Gross motor skills
- Fine motor/adaptive skills

- Personal/social skills
- Language skills
- Cognitive skills

Behrman (1992) further condenses the indicators into neuro-developmental processes (gross and fine motor skills), cognitive (language and learning), and psychosocial (personal/social).

Like physical growth, normal functional development occurs sequentially. This sequence is divided into periods, or stages. Each stage has one or more discrete changes, advances or accomplishments, referred to as milestones. **Milestones** are signs of normal development, indicating that the child is progressing at a rate and in a manner similar to other children of the same age (Powell & Smith, 1997).

DEVELOPMENTAL MILESTONES-OVERVIEW

Birth to 1 Year	1 to 3 Years	3 to 7 Years
reflexive responses	gradual voluntary motor activity	independent, coordinated motor activity
hand-mouth coordination	fine motor coordination matures	
sits-turns over-creeps-stands	walks with help-walks independently-runs-jumps; feeds and dresses self	skips; ties shoe laces
voluntary grasp and release of objects	mature finger and thumb grasp, scribbles	can write/draw simple figures
babbling, mono-to-polysyllabic speech	10-250 word vocabulary; 3-word sentences, understands simple commands	5-word sentences to mature speech
begins socialization; recognizes others; prefers familiar faces	progresses from isolated to cooperative play	
sensorimotor problem solving	ego-centric thought and language; pre-logical problem solving	pre-logical problem solving to logical, non-theoretical problem solving
	”magical” thinking and symbolic play (pretending)	can distinguish fantasy from reality

Sources: Behrman (1992), Rudolph (1996), Wadsworth (1971), Whipple (1966)

Jean Piaget spent most of his 50-year career studying children’s intellectual development or how functional intelligence develops. In his terminology intellectual, cognitive, and mental abilities are interchangeable. His developmental concepts include “assimilation, accommodation, equilibrium, and schemata.” Schemata are simply theoretical structures resembling index card files in the child’s mind. Piaget separated the periods of development into identifiable phases that progress or “flow along in a cumulative manner” consistent with the child’s chronological age, and build upon the previous phase, so

that each schemata [index card] becomes ever more precise, complex, and information-rich (Wadsworth, 1971, pp. 1, 6,11, 27).

As stated, functional development has its genesis in the brain. As the nervous system develops, so the child develops. From birth to about 6 months, the brain stem dominates behavior and response. “The nervous system is not fully mature at birth and the frontal cortex is one of the clearest examples of a structure that matures postnatally....The period of 6 to 12 months is a time of major change in the behaviors and cognitive abilities of human infants. [There is] evidence suggesting that the frontal lobe may play a role in some of the cognitive changes occurring at this time” (Gibson & Peterson, 1991, pp. 127, 158).

Piaget identifies nervous system maturation as one of several primary factors influencing a child’s ability to develop. “A disturbance in any one of these factors will adversely affect cognitive development. [A] main contribution of maturation to cognitive development is in neurological growth (the growth of brain tissue)...” (Wadsworth, 1971, p. 29).

Berkowitz (1996) defines developmental delay as the failure of a child to reach milestones at the expected age. Specifically, the American Academy of Pediatrics (September, 2002) defines developmental delay as “...including motor, language, cognitive, behavioral, or emotional delay or problem”. For each child who exhibits abnormal development, differential diagnosis is required. Diagnosis is based upon “1) determination of the areas...in which delay is apparent; 2) if motor delay is evident, determination of whether the condition is progressive or nonprogressive; and 3) assessment to see if ...milestones previously achieved are lost...” (Berkowitz, 1996, p. 53).

When a developmental abnormality is combined with a biological growth abnormality, as in loss of language or motor skills combined with an abnormally large head circumference, the issue of differential diagnosis becomes more pressing. “As with other growth parameters, the significance of a given measurement is best defined within the context of normal variations, patterns of past head growth...and the presence or absence of associated historical and/or physical findings” (Rudolph, 1996, p. 8).

Other factors, such as family problems and socioeconomic issues, must be investigated and ruled out as causative factors in developmental abnormality (Berkowitz, 1996, p. 49). The American Academy of Pediatrics (July 2001) estimates “12 to 16% of American children have developmental or behavioral disorders.”

The Professional's Role

The Developmental Surveillance and Screening of Infants and Young Children (RE0062), a policy statement by the Committee on Children with Disabilities of the American Academy of Pediatrics (July 2001), defines the pediatrician's role in monitoring growth and development: "Early identification of children with developmental delays is important in the primary care setting... Developmental screening tests have improved over the years, and instruments that are accurate and easy to use in an office setting are now available to the pediatrician."

But the onus of identifying and assessing developmental disorders doesn't lie solely with the pediatrician. In 1993, New York State established its Early Intervention Program in response to the federal Individuals with Disabilities Education Act. In Article 25 of the New York State Public Health Law, The Early Intervention Program (EIP) provides for "identification and referral of children at risk or suspected of having a disability by primary referral sources including physicians and other health-care providers." By law, parents of such children must receive information about services provided by the EIP, and a referral to the program if they so choose.

According to New York State law, physicians and licensed psychologists are "the only individuals qualified to diagnose autism" (Clinical Practice Guideline, Report of Recommendations, Early Intervention Program, 1997). However, the assessment and surveillance so crucial to forming a differential diagnosis are often conducted by nurses in a variety of settings and patient/provider relationships.

Family nurse practitioners or pediatric nurse practitioners (PNPs) who provide primary care in an office setting are in an especially advantageous position for ongoing assessment, diagnosis and surveillance during well- or sick-child visits. *The Scope and Standards of Practice* published by the National Association on Pediatric Nurse Practitioners (2004) states that PNPs are trained in childhood growth and development and "may consult with other members of the health care team, may coordinate care, and/or make referrals to other members of the health care team."

Practitioners agree in theory that identification and assessment are essential components of pediatric care. In the real world of time restrictions and heightened sensitivity to reimbursement issues, screening processes may be unintentionally omitted since they're time consuming and non-reimbursable (American Academy of Pediatrics, 2001). The first step a nurse takes in the identification process may be simply advocating for appropriate testing and evaluation.

Nurses in non-office environments will also be aware of the growth and development patterns of their pediatric charges (Coucouvanis, 1997). These include hospital and home care, school, camp or other recreational programs, or public health clinics. RN case managers in various settings may interface with children who display developmental disorders. Suzanne Powell (1996, p. 12) lists quality of care outcomes directly resulting from expert nurse case management as: "optimal clinical outcomes through monitoring and adherence to quality standards of care; comprehensive and accurate assessment of clients' deficits, health status, resources, formal and informal support systems; matching assessed needs to valuable services." These goals are suited to any child with developmental delays.

Nurses are often, if not always, on the front lines of patient and family encounters. Nurses are also a sustaining force for communication and maintaining trusting relationships with clients, family and non-family caregivers (Powell, 1996, p. 22). This is particularly important when the client is a young child who cannot speak for him/herself, or when caregivers are daunted by the prospect of a child who may have lifelong developmental shortfalls.

Nurses should be, by the nature of the nursing process, finely tuned to problems associated with underlying medical conditions and adept at noticing subtle behavioral changes or lags perhaps before any dramatic outward symptom manifests (Beauchesne & Kelley, 2004). The nursing time spent observing, noting changes, listening and responding to parents' concerns, is time well invested in a child's future. The nurse should carry these concerns to the primary care provider when the child or parent can't, and give feedback and support.

The knowledgeable nurse can advocate and liaison for families who must cope with an army of diagnosticians and service providers. Families need education regarding the nature of the delay and diagnostic and treatment options (Elder, 2002). Parents of children who predictably or unpredictably fail to achieve developmental milestones will understandably grieve over lost hopes for a “normal” child. These families are in particular need of astute nursing support (Melnyk & Feinstein, 2001).

Assessment and Surveillance - Beyond the Chart

Much of the assessment and surveillance necessary in monitoring a child with possible developmental delays takes place outside the parameters of graphs and tests. Formal screening tools, charts and statistical norms are integral to growth and development surveillance. But experts acknowledge the limitations of standardized growth and development guidelines, no matter how technically reliable they may be.

Rudolph (1996) suggests that tracking height, weight, and head circumference on a standard National Center for Health Statistics (NCHS) cross-sectional growth chart will provide basic parameters for normality. Standardized growth charts are certainly of value for establishing baseline information, and are widely used in pediatrics from birth through at least 36 months. Specialized charts have been designed to monitor growth to age 20 years. Examples of NCHS charts can be found at: http://www.cdc.gov/growthcharts/.

The NCHS (June 2002) advises: “growth charts have been in use since 1977, based on data collected since the early 1960's. They have been adopted by the World Health Organization for international use.” However, “growth charts are not intended to be used as a sole diagnostic instrument. Instead growth charts are tools that contribute to forming an overall clinical impression for the child....”

Interviewing, history taking, and observation are corollary skills essential to the formation of accurate and useful clinical impressions. As Rudolph (1996, pp. 4, 10, 11) says, “developmental normality cannot be defined in absolute terms….some of the most important aspects of developmental assessment, such as alertness, responsiveness, persistence, and concentration, defy objective scoring, whereas some of the most easily scored items, such as gross motor development in infancy, are the least reliable measures of overall mental ability...Surveillance relies more on continual monitoring of developmental functioning and well being, and paying attention to parental concerns and making longitudinal observations during all encounters with child and family.”

Evaluation and Diagnosis - Time is of the Essence

It's not sufficient to simply keep records and make observations in the presence of developmental abnormalities. Surveillance is the means to an end: if an abnormality is identified, the provider is professionally obliged to pursue a differential diagnosis. This responsibility rests with the primary care provider (Rudolph, 1996; Berkowitz, 1996; Behrman, 1992).

Evaluation is particularly crucial when standard indicators point toward an acute underlying cause. Brain lesions may cause permanent damage to the child's central nervous system. Even after surgery, "complications resulting in neurological or psychological problems may also influence outcomes" (Nelson & Palmer, 2002).

If the nurse is not the primary care provider (PCP), it is essential to report any and all concerns to the PCP. A clear perception of the problem, clearly stated, will be invaluable. Communicate concerns without delay. Any disruption of normal development must be addressed as soon as possible, and some situations can be life-threatening. Working closely with the PCP will keep him/her apprised of day-to-day trends that may be missed in intermittent office contacts. Nurses who have established a legitimate and trusting relationship with the family and child can effectively advocate for more extensive testing and treatment if appropriate (Elder, 2002).

Developmental Abnormalities: Autism vs. Brain Lesion

Distinguishing between abnormalities seen in autism and those caused by central nervous system lesions may seem difficult. Both conditions share at least superficial symptoms and emerge in roughly the same age groups. Both typically interfere with and/or cause regression in developmental processes. But compared in the light of primary clinical manifestations and measured against developmental norms, these conditions are actually quite distinct from each other.

With a firm grasp of developmental and behavioral norms and deviations, nurses will be more adept at doing assessments that are accurate and adequate for the basis of effective interventions (Coucouvanis, 1997). Assessments of children with developmental abnormalities "should include a detailed family history, developmental and behavioral history, physical and neurological exam, and formal testing of cognitive and functional abilities" (Rudolph, 1996, p. 169).

In its *Practice Parameter: Screening and Diagnosis of Autism*, the American Academy of Neurology (August 2000) recommends several easily performed tests for autism screening including audiology testing, lead screening and metabolic testing, and electroencephalogram (EEG). Guidelines for cognitive testing in autism are readily accessible and a multitude of tests are available to the practitioner. Examples of tests specifically for autism can be found at:
http://www.health.state.ny.us/nysdoh/eip/autism/screenin.htm and
http://www.patientcenters.com/autism/news/diag_tools.html

Autism "was unknown in ancient cultures, or even in medieval times, and…just 'appeared' about 60 years ago." The disorder was first described clinically in 1943 by Leo Kanner, in reference to children who appeared abnormally isolated and self-occupied (Yazbak, 2003, p. 103). Autism --literally, self-ism-- is an umbrella term that covers a wide range of developmental abnormalities and physical ailments.

The extent of autism in the United States is currently unknown due to lack of epidemiological data (Centers for Disease Control, 2003), but the incidence is on the rise. Yazbak (2003, p. 103) indicates that "the number of children aged 6 to 21 with autism in U.S. schools rose steadily from 5,415 in 1991-1992 to 118,602 in the latest published Department of Education report for the 2001-2002 school year."

Autism is considered a developmental disability (Centers for Disease Control, 2003). *The Diagnostic and Statistical Manual of Psychiatric Disorders IV, Text Revised* (DSM IV-TR, 2000, p. 40) includes autism under "Disorders Usually Diagnosed in Infancy, Childhood, or Adolescence", and describes it as a "Pervasive Developmental Disorder". There is a caveat that "Pervasive Developmental Disorders are sometimes observed with a diverse group of other general medical conditions (e.g., chromosomal abnormalities, congenital infections, structural abnormalities of the central nervous system" (DSM IV-TR, 2000, pg. 69). Boys are three to four times more likely than girls to be autistic; however, autistic girls "tend to have more severe symptoms and lower intelligence" (NIMH, 1999)

Symptoms are frequently observed during the first year or two of life. "Autism can almost always be accurately diagnosed by the time the child is 3 years old. About 20% of children with autism appear to develop normally at first, and only later do their social and communication skills begin to deteriorate" (Neurology Forum, 2002). To qualify diagnostically as autism, "The disturbance must be manifest by delays or abnormal functioning in at least one (and often several) of the following areas prior to age 3: social interaction, language used as social communication, or symbolic or imaginative play. In most cases, there is no period of unequivocally normal development….By definition, if there is a period of normal development, it cannot extend past age 3 years" (DSM IV-TR, 2000, p. 71).

Diagnostic features of autism include abnormal or impaired social interaction and "a markedly restricted repertoire of activity and interests" (DSM-IV-TR, 2000. p. 70). Abnormalities in socialization may present as impaired or inappropriate use of nonverbal behaviors, lack of interest in mutual activities, involving others only as tools or 'mechanical aids'", and an impaired awareness of others: "Individuals with this

disorder may be oblivious to other children (including siblings), may have no concept of the needs of others, or may not notice another person's distress" (DSM-IV-TR, 2000, pg.70).

Aside from difficulties with social development, the solitary behavior of autistic children is noticeably aberrant. They "are often preoccupied with one narrow interest (e.g., dates, phone numbers, radio station call letters). They may line up an exact number of playthings in the same manner over and over again….They may…show resistance to or distress over trivial changes (e.g., a younger child may have a catastrophic reaction to a minor change in the environment, such as rearrangement of the furniture or a new set of utensils at the dinner table" (DSM-IV-TR, 2000, pg. 71).

Disruption of normal language development is typical of autism. "There may be delay in, or total lack of, the development of spoken language. In individuals who do speak, there may be marked impairment in the ability to initiate or sustain a conversation..., or a stereotyped and repetitive use of language or idiosyncratic language" (DSM-IV-TR, 2000, pg. 70).

Language development, with its premier position among developmental milestones, can be a nonspecific but extremely important indicator of underlying problems. "Possible etiologies for developmental language disorders…are many: mental retardation, craniofacial disorders, cerebral palsy, autism, traumatic brain injury, hearing loss….At some point in our professional lives we will all encounter a child who is not talking in a way that is appropriate for age and developmental status" (Downey, et al., 2002).

When language development is evidently lagging, evaluation with intervention is crucial. "Research repeatedly tells us that the rate of speech and language development is at its highest during the critical period between birth and 5 years…anything that interferes with a child's ability to interact with the environment in a normal manner has the potential to cause speech or language delay…Professionals need to be alert to possible delay, so that the child receives essential and appropriate assessments and interventions….Referral to an interdisciplinary team is enormously valuable in evaluating a child's hearing, speech and language, cognitive, neurological and physical status" (Downey et al., 2002).

However, nurses who work with infants and young children should be aware of emerging research suggesting that autism can be predicted during the first and second years of life by non-verbal clues such as hypotonia, poor attention, unusual visual interests, lack of gesturing, and lack of emotional expression (Beauchesne & Kelley, 2004).

Although progress has been made in diagnosis, the etiology of autism remains unclear. Much remains to be done as far as investigating and identifying causative or contributing factors (Yazbak, 2003, p.106). Management of autism is multifaceted and includes referral to specialized educational and therapeutic developmental and behavioral programs (NIMH, 1999).

There are many approaches to the management of autism. Behavioral intervention, for example, seeks to treat behavior disorders that are "often mystifying and overwhelming to professionals" (Coucouvanis, 1997). Other interventions focus on social problems, education and development of basic functional skills. Pharmacologic intervention may use antipsychotic or serotonin-affecting medication to ease the more damaging physical behaviors seen in autism. The nurse must be familiar with the treatment regime of choice in order to coordinate planning and deliver care in harmony with therapy, assist and advise parents as needed, and develop a professional acumen (Elder, 2002).

Brain tumors in children are extremely rare, "with only about 2,200 children diagnosed in the United States per year….More brain tumors are found in children age 7 and younger than in older children, and they tend to be more common in boys than in girls" (Packer, Snyder, & Irvin, 2002). Choroid plexus papillomas can occur in children of 1 year and younger. There are several types of childhood brain tumors, including gliomas, astrocytomas, and papillomas. Some types of tumors are malignant; others are histologically benign, but can evolve into malignant growths (Islam & Butt, 2002).

Because these tumors are central nervous system lesions, and are tumors of early childhood (Pencalet et al., 1998), the first signs may be nonspecific physical and neurological abnormalities (Islam & Butt, 2002). Macrocephaly is a common symptom in childhood brain lesions, notably in choroid plexus papilloma: "it has been consistently observed and documented that a choroid plexus tumor produces amounts of CSF that are well in excess of the average 450 ml during a 24-hour period" (Pencalet et al., 1998). The tumor itself, if allowed to grow unchecked, can cause "mass effect" and increased intracranial pressure (Nelson & Palmer, 2002).

Recent research by Courchesne and colleagues indicates that macrocephaly occurs in approximately 20% of all children with ideopathic autism (Lainhart, 2003, p. 393). Macrocephaly is defined as head growth greater than 2 standard deviations above the mean of the NDC (Rudolph, 1996, p. 8). However, the same study has found that autistic macrocephaly is caused by overgrowth of brain cells (Lainhart, 2003, p. 393; Forum, 2002).

Autism and childhood brain lesions are both disorders of very early childhood. They are seen more frequently in boys, and may initially present with similar growth and developmental disruptions. Rudimentary language development with subsequent loss of language skills is typical of autism; however**,** "Children who attain developmental milestones and subsequently lose them may have...a lesion of the spinal cord or brain" (Berkowitz, 1996, p. 53). Children with brain lesions often develop "physical disabilities and cognitive delays" as well (Packer, et al., 2002).

Autism and brain lesion share other symptoms of disrupted neurologic development, specifically seizures, behavioral disorders and varying degrees of mental retardation (NYSDOH, 1997; Pencalet et al., 1998). Regarding choroid plexus papilloma, for example, Islam & Butt (2002) state: "The disease burden can be significant, especially in young children. Morbidity is associated with developmental delay in 39% of pediatric patients, severe behavioral problems in 17%, and epilepsy in 48%." Without astute surveillance and assessment, an acute medical condition may be mistaken for an ongoing developmental disorder.

The acute presenting symptoms of a childhood brain tumor are indicative of increasing intracranial pressure: vomiting, visual field defects, gait disturbances, and headache. Other symptoms include lethargy, irritability, and hemiparesis (Pencalet et al., 1998; Islam & Butt, 2002). These symptoms are not typical of autism and should serve as red flags to the nurse that an acute process is underway. Symptoms may be present for a very short time, or up to 4 years before diagnosis is made (Pencalet et al., 1998). Timely diagnosis and intervention are crucial: "persistently increased intracranial pressure is incompatible with life," and choroid plexus papillomas may become malignant if untreated ((Nelson & Palmer, 2002).

Diagnostic testing should be done by CT Scan and MRI (Islam & Butt, 2002; Nelson & Palmer, 2002). Thorough history taking and evaluation of presenting symptoms, combined with the appropriate testing, is vital. Symptoms such as vomiting and headache may be written off as flu or a "bug". But in cases of brain lesion, these symptoms seldom appear without corollary problems. Caregivers should be encouraged to report any illness or unusual behavior as accurately as possible, regardless of whether it seems pertinent.

Treatment will depend on the type and grade of tumor (Packer et al., 2002), but it must be initiated as soon as possible. "Case studies have shown that watchful waiting is not the most efficacious choice" (Nelson & Palmer, 2002). Surgery with total excision is the goal for benign and malignant neoplasms, but is more successfully achieved with choroid plexus papilloma than with carcinoma. Adjuvant therapy with radiation or chemotherapy may follow surgery for malignancies, but outcomes are generally poorer for these children (Pencalet et al., 1998). In some cases, hydrocephalus is not resolved by surgical removal of the tumor (Nelson & Palmer, 2002). Obstructive hydrocephalus is sometimes, but not always, treated with surgical shunting (Islam & Butt, 2002).

Brain tumors are devastating to the child's development and health. They carry high fatality rates if untreated. Diagnosed and treated early on, choroid plexus papilloma has a survival rate of 100% and at least some of the negative developmental effects can be reversed (Nelson & Palmer, 2002). If allowed to become malignant, the survival rate even after treatment drops to 26% (Islam & Butt, 2002).

Conclusion

Infancy and early childhood are the times of greatest physical growth and functional development. Growth and development occur in a sequential pattern consistent with central nervous system maturation. Growth and development can be defined, monitored and measured against reliable norms. Pediatric care providers at all levels must have a current working knowledge of growth and development norms and respond appropriately to abnormalities when they arise.

Deviations from growth and development norms must be investigated, diagnosed and treated with screening, referral, and family education. Autism and brain lesions share common signs and symptoms. Differential diagnosis is crucial and time-sensitive. Recognition and management of developmental deviations are the primary care provider's responsibility. Nurses form relationships, collect information, make clinical observations, educate clients, relay concerns to the PCP, and assist children and families to cope with delays and disease processes.

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Autism vs. Brain Lesion:
Identifying and Assessing Children with Developmental Disorders

Course Exam

After studying the downloaded course and completing the course exam, you need to enter your answers online. **Answers cannot be graded from this downloadable version of the course.** To enter your answers online, go to e-leaRN's Web site, www.elearnonline.net and click on the Login/My Account button. As a returning student, login using the username and password you created, click on the "Go to Course" link, and proceed to the course exam.

1. The Normal Distribution Curve (NDC) is a statistical tool is used by healthcare provides to track:

    A. Height, weight and lung capacity.
    B. Weight, length and head circumference.
    C. Height, weight and vital signs.
    D. Weight, length and cardiac conditioning.

2. The indicators for normal functional development are not as clear-cut as the physical markers, but are consistently recognized as having specific components. These include all the following EXCEPT:

    A. Gross and fine motor skills/adaptive skills
    B. Personal/social skills
    C. Executive functions and abstract reasoning.
    D. Language and cognitive skills

3. The monitoring of growth and development is a very important function. Assessment of the attainment of developmental milestones, often utilizing a standardized test can be helpful to identify children at risk for developmental delays. In New York State only physicians and licensed clinical psychologists can diagnose a brain lesion.

    A. True.
    B. False.

4. The nurse's role in the identification of developmental abnormalities is limited to:

    A. Surveillance of developmental issues
    B. Advocacy for the patient and family regarding healthcare
    C. Support of the patient and family
    D. All of the above

5. Autism was not known historically; it was first clinically described approximately 60 years ago by Leo Kanner.

    A. True.
    B. False.

6. If autism is suspected, the American Academy of Neurology recommends the following testing:

    A. Audiology testing.
    B. Lead screening and metabolic testing.
    C. Electroencephalogram.
    D. All the above.

7. Diagnostic criteria for autism includes:

    A. Disturbances in social interaction, language used as social communication or symbolic or imaginative play.
    B. If there is a period of normal development it does not extend past the age of 3.
    C. A markedly restricted repertoire of activity and interests.
    D. All of the above.

8. Some recent research, mentioned in this course, suggests that autism can be predicted during the first and second years of life by non-verbal clues. These include all of the following EXCEPT:

    A. Hypotonia and a lack of gesturing.
    B. Poor attention and lack of emotional expression.
    C. Lack of verbal skills.
    D. Unusual visual interests.

9. Except for language skills, most often if a child has attained developmental milestones and then subsequently loses them, a brain lesion should be suspected.

    A. True.
    B. False.

10. Acute symptoms of brain tumor in children are indicative of increased intracranial pressure and are not typical of autism. These include all the following **EXCEPT**:

    A. Unusual repetitive activity.
    B. Vomiting and headache.
    C. Visual field defects and irritability.
    D. Gait disturbances, lethargy and hemiparesis.