Growth and Development
Overview

- Newborn assessment: looking for abnormalities that might indicate a syndrome
- Nutrition
- Child: 12 months to 10 years
- Adolescents: 11-21 years
- Immunizations
NEWBORN HISTORY

- Review pregnancy, labor, delivery
- Past pregnancies: congenital anomalies, genetic or syndromic conditions
- Maternal illnesses, medications
- Events surrounding delivery

Post-Partal Visits

Visit at 2-3 days after birth
- Assess for jaundice
- Breastfeeding/Feeding methods
- Weight change from birth
- Status of newborn screenings
- Maternal well-being
- Infant care teaching

Visit at 1 week
- Weight gain
- Elimination patterns
- Sleep/wake cycle
- Continuation of breastfeeding
- Parent-infant interaction
- Review hearing tests and metabolic screenings

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Fetal nutrition is best determined by assessing:

1. hydration status.
2. birth weight.
3. subcutaneous fat on the anterior thighs and gluteal region.
4. ability of the newborn to suck.

Newborn Skin

- *Milia*: white papules on nose and cheeks
- *Mongolian spots*: congenital with indefinite borders; buttocks and base of spine; predominantly in AA and Asian infants
- *Nevus simplex*: “stork bite”, pink red capillary on face or neck
- *Nevus flammeus*: port wine stain anywhere on malformation body
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Fontanelles are normally described as:

1. fluctuant.
2. soft and flat.
3. bulging.
4. firm.

Eyes
- Spacing: hypertelorism is associated with many syndromes
- Cornea: enlargement suggests glaucoma
- Sclera, conjunctiva, eyelids, pupillary size, eye movement
- Red reflex

Vision Screening
- Red reflex should be present bilaterally at birth

Ears
- Look at placement and for malformations: either can indicate syndromes or chromosomal abnormalities and
- Low set ears may indicate renal agenesis

Hearing
- EOAE: Evoked otoacoustic emission testing
- EOAE: method of hearing screening used for universal newborn screening

Face
- Nose
- Mouth
- Neck: Torticollis, brachial cleft cysts, hematomas, thyroglossal duct cyst or enlarged thyroid

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A webbed neck may be associated with:

1. Turner syndrome.
2. broken clavicle.
3. thyroglossal cyst.
4. torticollis.

Webbed Neck
- Redundant skin along the posterolateral line
Trunk
- Clavicles: palpate both
- Chest: movement, breasts, supernumerary nipples
- Lungs: 40-60 breaths/min
- Heart: murmurs (nearly universal)
- Femoral pulses

Abdomen
- Distention: always abnormal
- Umbilical cord

Genitalia
Female:
- Labia, vagina patent, milky vaginal discharge is common
Male:
- Testes, hydrocele, hernia, rarely torsion, foreskin, assess

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Transillumination of the scrotum can:

1. demonstrate testicular torsion.
2. differentiate a hernia from hydrocele.
3. indicate the presence of testes.
4. can demonstrate presence of cysts.

Trunk and Spine
- Spine: Neural tube defect, hemangioma, discoloration of the sacrococcygeal area, sacral dimples: deep=> neural tube defect

Extremities
- Count fingers/toes
- Movement: symmetrical and spontaneous
- Hip: developmental dysplasia

Neurologic Exam
Assess primitive reflexes (72 total)
- Moro
- Stepping
- Palmar/Plantar Grasps
- Tonic neck reflex (Fencing)
- Others
Nutrition
- Breast milk is ideal for full-term infants for up to 6 months as sole source
- Delay complementary foods until 4-6 months of age
- May reduce risk of atopic dermatitis and atopic sensitization

Advancing Feeding
- Single ingredient foods first: meat, cereal (rice is least allergenic)
- Fruit juice when they can drink from a cup (6 months of age); not > 4-6 oz/day
- Cow’s milk at one year (allergenic prior)
- Finger foods at 8-10 months

Vitamins and Minerals
- Iron: 1 mg/kg/day (cereals, meat, etc.)
- Fluoride: start supplementation at 6 months
- Vitamin D for exclusively breast fed babies
- Vitamin B12 for exclusively breast fed babies of strict vegetarian mothers

INFANT EXAM

- General appearance: growth/development
- Hearing, vision, red reflex
- Murmurs
- Muscle tone, symmetrical movement, hip dysplasia
- Diaper area: Testes, patent vagina, rash
- Adequate care
- Abnormal findings that might indicate syndrome

Assessment by Body System: Essential pediatric assessment

Eye Evaluation
- Newborn to 3 months: Red reflex, inspection
- 3-6 months: fix and follow, red reflex, inspection
- 6-12 months: fix and follow with each eye, corneal light reflex, red reflex, inspection
- > 3 years: visual acuity, corneal light reflex, cover/uncover, red reflex, inspection, attempt ophthalmology

Additional Notes:
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A one week old infant does not have a red reflex in his right eye. What might this indicate?

1. Glioblastoma
2. Strabismus
3. Congenital cataracts
4. Congenital glaucoma

At what age should eye alignment occur?

1. Within 2 months of birth
2. 2-4 months of age
3. By 6 months of age
4. Before 12 months

Vision Screening for Children < 5 years
Screen for:
- Amblyopia: loss of vision
- When the two eyes don’t focus on the same object, the brain ignores information from one of the eyes. If this is not corrected, it can result in loss of vision, amblyopia.
- The most common cause of vision problems in children.

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The corneal light reflex and cover/uncover tests are used to assess:

1. visual tracking.
2. strabismus.
3. red reflexes.
4. vision.

Vision Screening
- Cover/Uncover test to assess for strabismus (start at 6 months through 3 years)

Additional Notes:
Eyes
- **Vision screening** at age 3-4 years with Snellen chart
  - Vision at 3 years: 20/50
  - Vision at 4 years: 20/40
  - Vision at 5 years: 20/30
  - 20/20 vision at 6 years
- **Vision screening > 5 years of age**
  - Vision screening with Snellen chart recommended by AAP:
    - 5, 6, 8, 10, 12, 15 and 18 years
    - Monocular visual acuity

Ear Evaluation
- **Newborn to 3 months**: Startle (Moro reflex)
- 3-6 months: stops and listens to new sound; stops crying with hearing parent’s voice
- 6-12 months: responds to own name
- 12-18 months: follows directions without cues
- 18-24 months: 50% of speech intelligible to strangers

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*Pediatric hearing loss is associated with what abnormality?*

1. Poor hand-eye coordination
2. Renal agenesis
3. Speech delay
4. Poor socialization

*What is the purpose of pneumatic otoscopy?*

1. To screen for hearing loss in newborns
2. To screen for hearing loss in 3-5 year olds
3. To assess for otitis media
4. To assess TM mobility

Articulation
- 24 months: 25% intelligible by a stranger
- 24-36 months: 66% intelligible
- By 3 years: 90%
- By 4 years: completely intelligible
- Difficult sounds: n,t,d,k,g,y ng
Mouth

Primary dentition:
- First teeth at about 6 months
- Final primary teeth at about 24 months

Permanent dentition:
- First at 6-8 years
- Last teeth at about 20 years
- Fluoride Supplementation: 6 months
- Dental home at 1 year of age
- Oral Health Risk Assessment starting at age 6 months, 18 months, 24 months, 30 months

Teeth Eruption
- Tooth eruption is bilaterally symmetrical
- Central incisors: 6-10 months

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*The best way to examine the oral cavity of a small child is:*

1. with the child standing looking at the ceiling.
2. to lie the child on his back on an exam table.
3. to have the caregiver hold the child in her (his) lap.
4. by asking the child to open his mouth.

Heart
- Normal rate at birth is 120-160 beats per minute with marked sinus arrhythmia
- 80-120 beats per minute at 3 years of age
- 70-110 beats per minute at 6 years of age
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What is the purpose of measuring blood pressures in all 4 extremities in the newborn period?

1. To assess heart murmurs
2. To assess blood flow to the extremities
3. To assess distal pulses
4. To assess for coarctation

- Femoral pulses should be equal and strong
- Suspect coarctation of the aorta if pulses unequal or weak
- Characterized by \( \uparrow \) BP upper extremity, \( \downarrow \) BP in lower extremity

Murmurs
- Murmurs are common, 10% are significant
- Due to growing and stretching of vessels, valves, chambers

Heart
- Congenital heart disease is common in children with chromosomal/gene disorders
- Common in fetal alcohol syndrome, hydrocephalus, others
- Assess HR with stethoscope up to 10 yrs
- Assess RR, BP, and O2 sat (cyanosis not always evident)

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When should routine blood pressure screening begin for children?

1. 3 years old
2. 5 years old
3. 6 years old
4. 10 years old

Blood Pressure
- Start screening at 3 years
- Tables consider age, gender, and height
- As BMIs increase, so does BP

Dyslipidemia
- Risk assessment at 2, 4, 6, 8, 10 years then annually
- Dyslipidemia screening (fasting lipid profile) 18-21 years
Growth and Development

GI Evaluation
- Growth: height, weight, BMI (≥ 2 years)
- Hydration status: turgor, mucous mems
- Inspect abdomen: peristalsis?
- Auscultate bowel sounds (5-20/min)
- Percuss, palpate lightly then deeply
- Assess peritoneal irritation
- Consider a rectal exam if intraabdominal, pelvic, or perirectal disease is suspected

Abdomen
- No masses or distention should be present
- Umbilical hernia is common, should be easily reducible
- May be present in African Americans until age 5 years

Hyperbilirubinemia
- Bilirubin is a normal component of RBCs (≥5 mg/dL is termed hyperbilirubinemia)
- In the newborn: normally, high number of RBCs which breakdown
- Immature liver can’t rid bili fast enough (lacks glucuronyl transferase)
- Measured with a bili level (indirect bili)
- Elevated direct (conjugated) bilirubin might indicate liver or gallbladder disease
- TB > 25-32 mg/dL associated with increased risk of neurologic dysfunction
- Kernicterus

Bilirubin
- Bilirubin usually peaks in full-term neonates on 3rd or 4th day
- In premature neonates, usually peaks on 5th-7th day (at greater risk of bilirubin toxicity)
- 60% of newborns have this!
- Pathologic jaundice usually is found in the first 24 hours
- Bhutani Nomogram

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A 3 day old term-infant who is being breastfed has hyperbilirubinemia (16 mg/dL). This is most often treated by:

1. stopping breast feeding.
2. phototherapy.
3. hydration.
4. blood transfusion.
Musculoskeletal
- Assess for developmental dysplasia of hip
- Barlow’s and Ortolani’s maneuvers
- Club foot, metatarsus adductus
- Genu varum, valgum
- Scoliosis

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Where should the examiner’s 2nd-5th fingers be placed to perform Ortolani’s test?

1. On the greater trochanter
2. On the buttocks
3. The medial aspect of the knee
4. The lower abdomen

A 2 month old patient has suspected hip dysplasia. What might be present on assessment?

1. Positive Galeazzi test
2. Inability to lie on hips
3. Pain with straightening the legs
4. Difficulty externally rotating the hips

- Club foot: Talipes equinovarus most common

What should the NP do when this condition is identified?

- Metatarsus adductus

Scoliosis – defined as a ≥ 10 degree curvature
- Risk is greatest during pubertal growth spurt
- Full length PA and lateral standing views on a single cassette (C7 to the sacrum and iliac crest)
- PA preferred because it minimizes radiation to breasts and thyroid
- Cobb method used to measure angle of curvature: Done by radiologist
- Referral for Cobb angle 20°-29° in premenarcheal girl or boy 12-14 years
- Consider referral for any Cobb angle ≥ 20°
- Cobb angle > 30° in any age

Scoliosis Radiographs

The Cobb Method of angle measurement
1. Identify the upper and lower end vertebrae.
2. Draw lines extending along the vertebral borders.
3. Measure the Cobb Angle directly or geometrically.
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Which scoliosis patient should cause the greatest concern for the NP?

1. A 13 y/o female with a 20° curve
2. A 17 y/o female with a 20° curve
3. A 12 y/o male with a 15° curve
4. A 18 y/o male with a 15° curve

GU Evaluation
- BP
- Edema, pallor, dehydration
- Ear position and formation
- Abdominal masses
- CVA tenderness
- External genitalia abnormalities
- Urinalysis

Tanner Staging-Female
(Beginning at age 8 years)
- Stage 1: Prepubertal: papilla elevated above chest wall
- Stage 2: Breast bud stage (8-13 yrs): breast and papilla form small mound, areola increases in diameter
- Stage 3: Breast and areola enlarge; no separation in contours
- Stage 4: Secondary mound formed by areola and papilla about at level of breast
- Stage 5: Adult breast

Tanner Staging-Male
(Beginning at age 8 years)
- Stage 1: testes 1 cm, scrotum and penis are size seen in early childhood
- Stage 2: Slight enlargement of testes (2-3 cm), scrotum becomes reddened and textured (10-13.5 yrs.)
- Stage 3: Further testicular growth (3-4 cm) slight enlargement of penis
- Stage 4: Penis increases in length and diameter, testes enlarge (4-5 cm)
- Stage 5: Adult genitalia

Tanner Staging Pubic Hair
(Beginning at age 8 years)
- Stage 1: No pubic hair present
- Stage 2: Sparse, lightly pigmented, straight along border or labia/base of penis
- Stage 3: Hair becomes more pigmented, coarse, curled, and more abundant
- Stage 4: Pubic hair abundant but covers smaller area than found in adult
- Stage 5: Adult hair distribution, female distributed as reverse triangle
- Stage 6: Hair grows up linea alba
Growth Spurts
Pubertal growth occurs at Tanner Stage II - III in girls
Pubertal growth occurs at Tanner Stage III - IV in boys

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The correct order of maturation in males is:

1. pubic, axillary, and then facial hair.
2. facial, axillary, then pubic hair.
3. axillary, pubic, facial hair.
4. They all appear within 6 months of each other.

The earliest secondary sexual characteristic in girls is:

1. the onset of breast development (thelarche).
2. the development of pubic hair.
3. linear growth.
4. menarche.

The earliest stage of male maturation is:

1. testicular volume.
2. the development of pubic hair.
3. linear growth.
4. lengthening of the penis.

A 4 month old has an ankle bracelet made of tiny flowers. The baby’s mother states that this prevents colic. How should the NP respond?

1. Leave it on and encourage its use.
2. Tell the mother that it will not help and that she should remove it.
3. Recognize that this is a harmless cultural practice.
4. Ask if this has helped other siblings.

An NP has filed a report of suspected child abuse for a child she has just examined. Which statement is correct?

1. NPs are mandatory reporters in some states.
2. Suspected child abuse requires concrete evidence of abuse.
3. Child neglect does not constitute child abuse.
4. The parents should be informed that the report is being made.
An 8 y/o female is brought to your clinic with a spiral fracture of the arm. The NP suspects abuse because the mother’s story doesn’t match the child’s story. How should the NP proceed?

1. Confront the mother about possible abuse.
2. Ask the child what happened.
3. Separate the child from the mother.
4. Tell the parent that you are concerned about the child’s safety.

**ADOLESCENCE (11-21 years)**

**Adolescence (11-14 years)**
- Puberty: Girls 2 years earlier than boys
- Egocentric, moody behavior
- Eating disorders emerge
- Focus is on concrete and present
- Engage in risk taking behaviors
- Deaths secondary to MVAs

**Adolescence (15-17 years)**
- Peer groups
- Seek privacy while at home
- Transitioning from concrete to operational behavior (planning for future)
- Risk taking behaviors escalate

**Adolescence (18-21 years)**
- Key developmental task is focus on achieving
- Emotional intimacy
- Risky behaviors peak: independence, mobility
- Deaths secondary to MVAs, suicide, homicide

**Anticipatory Guidance**
- Healthy dietary habits
- Reduction of injuries
- Regular exercise
- Responsible sexual behaviors, including abstinence
- Avoidance of tobacco, EtOH, others, and anabolic steroids

**Additional Notes:**
CHECK YOUR KNOWLEDGE

1. A 12 year old female visits the NP because she has asymmetry of her breasts. She is in Tanner Stage 3. The NP knows that this:

   1. is an ominous finding.
   2. represents gynecomastia.
   3. is an unusual finding.
   4. will probably resolve by Tanner Stage 5.

2. A 2 week old infant has white pinpoint papules on his face and cheeks. What is this?

   1. Mongolian spots
   2. Eczema
   3. Milia
   4. Hemangioma

3. Which finding is abnormal in a 2 month old child?

   1. A closed anterior fontanel
   2. A palpable posterior fontanel
   3. Presence of the stepping reflex
   4. Red reflex

4. In most children, the primary teeth have completely erupted by:

   1. 12 months.
   2. 15 months.
   3. 18 months.
   4. 24 months.

5. Normal vision in a child is expected by:

   1. 4 years of age.
   2. 5 years of age.
   3. 6 years of age.
   4. 7 years of age.
DEVELOPMENT

Two Months
- Infant focuses on face
- Grasps rattle if placed in hand
- Smiles, coos
- Able to lift head 45 degrees

Four Months
- Able to hold and control head when held upright
- No head lag when pulled upright
- Raises body on hands
- Rolls prone to supine
- Follows light 180 degrees

Six Months
- Able to place object in opposite hand and in mouth
- Sits with support/maybe unassisted
- Rolls supine to prone
- Bears weight
- Recognizes parents
- Says “dada” or “baba”
- Babbles
- Smiles, squeals, laughs, imitates sounds

Nine Months
- Pulls to stand
- Bangs, shakes, drops, and throws objects
- Able to feed self with finger foods
- Responds to own name and understands a few words
- Stranger anxiety
- Crawls, creeps, and scoots

Twelve Months
- Pulls to stand, may take a few steps
- Uses pincer grasp and able to point
- Says 2-4 words
- Looks for dropped or hidden objects
- Responds to own name and understands a few words
- Feeds self and drinks from cup
- Waves and says “bye-bye”, “dada”, “mama”
- Imitates vocalizations
Fifteen Months
- Walks well and is able to stoop
- Can point to a body part
- Says 3-6 words
- Stacks two blocks
- Follows simple commands
- Points, grunts, pulls to show what he wants
- Listens to a story

Eighteen Months
- Able to walk backwards
- Can throw a ball
- Says 15-20 words
- Imitates words, uses two word phrases
- Points to multiple body parts

Two Years
- Able to walk up and down stairs one step at a time
- Can kick a ball
- Says at least 20 words
- Imitates adults
- Follows two step commands
- Stacks 5 blocks

Three Years
- Able to jump
- Can stand on one foot
- Able to ride a tricycle
- Says name, age, and gender
- Knows gender of others
- Able to copy a circle, cross
- Able to recognize colors

Four Years
- Able to sing a song
- Can hop on one foot
- Able to throw a ball overhand
- Able to draw a person with three parts
- Able to cut and paste
- Able to build a tower with 10 blocks
- Counts to five
- Able to copy a square
- Able to dress self with supervision
Five Years
- Able to draw a person with body, head, arms, legs
- Able to recognize most letters and can print some
- Plays make believe
- Learns address and phone number
- Can define at least one word

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**ANTICIPATORY GUIDANCE**

**Birth**
- Infant will feed every 2-3 hours. Awaken to feed if 4 hours have elapsed without feeding.
- Supplementation with Vitamin D usually NOT needed (only needed if breastfeeding mother’s diet lacking in Vitamin D OR formula is not fortified with Vitamin D and infant does not have adequate exposure to sunlight).
- Place infant on back for sleeping
- Do not use baby powder

**One Month**
- Do not place bottle in bed with baby
- Do not give solids until 4 months of age
- Discuss colic and comfort measures

**Two Months**
- No solid foods, no cereal in bottle
- Do not give honey or plain water in bottle

**Four Months**
- Childproof home (small, sharp, or dangerous objects, poisons, meds, etc.)
- Introduce solid foods: cereal first, then pureed veggies, fruits
- Have syrup of ipecac available

**Six Months**
- Introduce solids 2-3 times per day
- Avoid foods which are choking hazards: nuts, hotdogs, whole grapes, hard candy
- Start using a cup
- Fluoride supplements if not in drinking water

**Nine Months**
- Introduce mashed foods and finger foods, start table foods
- Discuss weaning from bottle
- Brush teeth
Twelve Months
- Start on whole milk
- Allow to feed self

Eighteen Months
- Allow toddler to feed self with spoon and hands
- Assess child’s readiness for toilet training

Three Years
- Use time-out for unacceptable behavior: 1 minute for each year of age

Additional Notes: