GUIDELINE FOR MANAGEMENT OF CHILD SCREENING IN PRIMARY CARE SETTINGS AND OUTPATIENT CLINICS IN THE KINGDOM OF BAHRAIN
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The aim of the guidelines:
Strengthening legal and policy frameworks to support:
- Effective and sustained implementation of programmes.
- More equitable access to services.
- Child health policies that provide a holistic view and unified approach.

The Ministry of Health vision:
- Towards child care is in line with the WHO vision which is "a world in which children and adolescents enjoy the highest attainable standard of health and development.
- A world that meets their needs, as well as respects their rights, enabling them to live to their full potential".

Children are the promise and the future of every nation.
Investing in children’s health and development means investing in the future of a nation.
They are at the core of development.
Children are also a vulnerable group whose needs and rights must be protected, including the right to health and development.
Benefits of investing in early childhood care and developmental programmes:
- Psychological development: (mental, motor, social, behavioral)
- Nutrition
- Physical growth
- When all these are adequate, children achieve their potential for development

Childhood is a critical stage in life. The first years shape the future and predict health outcomes at later stages of life. Child care is investment for the future because good child care yields adults who are in optimum health and who are productive, independent and participate actively in their society with minimum health care cost.

The aim of child care is to minimize the preventable deaths, illness, disability and impaired psychosocial development among children and this is achieved with the introduction of frequent, comprehensive screening and immunization program to ensure early recognition and intervention.
Development:

Is categorized as:

Cognitive (mental) : memory, problem solving, numerical understanding

• Language development.

• Social-emotional development: understand relation to self and others

• Fine and gross developmental ability to set, walk, run, and hold small objects

• Child growth is an indicator of past and present conditions (food intake and health status), predictor of future impairments in health and performance.

To deliver these interventions, WHO promotes three main strategies:

• Integrated management of childhood illness

• Expanded programme on immunization

• Infant and young child feeding.

Integrated Management of Childhood Illness:

• Approach that focuses on the well-being of the whole child.

• Aims to reduce death, illness and disability.

• Promote improved growth and development among children under five years of age.

• Includes both preventive and curative elements that are implemented by families and communities as well as by health facilities.

Health and the Millennium Development Goals:

• In September 2000, the Declaration, endorsed by 189 countries, setting out goals to be reached by 2015.

• MDG 4: Reduce child mortality

• Target 4.A: Reduce the under-five mortality rate by two-thirds, between 1990 and 2015.

• Infant mortality: 20 deaths in 1990 to 6.6 / 1000 live birth in 2006 = goal (two third)

• Under five mortality: 22 deaths in 1990 to 10.1 / 1000 live birth in 2006 = half
• Reduce the under-five mortality rate by two-thirds, between 1990 and 2015.

Causes of death:

• The risk of death is highest in the first month of life: Preterm birth, birth asphyxia and infections cause most newborn deaths.

Health risks to newborns are minimized by:

• Quality care during pregnancy.
• Safe delivery by a skilled birth attendant (99.4% in 2006)
• Strong neonatal care.
• Early initiation of exclusive breastfeeding.

From one month to five years of age, the main causes of death are pneumonia, diarrhoea, malaria, measles and HIV.

• Malnutrition is estimated to contribute to more than one third of all child deaths.
• About two-thirds of child deaths are preventable through practical, low-cost interventions.

The WHO Multi-centre Growth Reference Study was undertaken between 1997 and 2003 for assessing the growth and development of infants and young children around the world.

• The MGRS collected growth data from approximately 8500 children from widely different ethnic backgrounds and cultural settings: Africa (Ghana), Americas (Brazil, and the USA), Europe (Norway), Asia (Oman, India).
• The new growth curves are expected to provide a single international standard that represents the best description of physiological growth for all children from birth to five years of age and to establish the breastfed infant as the normative model for growth and development.

• The criteria of selection:
Absence of illnesses, and socioeconomic constraints on growth, non smoking mothers, born at term, breast feeding.

**The average breastfed baby:**
- Doubles birth weight in 5–6 months.
- By one year, will weigh about 2½ times birth weight.
- At one year, tend to be leaner than bottle fed babies.
- By two years, differences in weight gain and growth between breastfed and formula-fed babies are no longer evident.
- Breastfeeding appears to reduce the risk of extreme obesity in children aged 39 to 42 months.

**Nutrition program**
- Legislation to protect and support breastfeeding among working mothers.
- Legislative initiatives to give effect to the International Code of Marketing of Breast milk Substitutes in the country.
- Regulate donations and use of formula.
- Policy on exclusive breastfeeding.
- Guidelines on micronutrients, for treatment of deficiency disorders, supplementation (vitamin A, D, iron, zinc, iodine) and food fortification.
- Sustainability of the Baby-Friendly Hospital Initiative.
- Feeding in infants and young children.
- Globally less than 40% of infants under six months of age are exclusively breastfed.
- WHO actively promotes breastfeeding as the best source of nourishment for infants and young children.
- Adults who were breastfed as babies often have lower blood pressure and lower cholesterol, as well as lower rates of overweight, obesity and type-2 diabetes. There is evidence that people who were breastfed perform better in intelligence tests.
- Malnutrition has been responsible, directly or indirectly, for 60% of the 10.9 million deaths annually among children under five.
- Complementary feeding frequently begins too early or too late, and foods are often nutritionally inadequate and unsafe.

Rising incidences of overweight and obesity in children are also a matter of serious concern

**Expanded program of immunization:**
Immunization, one of the most successful and cost-effective public health investments, have saved countless lives. leads to significant economic benefits as it protects individuals not only against getting an illness but also against the long-term effects of that illness on their physical, emotional and cognitive development.

Immunization can significantly contribute to achieving the MDG 4 which aims to reduce under-five mortality by two thirds by 2015.

![Graph showing vaccination coverage from 1995 to 2006](image)

Vaccine-preventable diseases are responsible for about one quarter of the 10 million deaths occurring annually among children under five years of age.

- In addition, introducing new vaccines will help prevent some 1.1 million child deaths attributed to pneumococcal disease, meningococcal disease and rotavirus.

**Child Safety:**

- All children have the right to a safe environment and deserve protection from injury. Many young lives could be saved by integrating child injury prevention into other global child health efforts.
- Improved child-friendly, emergency health services could also help reduce the consequences of injuries.
- Nearly 90% of injuries to children are the result of unintentional or "accidental" incidents.

**Causes**

- Road traffic crashes, drowning, burns, falls and poisoning are the leading causes of child death from injuries.

**Road traffic crashes**

- Are the leading cause of death among children ages 10 to 19.

The most successful interventions to prevent road traffic injuries: Seat-belts and child-restraints, helmets, pedestrian lanes.

- **Drowning**

Drowning is the leading cause of death in many Asian countries.
Prevention: include the use of life jackets, fencing around swimming pools, covering water hazards and prompt first aid in an emergency

- **Burns**
  Burns from flames and hot liquids can result in long-lasting disabilities.
  Measures effectively prevent burns:
  Smoke alarms, and hot-water temperature regulators

- **Poverty**
  Children in poorer communities are at increased risk of injuries. They are more likely to live in hazardous conditions - residing in homes with open fires, unprotected windows, unsafe roofs and stairs, or near dense, fast-moving traffic. They often lack spaces and facilities for safe play.

- **Falls**
  Falls account for up to one half of all visits by children to hospital emergency departments.
  Severe falls can be avoided by the use of fitted window guards, and specially designed children's products and playground equipment that meet safety standards.

- **Poisoning**
  Prevention: safe storage of toxic agents, child-resistant packaging of medicines and other poisons, distributing medication in non-lethal quantities.

- **Prevention**
  Many developed countries have reduced their child injury deaths by up to 50% over the past three decades.

**Play recommendation:**
Age specific to ensure child safety, social, behavioral, language development

**Adolescence:**
There is 1.2 billion (1/5th of the world population in the age group 10-19.
It’s a period of intense physiological and psychological change, physical growth, and increased nutritional requirements.
Adolescents needs are unmet everywhere, generally thought to be healthy, compared to other age groups, survived diseases of child hood.
lifestyle diseases were responsible for 68.4% of mortality and 58.4% of morbidity, and that these diseases had their roots in adolescence.Common adolescent problems could be preventable
- **The major health problems in adolescence:**
  Mainly sexual and reproductive health problems (early or unwanted pregnancy, abortion complications and Sexually Transmitted Infections, including HIV/AIDS).
  Substance abuse and mental health problems. Nutritional deficiencies.
  Injuries and accidents, and sexual abuse and exploitation
CHAPTER TWO

CHILD GROWTH & DEVELOPMENT

Interpretation of Growth Indicators

1. Introduction

A growth chart offers a simple and inexpensive means of monitoring child health and nutrition status, and it’s a useful instrument for educating the family on the nature of growth and development. The basic growth assessment involves a child weight, length or height, head circumference and body mass index (BMI) and comparing these measurements to age growth standards in order to determine whether the child is growing normally or has any growth problems or tends towards a growth problem that should be addressed.

The measurements of a child should be taken and recorded whenever an infant or child visits the health center for child screening. A growth record is a booklet that contains all charts needed to record and assess the growth of a child from birth up to 5 years of age. A different growth record is needed for boys and girls because they have different weights and lengths beginning at birth. Boys and girls needed to be assessed by standards that reflect normal differences in their sizes.

The standards previously used are based on the growth patterns of limited group (primarily U.S. Children) most of whom were formula–fed babies. In these guidelines we will be using the growth charts derived from the WHO Multicentre Growth reference study. Standards in this study were based on a sample of children from diverse geographical settings including Asia, Africa, America and Europe. Children from Brazil, Ghana, India, Norway, and United States of America and from Oman were included in the study. The Key selection criteria for newborns included were recommended health behaviors such as breast fed infants born at term (the breast fed children grow faster than average during their first three months, but more slowly thereafter; they also tend to be taller and thinner compared with mostly formula–fed group), providing standard pediatric care like immunization and care during illness, as well as non smoking mothers.

These new standards will help better identify stunted, over weight or obese children.
Growth Indicators are typically identified as:

- Head circumference-for-age
- Weight-for-age
- Length/height-for-age
- Weight-for-length/height
- Body Mass Index (BMI)-for-age

All these indicators will be plotted on the growth charts in the boys or girls growth records and they will be used to assess growth considering a child’s age and measurements together.

Age is plotted in completed weeks from birth to age 3 months, in completed months from 3 to 12 months and in completed years and months thereafter.

This means that we plot the age on a vertical line (not between vertical lines).

For example, 5 ½ months should be plotted as follows:

- **Head circumference-for-age**
  
  Head circumference (the distance around the largest part of the head) can provide clues about brain development. If a baby's head is bigger or smaller than most other kids’ are, or the head circumference stops increasing or increases quickly, it may indicate a problem. For example, an unusually large head may be a sign of hydrocephalus, a buildup of fluid inside the brain. A head that is smaller than average may be a sign that the brain is not developing properly or has stopped growing.
a. **Small Head Size**

Small head size {microcephaly} is most often defined as more than two standard deviations below the mean, which corresponds to the 2.3 percentile. Some authors prefer the cutoff of 3 standard deviations below the mean.

In some circumstances, microcephaly may be expected, especially with very short children; it can also be due to many familial, prenatal, and postnatal causes, including prenatal and postnatal severe malnutrition. Depending on head size at birth, microcephaly may be classified as congenital or acquired, the two types tending to have different causes.

b. **Large Head Size**

Large head size {macrocephaly} is commonly defined as more than two standard deviations above the mean. The causes are numerous and include normal familial growth patterns, hydrocephalus, malformations, and genetic, metabolic, and other disorders.

An accurate head circumference measure is obtained with a flexible non-stretchable measuring tape. A plastic tape such that one end inserts into the other is recommended.

Head circumference is generally measured on infants and children until age three years.

Head circumference or OFC [occipital frontal circumference] is measured over the most prominent part on the back of the head (occipital) and just above the eyebrows (supraorbital ridges). This can be translated to mean the largest circumference of the head.

**Head Circumference Measurement - The Procedure**

- Any braids, barrettes, or other hair decorations that will interfere with the measurement should be removed.
- The infant or child may be more comfortable in the arms or on the lap of a parent.
The tape is positioned just above the eyebrows, above the ears, and around the biggest part of the back of the head. The goal is to locate the maximum circumference of the head.

- The tape is pulled snugly to compress the hair and underlying soft tissues.
- The measurement is read to the nearest 0.1 cm or \(\frac{1}{8}\) inch and recorded on the chart.

**Weight-for-age**

- Reflects body weight relative to the child’s age on a given day (measured in kg).
- This indicator is used to assess whether a child is underweight or severely underweight and not used to classify a child as overweight or obese.
- Weight is measured to 0.1 kg (e.g. 7.1 kg or 7.8 kg)

**Weight Measurement – the Procedure**

- Be sure that the scale is placed on a flat, hard, even surface. Explain all procedures to the mother and enlist her help. Explain to her that the child needs to remove outer clothing in order to obtain an accurate weight. Babies should be weighed naked, older children should be weighed with minimal clothing.
- Small babies are weighed on an electronic scale
- If the child is more than 2 years
- Talk with the child about the need to stand still. Communicate with the child in a sensitive, non-frightening way.
- Turn on the scale, when the number 0.0 appears, the scale is ready.
- Ask the child to stand in the middle of the scale, and to remain still until the weight appears on the scale.
- Record the child’s weight.
• If the child jumps on the scale or will not stand still, the mother can be weighed alone, then the mother and child can be weighed together and then mother’s weight subtracted to determine the child’s weight.

- Length/height-for-age
  • This indicator can help identify children who are stunted (short) due to prolonged under-nutrition or repeated illness.
  • Children who are tall for their age can also be identified but tallness is rarely a problem unless it is excessive and may reflect common endocrine disorders.
  • Plot length or height between the horizontal lines as precisely as possible up to 0.5 cm (e.g. 60.5cm)

Judge whether a plotted point seems sensible and if necessary, re-measure the child (For example, a baby’s length should not be shorter than the length at the previous visit. If it is, then one of the measurements was wrong).
**Length/Height Measurement – the Procedure**

- Depending on child’s age and ability to stand, measure the child’s length or height. A child’s length is measured with the child lying down (recumbent). Height is measured with the child standing upright.
- If a child is less than 2 years old, measure recumbent length.
- If the child is aged 2 years or older and able to stand, measure standing height.
- Explain to the mother that she will need to place the baby on the length board herself and then help to hold the baby’s head in place while you take the measurement. Show her where to stand when placing the baby down, i.e. opposite you, on the side of the length board away from the tape. Also show her to place the baby’s head (against the fixed headboard) so that she can move quickly and surly without distressing the baby.
When the mother understands your instructions and is ready to assist

- Ask her to lay the child on his back with his head against the fixed headboard, compressing the hair.
- Quickly position the head so that an imaginary vertical line from the ear canal to the lower board of the eye socket is perpendicular to the board. (The child’s eyes should be looking straight up). Ask the mother to move behind the headboard and hold the head in this position.

Speed is important, stand on the side of the length board where you can see the measuring tape and move the footboard.

- Check that the child lies straight along the board and does not change position.
- Hold down the child’s legs with one hand and move the footboard with the other. Apply gentle pressure to the knees to straighten the legs as far as they can go without causing injury.
- While holding knees, pull the footboard against the child’s feet. The soles of the feet should be flat against the footboard, toes pointing upwards. If the child bends the toes and prevents the footboard from touching the soles, scratch the soles slightly and slide in the footboard quickly when the child straightens the toes.
- Read the measurement and record the child’s length in centimeters.

Measuring standing height

Working with the mother, and kneeling in order to get down to the level of the child

- Help the child to stand on the baseboard with feet slightly apart. The back of the head, shoulder blades, buttocks, clavicles, and heels should all touch the vertical board.
- Ask the mother to hold the child’s knees and ankles to help the legs straight and feet flat, with heels and calves touching the vertical board. Ask her to focus the child’s attention, soothe the child as needed, and inform you if the child moves out of position.
- Position the child’s head so that a horizontal line from the ear canal to the lower border of the eye socket runs parallel to the baseboard. To keep the head in this
position, hold the bridge between your thumb and forefinger over the child’s chin.

- If necessary, push gently on the tummy to help the child stand to full height.
- Still keeping the head in position. Use your other hand to pull down the headboard to rest firmly on top of the head and compress the hair.
- Read the measurement and record the child’s height in centimeter.

**Weight-for-length/height**

- This indicator reflects body weight in proportion to attained growth in length or height.
- It is especially useful in situations where children’s ages are unknown.
- This indicator helps to identify children with low weight-for-height who may be wasted or severely wasted.
- It also helps to identify children with high weight-for-length/height who may be at risk of becoming overweight or obese.
- Here we plot length or height on a vertical line in cm. It will be necessary to round the measurement to the nearest whole centimeter (e.g. 6.8 cm rounds to 7 cm).
- Plot weight as precisely as possible given the spacing of lines on the chart.

**Body Mass Index (BMI)-for-age**

- BMI is calculated as weight in kg divided by the square of the height or length in meters.
- A reference table can be used to calculate BMI.

**BMI-for-age**

- This indicator is especially useful for screening for overweight and obesity.
- The BMI-for-age chart and weight-for-length/height chart tend to show very similar results.
- Plot the BMI on a horizontal line or in the space between the lines. If a reference table is used it is adequate to record and plot a whole number BMI.
2. Interpretation of plotted points for growth indicators

For all indicators, when points are plotted for two or more visits, connect the points with a straight line to better observe trends.

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Normally distributed measurements

- The bell-shape of the normal distribution indicates the natural spread of a variable.
- Measurements that fall above or below 1 SD from the median can be considered abnormal.
Z-Score

- A score that indicates how far a measurement is from the median. Also known as standard deviation (SD) scores.
- The reference lines on the growth chart (labeled 1, 2, 3, -1, -2, -3) are called z-score lines. They indicate how far points are above or below the median score. For example, a score close to the 3 or -3 line may represent a growth problem.

Identification of growth problems from plotted points

- The following table provides a summary of definitions of growth problems in terms of z-score.
- Compare the points plotted on the child’s growth charts with the z-score lines to determine whether they indicate a growth problem. Measurements in the shaded boxes are in the normal range.

<table>
<thead>
<tr>
<th>Z-score</th>
<th>Growth indicators</th>
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<tbody>
<tr>
<td></td>
<td>Length/height-for-age</td>
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<tr>
<td>Above 3</td>
<td>See note 1</td>
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<tr>
<td>Above 2</td>
<td>See note 2</td>
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<tr>
<td>Above 1</td>
<td>See note 3</td>
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<td>0 (median)</td>
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<td>Below –1</td>
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<td>Below –2</td>
<td>Stunted (See note 4)</td>
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<tr>
<td>Below –3</td>
<td>Severely stunted (See note 4)</td>
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</tbody>
</table>

1. A child in this range is very tall. Tallness is rarely a problem, unless it is so excessive that it may indicate an endocrine disorder such as a growth-hormone-producing tumor. Refer a child in this range for assessment if you suspect an endocrine disorder (e.g. if parents of normal height have a child who is excessively tall for his or her age).
2. A child whose weight-for-age falls in this range may have a growth problem, but this is better assessed from weight-for-length/height or BMI-for-age.
3. A plotted point above 1 shows possible risk. A trend towards the 2 z-score line shows definite risk.
4. It is possible for a stunted or severely stunted child to become overweight.
REFERENCES

2. The WHO multicentre growth reference study, training video, MGRS Anthropometry training video
CHAPTER THREE
CHILD DEVELOPMENT

Introduction
A child’s growth is more than just physical. Children grow, develop, and learn throughout their lives, starting at birth. A child’s development can be followed by how they play, learn, speak, and behave. The early years of a child's life are crucial for cognitive, social and emotional development. Therefore, it is important that we take every step necessary to ensure that children grow up in environments where their social, emotional and educational needs are met.

Developmental screening
Developmental screening is a procedure designed to identify children who should receive more intensive assessment or diagnosis, for potential developmental delays. It can allow for earlier detection of delays and improve child health and well-being for identified children. Developmental milestones are a set of functional skills or age-specific tasks that most children can do at a certain age range. Although each milestone has an age level, the actual age when a normally developing child reaches that milestone can vary quite a bit. Every child is unique!

Importance of developmental screening
- Many children with behavioral or developmental disabilities are missing vital opportunities for early detection and intervention.
- Many children with developmental delays are not being identified early.
- Obtain information from parents about their child, including strengths and any concerns the parents may have about the child’s health, development and behavior.
- Determine whether a child’s development is typical for age or is delayed in some regard.
- Talk with parents and involve them more effectively.

Who provides developmental screening services?
Developmental screening can be done by various professionals in healthcare, community nurse, or school settings. The role of health professionals has become particularly important, because of the greater emphasis placed on early identification of children with delays.
Two reasons why primary health care providers are the best to promote children’s developmental health care:

- Primary care providers have regular contact with children before they reach school age. The screening visits allow developmental and other health problems to be identified and treated early in a child’s life.

- Primary care providers are able to provide family-centered, comprehensive, coordinated care, including a more complete medical assessment. The provider may further assess the child for a diagnosable developmental condition(s) (for example, a language disorder, attention-deficit/hyperactivity disorder, autism, mental retardation), and for potential coexisting neurological, metabolic, or genetic disorders. Then the primary care provider refers the child and family to a specialist for further assessment and diagnosis.

Goals of child screening

- Early identification of cognitive, social or emotional, and physical developmental problems in children and adolescents, and appropriate referral for further assessment and intervention, when indicated.

- An increase in the number of children and adolescents who receive appropriate preventive health care services and immunizations.

- A health care home for all children, and improved care coordination among primary care, early intervention, and other services.

- Reduced numbers of children and adolescents with chronic illnesses (such as obesity, asthma, and diabetes) through health maintenance and education.

- Increased awareness among women and families of the need for early prenatal care and the importance of regular preventive health check-ups for infants and children.

When we talk about normal development in children, we are talking about developing skills like:

- Gross motor: using large groups of muscles to sit, stand, walk, run, etc., keeping balance, and changing positions.

- Fine motor: using hands to be able to eat, draw, dress, play, write, and do many other things.

- Language: speaking, using body language and gestures, communicating, and understanding what parents and other children say.
• Cognitive: Thinking skills: including learning, understanding, problem-solving, reasoning, and remembering.

• Social: Interacting with others, having relationships with family, friends, and teachers, cooperating, and responding to the feelings of others.

• Sensory - seeing, hearing, tasting, touching and smelling.

### 3.1 Development of 2 Months Old Infant

**Physical and motor-skill markers**

- Closure of posterior fontanelle (soft spot at the back of the head)
- Several newborn reflexes, such as the dance reflex (baby appears to dance or step when placed upright on solid surface) and grasp reflex (grasping a finger), disappear
- Less head lag
- When on stomach, able to lift head almost 45 degree.
- Less flexing of the arms and legs while on stomach.

**Sensory and cognitive markers**

- Head turns from side to side with sound at the level of the ear
- Beginning to look at close objects
- Crying becomes differentiated
- Coos
- Vocal response to familiar voices
- Smiles

**Play recommendations**

- Toys and objects should be bright colors
- The room should be bright with pictures and mirrors
- Expose the baby to sounds outside those of the home
- Take the baby for rides in the car
Child safety

- Always lay your baby on his or her back, never on their front.
- Make sure the mattress is firm flat and snug fit all round, with a water proof, easy to clean, outer covering such as PVC.
- Cover the mattress with a single sheet and use sheets of lightweight blankets as top covers, always making sure they are securely tucked in.
- Don’t use pillow or duvet until your baby is at least 1 year old.
- Never smoke near your baby – in fact, its best not to smoke inside the house at all!
- Chose plain, simple clothes for your baby to sleep in and avoid ribbons, braces or large-weave cardigans as these can get hooked up or twisted around your baby’s neck.
- Check for loose hanging buttons on your baby’s clothes as these can easily be swallowed.
- Never fall asleep with your baby in your arms as you could roll over and crush or suffocate them.
- Do not apply herbal medicine on your baby’s skin before consulting with your doctor.
- Do not heat your baby’s bottle in the microwave.
- Never leave the bottle propped in your baby’s mouth, even for a few seconds.
- Never leave your baby alone with an older brother or sister because they might give the baby an unsuitable toy or sweets to eat.
- Always change your baby’s nappy on the floor, never on a raised surface as it only takes a second for a baby to roll off.
- If you put your baby on a baby bouncer chair, never put it on a table.
- Never leave your baby on lying on a chair or sofa unsupervised.
- Never carry your baby if you’ve got a hot drink in your other hand.

3.2 Development of 4 Months Old Infant

Physical and Motor Skills

The typical 4-month-old should:

- Show a slowing of weight gain to approximately 20 grams per day.
- Demonstrate the fading of the infant reflexes.
- Have almost no head lag while in a sitting position.
- Be able to sit up straight if propped.
- Raise head 90 degrees when placed on stomach.
- Be able to roll from front to back.
- Try to reach objects with hands (may commonly overshoot).
- Play with rattle when it's placed in the hands, but won't be able to pick it up if dropped.
- Be able to grasp rattle with both hands.
- Be able to place objects in mouth.

**Sensory and Cognitive Skills**

A 4-month-old is expected to:

- Have beginning eye-hand coordination
- Be able to babble and coo
- Be able to laugh out loud
- Anticipate feeding when able to see a bottle (if bottle-fed)
- Demand attention by fussing
- Recognize parent voice or touch.
- Turns head toward direction of sound.

**Play**

**Parents can encourage development through play:**

- Place the baby in front of a mirror
- Provide bright-colored toys to hold
- Repeat sounds the infant makes
- Help the infant roll over
- Use a swing or stroller

**Warning signs**

- Does not seem to respond to loud noises
- Does not notice hands by 2 months
- Does not follow moving objects with eyes by 2 to 3 months
- Does not grasp and hold objects by 3 months
- Does not smile at people by 3 months
- Cannot support head well by 3 months
• Does not reach for and grasp toys by 3 to 4 months
• Does not babble by 3 to 4 months
• Does not bring objects to mouth by 4 months
• Does not push down with legs when feet are placed on a firm surface by 4 months
• Has trouble moving one or both eyes in all directions
• Crosses eyes most of the time (occasional crossing of the eyes is normal in these first months)
• Does not pay attention to new faces, or seems very frightened by new faces or surroundings
• Experiences a dramatic loss of skills.

Child safety
• Make sure the mattress is firm flat and a snug fit all round, with a water proof, easy to clean, outer covering such as PVC.
• Cover the mattress with a single sheet and use sheets of lightweight blankets as top covers, always making sure they are securely tucked in.
• Don’t use pillow or duvet until your baby is at least 1 year old.
• To prevent your baby wriggling down under the covers, always place your baby’s feet at the foot of the cot or pram and make up the covers so they reach no higher than your baby’s shoulders
• Never smoke near your baby – in fact, its best not to smoke inside the house at all!
• Chose plain, simple clothes for your baby to sleep in an avoid ribbons, braces or large-weave cardigans as these can get hooked up or twisted around your baby’s neck.
• Check for loose hanging buttons on your baby’s clothes as these can easily be swallowed.
• Never fall asleep with your baby in your arms as you could roll over and crush or suffocate them.
• Do not apply herbal medicine on your baby’s skin before consulting with your doctor.
• Do not heat your baby’s bottle in the microwave.
• Never leave the bottle propped in your baby’s mouth, even for a few seconds.
• Never leave your baby alone with an older brother or sister because they might give the baby an unsuitable toy or sweets to eat.
• Toys should be suitable for age. Check that toys have no broken bits, sharp edges or loose parts.
• Never give a baby a toy with long hair or fur as these can cause choking.
• Never string a line of toys across a cot as the string could break or come loose and get wrapped around the baby’s neck.
• Always change your baby’s nappy on the floor, never on a raised surface as it only takes a second for a baby to roll off.
• If you put your baby on a baby bouncer chair, never put it on a table.
• If you put your baby on a highchair, place it in the middle of the room out of reach of tables and work surfaces and make sure your baby is firmly strapped.
• Never leave your baby in a bathtub unsupervised.
• Never leave your baby lying on a chair or sofa unsupervised.
• Never carry your baby if you’ve got a hot drink in your other hand.

3.3 Development of 6 Months Old Infant

Physical and motor-skill markers
• Able to lift chest and head while on stomach, bearing the weight on hands (often occurs by 4 months)
• Able to sit in a high chair with a straight back
• Able to bear almost all weight when supported in a standing position
• Able to roll from back to stomach
• Able to hold own bottle (but many babies won't do it, or do it only for short periods)
• Able to pick up a dropped object

Sensory and cognitive markers
• Vision is between 20/60 and 20/40
• Turns head toward noisy stimilus
• Prefers more complex sound stimulation
• Starts to imitate sounds
• Sounds resemble one-syllable words
• Enjoys hearing own voice
• Makes sounds to mirror and toys
• Begins to fear strangers
• Recognizes parents
• Begins to imitate actions
• Begins to realize that if an object is dropped, it is still there and just needs to be picked up

**Play recommendations**
• Provide a mirror that is unbreakable
• Provide large, bright colored toys that make noise or have moving parts
• Play peek-a-boo
• Provide paper to tear
• Speak clearly
• Imitate words such as "mama" to facilitate learning of language
• Start naming parts of the body and the environment
• Use the word "no" INFREQUENTLY
• Use body movements and actions to teach language

**Child safety**
• Make sure the mattress is firm flat and a snug fit all round, with a water proof, easy to clean, outer covering such as PVC.
• Cover the mattress with a single sheet and use sheets of lightweight blankets as top covers, always making sure they are securely tucked in.
• Don’t use pillow or duvet until your baby is at least 1 year old.
• To prevent your baby wriggling down under the covers, always place your baby’s feet at the foot of the cot or pram and make up the covers so they reach no higher than your baby’s shoulders
• Never smoke near your baby – in fact, its best not to smoke inside the house at all!
• Chose plain, simple clothes for your baby to sleep in an avoid ribbons, braces or large-weave cardigans as these can get hooked up or twisted around your baby’s neck.
• Check for loose hanging buttons on your baby’s clothes as these can easily be swallowed.
• Never fall asleep with your baby in your arms as you could roll over and crush or suffocate them.
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• Never give a baby a toy with long hair or fur as these can cause choking.
• Never string a line of toys across a cot as the string could break or come loose and get wrapped around the baby’s neck.
• Always change your baby’s nappy on the floor, never on a raised surface as it only takes a second for a baby to roll off.
• If you put your baby on a baby bouncer chair, never put it on a table.
• If you put your baby on a highchair, place it in the middle of the room out of reach of tables and work surfaces and make sure your baby is firmly strapped.
• Never leave your baby in a bathtub unsupervised.
• Never leave your baby on lying on a chair or sofa unsupervised.
• Never carry your baby if you’ve got a hot drink in your other hand.
• When the baby starts to shuffle and crawl, make sure there are no small or sharp objects on the floor that could choke or cut your baby.
• If you have older children at home, also make sure that their toys are never left lying around for your baby to chew and choke on.
• Always keep hot irons and mugs of hot liquid well out of reach of your baby.
• Put corner protector cushion pads on all sharp edges of all tables.
• Take of all table covers as the baby might pull them.
• Watch for possible falls on stairs, fit safety gates on top and bottom of stairs.
• Avoid the danger of little fingers getting trapped by closing all doors.
• Watch for electrical cords, babies might pull them. Always unplug all appliances immediately after use and put them away, even mobile phone charges.
Never leave toiletries, cosmetics, chemicals, medicines…within reach of your crawling baby – in a low-level cupboard, on the floor in the bathroom, or in a handbag or carrier bag left on the floor.

Store all items that your child could be tempted to swallow, up high out of their reach or put a lock or child-resistant catch on a low-level cupboard door.

Put plastic safety plugs into every empty electrical socket.

Put video and DVD appliances on high surfaces where babies cannot reach.

DO NOT use baby walkers. Baby walkers are NOT recommended by experts and can, in fact, hamper a child's natural physical development. Baby walkers can be dangerous for your child.

3.4 Development of 9 Months Old Infant

Gross motor skills

- Can sit unsupported for 10-15 minutes. Can reach out for objects and still maintain balance
- crawling on belly - from 9 months
- pulls to standing
- May have a sideways saving response at 9 to 10 months.

Fine motor skills

- index finger approach to object - begins to grasp object between thumb and forefinger
- When given two bricks, 'matches' the two bricks. May bang them together
- can shake, bash, pull, push or hold objects
- no hand preference

Language and hearing

Vocalizes with syllables - ka, ba, da - tuneful babble

Signs of abnormal development at 8-9 months

Warning signs include:

- hand preference
- immature grasp/fisting
- no response to distraction test
- limited 'babble'
- not able to maintain a stable sitting position

**Play Recommendations**

- Make musical instruments: You don't need to spend a lot on musical toys – fill an old bottle with rice or pasta (make sure the lid screws on tightly!) and let her find out what an interesting noise it makes when she shakes it.
- Take things in and out of boxes: Empty shoe boxes or ice-cream tubs are perfect for showing your baby how things can be put in, taken out, and put back in again. Good objects to try are ping-pong balls or big Duplo blocks.
- Do action rhymes: Pat-a-cake, pat-a-cake, Incey-wincey spider and This little piggy are favourites at any age, but at 9 months your baby is just beginning to anticipate what's coming next, and gets excited when it comes to the climax.
- Take her swimming: Going to the pool regularly at this age will help build her confidence and she'll love splashing around and kicking her legs. It's great exercise, too, and will tire her out nicely for nap time!

**Child safety**

- Make sure the mattress is firm flat and a snug fit all round, with a water proof, easy to clean, outer covering such as PVC.
- Cover the mattress with a single sheet and use sheets of lightweight blankets as top covers, always making sure they are securely tucked in.
- Don’t use pillow or duvet until your baby is at least 1 year old.
- To prevent your baby wriggling down under the covers, always place your baby’s feet at the foot of the cot or pram and make up the covers so they reach no higher than your baby’s shoulders.
- Never smoke near your baby – in fact, its best not to smoke inside the house at all!
- Chose plain, simple clothes for your baby to sleep in an avoid ribbons, braces or large-weave cardigans as these can get hooked up or twisted around your baby’s neck.
- Check for loose hanging buttons on your baby’s clothes as these can easily be swallowed.
- Never fall asleep with your baby in your arms as you could roll over and crush or suffocate them.
• Do not apply herbal medicine on your baby’s skin before consulting with your doctor.
• Do not heat your baby’s bottle in the microwave.
• Never leave your baby alone with an older brother or sister because they might give the baby an unsuitable toy or sweets to eat.
• Toys should be suitable for age. Check that toys have no broken bits, sharp edges or loose parts.
• Never give a baby a toy with long hair or fur as these can cause choking.
• Never string a line of toys across a cot as the string could break or come loose and get wrapped around the baby’s neck.
• Always change your baby’s nappy on the floor, never on a raised surface as it only takes a second for a baby to roll off.
• If you put your baby on a highchair, place it in the middle of the room out of reach of tables and work surfaces and make sure your baby is firmly strapped.
• Never leave your baby in a bathtub unsupervised.
• Never leave your baby on lying on a chair or sofa unsupervised.
• Never carry your baby if you’ve got a hot drink in your other hand.
• Make sure there are no small or sharp objects on the floor that could choke or cut your baby.
• If you have older children at home, also make sure that their toys are never left lying around for your baby to chew and choke on.
• Always keep hot irons and mugs of hot liquid well out of reach of your baby.
• Put corner protector cushion pads on all sharp edges of all tables.
• Take off all table covers as the baby might pull them.
• Watch for possible falls on stairs, fit safety gates on top and bottom of stairs.
• Avoid the danger of little fingers getting trapped by closing all doors.
• When baby starts to walk, they can take a few steps then lose their balance and fall, so make sure all carpets and rugs are firmly fixed to the floor, and be especially careful to look after your toddler in rooms with wooden or stone floors.
• Watch for electrical cords, babies might pull them. Always unplug all appliances immediately after use and put them away, even mobile phone charges.
Never leave toiletries, cosmetics, chemicals, medicines...within reach of your crawling baby – in a low-level cupboard, on the floor in the bathroom, or in a handbag or carrier bag left on the floor.

Store all items that your child could be tempted to swallow, up high out of their reach or put a lock or child-resistant catch on a low-level cupboard door.

Put plastic safety plugs into every empty electrical socket.

Put Video and DVD appliances on a high surface out of reach of the baby.

Never leave your child alone on a balcony or in a kitchen.

Never leave a young child alone in the bathroom, even for a second. If they are already in the bath, they might try to climb out. If they’re not in the bath, they might try to climb in and even start playing with the hot tap.

DO NOT use baby walkers. Baby walkers are NOT recommended by experts and can, in fact, hamper a child’s natural physical development. Baby walkers can be dangerous for your child.

Always clear your child’s toys away when they’ve finished playing with them, tripping over toys is a common cause of falls in the home.

Go through your child’s toy box regularly and throw away any broken toys.

Children under 3 should never play with toys with small parts and bits that could easily break of.

Never leave your child alone around a pool.

3.5 Development of 12 Months Old Infant

Physical and motor skills

The 12-month-old child is expected to:

- Triple the birth weight
- Grow to a height of 50% over birth length
- Have a head circumference equal that of the chest
- Have 6 - 8 teeth
- Have a nearly-closed anterior fontanel (the front soft spot on the head)
- No longer have a Babinski reflex
- Pull to stand and walk with help or alone
- Sit down without help
• Bang 2 blocks together
• Turn through pages of a book by flipping many at a time
• Have a precise pincer grasp

Sensory and cognitive development

The typical 12-month-old:
• Follows a fast moving object
• Has control over response to sounds
• Understands meaning of fraises and fallows commands
• Tries to imitate animal sounds
• Associates names with objects
• Searches for objects that are hidden, but unable to consider alternative locations
• Points to objects with index finger
• Waves bye
• May develop attachment to a toy or object
• Experiences separation anxiety and may cling to parents
• May make brief exploratory journeys away from parents in familiar settings

Parents can help a 12-month-old develop skills through play:
• Provide the infant with picture books
• Provide the infant with different stimuli, such as going to the mall or zoo
• Play ball
• Build vocabulary by reading and naming people and objects in the environment
• Teach hot and cold through play
• Provide large toys that can be pushed to encourage walking

Child safety (advice given at one year and 18 months of child’s age)
• Make sure the mattress is firm flat and a snug fit all round, with a water proof, easy to clean, outer covering such as PVC.
• Cover the mattress with a single sheet and use sheets of lightweight blankets as top covers, always making sure they are securely tucked in.
• Never smoke near your baby – in fact, its best not to smoke inside the house at all!
• Chose plain, simple clothes for your baby to sleep in an avoid ribbons, braces or large-weave cardigans as these can get hooked up or twisted around your baby’s neck.

• Check for loose hanging buttons on your baby’s clothes as these can easily be swallowed.

• Never fall asleep with your baby in your arms as you could roll over and crush or suffocate them.

• Do not apply herbal medicine on your baby’s skin before consulting with your doctor.

• Do not heat your baby’s bottle in the microwave.

• Never leave your baby alone with an older brother or sister because they might give the baby an unsuitable toy or sweets to eat.

• Toys should be suitable for age. Check that toys have no broken bits, sharp edges or loose parts.

•Never give a baby a toy with long hair or fur as these can cause choking.

• Always change your baby’s nappy on the floor, never on a raised surface as it only takes a second for a baby to roll off.

• If you put your baby on a highchair, place it in the middle of the room out of reach of tables and work surfaces and make sure your baby is firmly strapped.

• Never leave your baby in a bathtub unsupervised.

• Never leave your baby on lying on a chair or sofa unsupervised.

• Never carry your baby if you’ve got a hot drink in your other hand.

• Make sure there are no small or sharp objects on the floor that could choke or cut your baby.

• If you have older children at home, also make sure that their toys are never left lying around for your baby to chew and choke on.

• Always keep hot irons and mugs of hot liquid well out of reach of your baby.

• Put corner protector cushion pads on all sharp edges of all tables.

• Take of all table covers as the baby might pull them.

• Watch for possible falls on stairs, fit safety gates on top and bottom of stairs.

• Avoid the danger of little fingers getting trapped by closing all doors.

• Toddlers are not fully-formed walkers, they can take a few steps then lose their balance and fall, so make sure all carpets and rugs are firmly fixed to the floor, and be especially careful to look after your toddler in rooms with wooden or stone floors.
• Watch for electrical cords, babies might pull them. Always unplug all appliances immediately after use and put them away, even mobile phone charges.

• Never leave toiletries, cosmetics, chemicals, medicines…within reach of your crawling baby – in a low-level cupboard, on the floor in the bathroom, or in a handbag or carrier bag left on the floor.

• Store all items that your child could be tempted to swallow, up high out of their reach or put a lock or child-resistant catch on a low-level cupboard door.

• Put plastic safety plugs into every empty electrical socket.

• Put Video and DVD players on a high surface out of reach of the baby.

• Never leave your child alone on a balcony or in a kitchen.

• Never leave a young child alone in the bathroom, even for a second. If they are already in the bath, they might try to climb out. If they're not in the bath, they might try to climb in and even start playing with the hot tap.

• Always clear your child’s toys away when they’ve finished playing with them, tripping over toys is a common cause of falls in the home.

• Go through your child’s toy box regularly and throw away any broken toys.

• If your child has a swing or a climbing frame, make sure there’s a soft landing underneath such as a mat.

• Children under 3 should never play with toys with small parts and bits that could easily break of.

• Never leave your child alone around a pool.

• Never leave any sharp tool or piece of machinery lying around when children are playing in the garden.

• Always lock and bolt garden gates and make sure there no gaps in the garden fence for a child to squeeze through and go running out in the road.

3.6 Development of 18 Months Old Infant

Social

• Greets people with hi or similar.

• Gives kisses or hugs.

• Wants stuffed animal, doll or blanket in bed. Look at a person who is talking to him.

• Protests when frustrated.
• Directs another's attention to an object or action.
• Becomes anxious when separated from parent(s)…
• Brings toys to share with parent and acts out a familiar activity in play (as in pretending to take a bath).
• Plays alone on the floor with toys.
• Competes with other children for toys.
• Recognizes herself in the mirror or in pictures.
• Seems selfish at times.

Self help
• Insists on doing things by self such as feeding.
• Feeds self with spoon.
• Lifts cup to mouth and drinks.

Gross motor
• Runs, with eyes on the ground
• Walks with help.
• Stands without support.

Fine motor
• Scribbles with crayon.
• Picks up two small toys in one hand.
• Stacks two or more blocks.
• Likes to pull, push, and dump things.
• Pulls off hat, socks, and mittens.
• turns pages in a book

Language
• Asks for food or drink with words.
• Talks in single words.
• Uses one or two words as names of things or actions.
• Says 8-10 words you can understand.
• Asks specifically for her mother or father.
• Uses "hi," "bye," and "please," with reminders.
• Asks for something by pointing or by using one word.

Sensory
• identifies an object in a picture book
• laughs at silly actions (as in wearing a bowl as a hat)
• looks for objects that are out of sight
• puts a round lid on a round pot
• follows simple 1-step directions
• solves problems by trial and error

Play Recommendations
• Encourage and provide the necessary space for physical activity
• Provide safe replicas of adult tools and equipment for the child to play with
• Allow the child to help around the house and participate in the daily responsibilities of the family
• Encourage play that involves building and creativity
• Read to the child
• Control the type and quantity of television viewing
• Control the type and quantity of games played
3.7 Development of 2 Years Old Child

Motor Skills

- drinks from a straw
- feeds himself with a spoon
- helps in washing hands
- puts arms in sleeves with help build a tower of 3-4 blocks
- tosses or rolls a large ball
- opens cabinets, drawers, boxes
- operates a mechanical toy
- bends over to pick up a toy and not fall
- walks up steps with help
- takes steps backward

Sensory and Thinking Skills

- likes to take things apart
- explores surroundings
- points to 5-6 parts of a doll when asked

Language and Social Skills

- have a vocabulary of several hundred words
- uses 2-3 word sentences
- says names of toys
- asks for information about an object (asks, "Shoe?" while pointing to shoe box)
- hums or tries to sing
- listens to short rhymes
- likes to imitate parents
- sometimes gets angry and have temper tantrums
- acts shy around strangers
- comforts a distressed friend or parent
- takes turns in play with other children
- treats a doll or stuffed animal as though it were alive
• applies pretend action to others (as in pretending to feed a doll)
• shows awareness of parental approval or disapproval for her actions
• refers to self by name and use "me" and "mine"
• verbalizes his desires and feelings ("I want cookie")
• laughs at silly labeling of objects and events (as in calling a nose an ear)
• enjoys looking at one book over and over
• points to eyes, ears, or nose when asked

Safety measures needed to be applied by parents for 2 years old children:
• Block off stairs with a small gate or fence. Lock doors to dangerous places such as the garage or basement.
• Toddler proof your home by placing plug covers on all unused electrical outlets.
• Keep kitchen appliances, irons, and heaters from the reach of your toddler. Turn pot handles toward the back of the stove.
• Keep sharp objects such as scissors and pens in a safe place.
• Lock up medicines, household cleaners and poisons.
• Never leave the child alone in the car, even for a few moments.
• Store any guns in a safe place out of his reach.

How parents can increase child learning and emotional security:
• Let the child have a choice when possible: for example, say, "Do you want a banana or an orange?"
• Let the child help around the house, such as dusting, sweeping, or sorting laundry.
• Read picture and story books with the child.
• Help the child learn to wash his/her hands.
• Let the child try to take off his/her own clothes and put on some simple clothes (i.e., clothes without buttons or zippers).
• Let the child play with blocks, balls, crayons, and/or clay. Supervise play so that the child does not put objects in his/her mouth, ears, etc.
• Sing songs, play children's music, and dance with the child.
• Look at family pictures with the child and tell a story.
• Make cut-outs in a large cardboard box to pretend it is a house or car.
• Use toys during bath time; have fun pouring water from one cup to another.
• Let the child talk on a toy phone, or say a few words while parents are talking on a real phone.
• Play "follow the leader" games.
• Teach body parts while dressing and bathing.
• Let the child put stickers on paper to make a design.
• Count things out loud to teach the child about numbers (i.e., count eggs in the carton, stairs as you go up, or fingers and toes).
• Play with soap bubbles.
• Use toys that sort shapes such as a circle, square, or triangle.
• Give the child a doll or teddy bear.
• Read for the child a book of rhymes.
• Give the child a toy to ride.
• Provide safe replicas of adult tools and equipment
• Allow the child to help around the house and participate in the daily responsibilities of the family
• Encourage play that involves building and creativity
• Try to avoid watching television at this age (recommendation of the American Academy of Pediatrics)
• Parents should control both the content and quantity of television viewing. Limit television viewing to less than 3 hours per day, and preferably 1 hour or less. Avoid programming with violent content. Re-direct the child to reading or play activities
• Control the type and quantity of games played

Child Safety
• Never smoke near your child – in fact, its best not to smoke inside the house at all!
• Check for loose hanging buttons on your child’s clothes as these can easily be swallowed.
• Do not apply herbal medicine on your child’s skin before consulting with your doctor.
• Never leave your child alone with an older brother or sister because they might give him/her an unsuitable toy or unsuitable food to eat.
• Toys should be suitable for age. Check that toys have no broken bits, sharp edges or loose parts.

• If you put your child on a highchair, place it in the middle of the room out of reach of tables and work surfaces and make sure your baby is firmly strapped.

• Never leave your child in a bathtub unsupervised.

• Never carry your child if you’ve got a hot drink in your other hand.

• Always keep hot irons and mugs of hot liquid well out of reach of your child.

• Put corner protector cushion pads on all sharp edges of all tables.

• Take of all table covers as the baby might pull them.

• Watch for possible falls on stairs, fit safety gates on top and bottom of stairs.

• Avoid the danger of little fingers getting trapped by closing all doors.

• Watch for electrical cords, babies might pull them. Always unplug all appliances immediately after use and put them away, even mobile phone charges.

• Never leave toiletries, cosmetics, chemicals, medicines…within reach of your child – in a low-level cupboard, on the floor in the bathroom, or in a handbag or carrier bag left on the floor.

• Store all items that your child could be tempted to swallow, up high out of their reach or put a lock or child-resistant catch on a low-level cupboard door.

• Put plastic safety plugs into every empty electrical socket.

• Put Video and DVD players on a high surface out of reach of the child.

• Never leave your child alone on a balcony or in a kitchen.

• Never leave a young child alone in the bathroom, even for a second. If they are already in the bath, they might try to climb out. If they’re not in the bath, they might try to climb in and even start playing with the hot tap.

• Always clear your child’s toys away when they’ve finished playing with them, tripping over toys is a common cause of falls in the home.

• Go through your child’s toy box regularly and throw away any broken toys.

• If your child has a swing or a climbing frame, make sure there’s a soft landing underneath such as a mat.

• Children under 3 should never play with toys with small parts and bits that could easily break of.
• Encourage your child not to climb trees, walls, fences or on the roof of a shed or garage without adult supervision.
• Never leave your child alone around a pool.
• Teach your child never to eat anything they find growing in the garden.
• Keep all garden chemicals, sprays and seeds locked up out of reach of your child.
• Never leave any sharp tool or piece of machinery lying around when children are playing in the garden.
• Always lock and bolt garden gates and make sure there no gaps in the garden fence for a child to squeeze through and go running out in the road.
• Make sure that swings, slides and climbing frames are properly assembled and keep checking regularly for any loose nuts or bolts.

3.8 Development of 3 Years Old Toddler

Physical Development
• Jumps, gallops, tiptoes, run smoothly.
• Can walk backwards along distance.
• May stumble and fall frequently.
• Rides a tricycle.
• Pour from a pitcher or milk carton using both hands.
• Undresses self, but needs help with dressing.
• Uses crayons with somewhat more control.
• Primary teeth have erupted.

Emotional Development
• Becoming more relaxed and flexible.
• Still cries and hits at times.
• Quickly alternates between shyness and exuberance.
• May show fear of unfamiliar objects or activities.
• May want to be a baby at times.
• Begins to talk about dreams.
Social Development
- Is keenly interested in family activities.
- Idolizes parents.
- Seeks approval from adults.
- Tests limits constantly.
- Often prefers to play alone.
- May have an imaginary playmate.
- Shares and takes turn occasionally.
- Quarrels with other children.

Mental Development
- Develops more stable concept of self.
- Speaks about 1,000 words.
- Begins to use pronouns in speech.
- Grasps some grammatical principles.
- Delight in hearing stories over and over again.
- Loves learning short rhymes and songs.
- May match or identify primary colors.
- Enjoys imaginative and imitative play.
- Can assume some very simple responsibilities.
- Puts toys away with adult help.
- Has attention span of no more than a few minutes.
- Can choose between alternatives.

Positive Parenting
Parents can contribute to the development of their child by:
- Setting up a special time to read books with their toddler.
- Encourage their child to engage in pretend play.
- Play parade or follow the leader with the toddler.
- Help their child to explore her/his surroundings by taking her/him on a walk or wagon ride.
- Teach their child simple songs like Itsy Bitsy Spider, or other cultural childhood rhymes.
Child safety

- Never smoke near your child – in fact, it’s best not to smoke inside the house at all!
- Do not apply herbal medicine on your child’s skin before consulting with your doctor.
- Toys should be suitable for age. Check that toys have no broken bits, sharp edges or loose parts.
- Never leave your child in a bathtub unsupervised.
- Always keep hot irons and mugs of hot liquid well out of reach of your child.
- Put corner protector cushion pads on all sharp edges of all tables.
- Avoid the danger of little fingers getting trapped by closing all doors.
- Watch for electrical cords, always unplug all appliances immediately after use and put them away, even mobile phone charges.
- Never leave toiletries, cosmetics, chemicals, medicines…within reach of your child – in a low-level cupboard, on the floor in the bathroom, or in a handbag or carrier bag left on the floor.
- Put plastic safety plugs into every empty electrical socket.
- Never leave your child alone on a balcony or in a kitchen.
- Never leave a young child alone in the bathroom, even for a second. If they are already in the bath, they might try to climb out. If they’re not in the bath, they might try to climb in and even start playing with the hot tap.
- Go through your child’s toy box regularly and throw away any broken toys.
- If your child has a swing or a climbing frame, make sure there’s a soft landing underneath such as a mat.
- Encourage your child not to climb trees, walls, fences or on the roof of a shed or garage without adult supervision.
- Never leave your child alone around a pool.
- Teach your child never to eat anything they find growing in the garden.
- Keep all garden chemicals, sprays and seeds locked up out of reach of your child.
- Never leave any sharp tool or piece of machinery lying around when children are playing in the garden.
- Always lock and bolt garden gates and make sure there no gaps in the garden fence for a child to squeeze through and go running out in the road.
• Make sure that swings, slides and climbing frames are properly assembled and keep checking regularly for any loose nuts or bolts.

3.9 Development of 4 Years Old Toddler

Physical Development

• Develops confidence in their physical ability. He can and easily misjudge his capacities.

• Walks easily up & down steps, one foot to step.
• Throws and catches, Bounces and kicks a ball and uses a bat.
• Climbs ladders and trees.
• Stands on tiptoe, and walks and runs in tip toe.
• Runs quite fast.
• Jumps over small objects.
• Walks along a line for a short distance.
• Rides a tricycle very well and may try bicycle with trainer wheels.
• Stands on one foot for few seconds and most can hop.
• Threads beads to make necklaces.
• Swings himself on a swing.
• Dresses himself providing the fastenings are not too difficult.
• Manages his own toilet needs during the day but still may not be dry at night.

Speech/Language Development:

• Speaks clearly on the whole, but he may still not use some sounds correctly e.g. say “th” for s”.
• Asks “why”, “when”, “how”, questions and asks what words mean.
• Tells long stories, may be partly true and partly made up.
• Is interested in question and can argue and give his own ideas about things.
• Talks about what might happen or what he would like to have happened.
• Knows a few nursery rhymes which he can say, repeat or sing.
• Can make conversation about lots of different topics.
Social and Emotional Development

- Learns a lot about the world and how it works, also about people and relationships.
- Makes Friends (often short term) and plays group games.
- Needs structure and a routine to feel safe.
- When his behavior is “over the top” he needs his parents to set limits and bring him back to earth without making him feel bad.

A 4 year old child usually enjoys

- Jokes (especially toilet jokes) he will laugh at and say non sense or silly words “rude word”.
- Books and stories with interesting rhymes and words, he may make up rhymes.
- Playing with other children.
- Physical activities.
- Simple computer games.

Be Alert

- If the child’s understanding and skills go backward for more than a brief time:
- If doesn’t speak clearly enough to be understood by other people.
- Can’t hear a whisper or constantly asks for things to be repeated (says “what”?).
- Does not take an interest in other children and what is happening around.
- Is very much behind other children of the same age in some areas.
- Screws up his eyes to see some things or has trouble seeing some things or the pupils in his eyes do not always seem to be looking the same way.

3.10 Development of 5 Years Old Child

Physical development

- Begins to lose primary teeth.
- Displays left or right handedness.
- Builds elaborate structures.
- Tires easily.
- Bathes, eats, dresses, toilets independently.
- Begins to participate in some structured games.
• Enjoys playing noisy rhythm instruments.
• Is curious about reproduction and birth.

**Emotional development**
• Begins to express more feelings in words.
• Embarrasses easily and cannot yet laugh at self.
• Feeling about death appears.
• Shows guilt over misbehavior.
• Likes independence.
• Is serious and dependable.

**Social development**
• Submits to more rules and regulations.
• May tattle, name-call, hit and shore at times.
• Cooperates in simple group tasks.
• Likes to please adults.
• Takes turns during playing and speaking.
• Gets along comfortably with other children.
• Is keenly interested in family activities.

**Mental development**
• Begins to recognize letters and words.
• Sustains activities over longer periods of time.
• Has developed an overall image of self.
• Craves facts.
• Names simple colors.
• Understands left and right on self.
• Has a vocabulary of about 2,000 to 2,500 words.
• Can help with chores.
• Can learn address and phone number.
• Can think some things through.
• Counts to 10.
• Begins to understand concept of opposites
• Can speak in sentences of 6 to 8 words.
• Identifies coins.
• Engages in elaborate dramatic play.
• Understands concepts of morning, afternoon, night, yesterday, today tomorrow.
• Is better able to distinguish make believe from real life.

Positive parenting
Parents need to
• Continue to read to the child. Nurture her/his love for books by taking her/him to the library or bookstore.
• Let the child help with simple chores.
• Encourage the child to play with other children. This helps him to learn the value of sharing and friendship.
• Help the child’s language by speaking to her/him in complete sentences and in “adults” language. Help her/him to use the correct words and phrases.
• Be clear and consistent when disciplining the child. Model the behavior that is expected from her/him.

Child safety
As the child becomes more independent and increases her/his interaction with the outside world, it is important that the parent and the child are aware of ways to stay safe. Here are a few measures parents need to take in order to prevent accidents:
• Never smoke near your child – in fact, its best not to smoke inside the house at all!
• Do not apply herbal medicine on your child’s skin before consulting with your doctor.
• Toys should be suitable for age. Check that toys have no broken bits or sharp edges.
• Never leave your child in a bathtub unsupervised.
• Always keep hot irons and mugs of hot liquid well out of reach of your child.
• Never leave toiletries, cosmetics, chemicals, medicines…within reach of your child– in a low-level cupboard, on the floor in the bathroom, or in a handbag or carrier bag left on the floor.
• Put plastic safety plugs into every empty electrical socket.
• Never leave your child alone on a balcony or in a kitchen.
• Go through your child’s toy box regularly and throw away any broken toys.
• If your child has a swing or a climbing frame, make sure there’s a soft landing underneath such as a mat.
• Encourage your child not to climb trees, walls, fences or on the roof of a shed or garage without adult supervision.
• Teach your child never to eat anything they find growing in the garden.
• Keep all garden chemicals, sprays and seeds locked up out of reach of your child.
• Never leave any sharp tool or piece of machinery lying around when children are playing in the garden.
• Always lock and bolt garden gates and make sure there no gaps in the garden fence for a child to squeeze through and go running out in the road.
• Make sure that swings, slides and climbing frames are properly assembled and keep checking regularly for any loose nuts or bolts.
• Tell your child why it is important stay out of traffic.
• Tell your child not to play in the street or run after stray balls.
• Be cautious when letting your child ride her/his tricycle. Keep her/him on the sidewalk and away from the street.
• When the child is playing outside, keep watch over him at all times.
• Practice water safety. Teach the child to swim and never leave a child alone around a swimming pool.
• Teach your child how to interact with strangers and how not to interact.
• Teach the child how to ride in and out of the school bus.
• Teach your child not to take any food, medicines or sweets from strangers.
As a primary medical care provider, you have a unique role in the early detection of infant motor delays. Motor development reflects the maturation of the child’s nervous system. Looking at motor development in young infants is a way of telling if the CNS is maturing as expected. Many factors, such as the complications of prematurity or prolonged chronic illness, can delay the appearance of motor milestones. Movement disorders such as cerebral palsy and muscle diseases affect not only the acquisition of motor milestones but also the quality of movement. Although there is controversy about the most effective treatments for motor disabilities, there is some consensus that early intervention enables families to develop strategies, obtain resources and thus function better with a disabled child. Taking parental concerns seriously and screening for motor milestones and quality of movement at every screening visit is the first step toward successful early intervention.

What are red flags in motor development?
The following are red flags in motor development. If you observe one or more of these red flags, refer the child for further neuro-developmental assessment. These red flags are based on skills demonstrated by at least 90% of children at each age. (If the child was born prematurely, use the child’s corrected age.)

2 months
- Infant does not move both arms and legs actively in play when supine
- Infant does not use eyes to follow or focus on an adult’s face

4 months
- Infant cannot hold head erect and steady when held at an adult’s shoulder
- Infant cannot maintain head centered and bring hands together when supine
- Infant cannot hold onto a toy placed in either hand
- Infant’s leg(s) are stiff and feet are plantar flexed (toes pointed) in most positions
- One or two hands are tightly fisted and/or ipsilateral leg is stiff
- Infant has poor visual tracking or eyes are crossed
6 months
- Infant does not reach and grab toys with one or both hands
- Infant takes little or no weight on legs or does so with legs stiffly extended, on toes
- Infant does not sit well with support
- Head is not vertical when infant is prone

9 months
- Infant does not sit alone with arms free
- Infant does not roll supine to prone
- Infant does not transfer toys from hand to hand

12 months
- Infant does not pull to standing at furniture
- Infant does not bang 2 objects together

15 months
- Infant does not lower himself from standing with control
- Infant is not yet walking with one hand held

18 months
- Infant is not yet walking alone

Red Flags in Speech and Language Development
Speech and language development begin long before a child utters the first recognizable word! From birth, a child is listening to speech sounds and attaining the prelinguistic communication skills on which future language development will depend. The timely attainment of communication, speech, and language milestones sets the foundation for a child’s subsequent academic and social success. You can watch for speech and language milestones beginning with the earliest screening visits

Speech and language delays
- can be identified early, even though findings are subtle in the first two years of life
• should be screened for if there is a neuro-developmental disorder or motor delay
• may be the first sign of hearing loss in infants, or autism spectrum disorder in toddlers
• can impact behavior and the ability to form peer relationships
• are associated with increased incidence of learning disabilities, especially in reading and writing
• do not generally self-resolve, especially when associated with other disabilities and/or low SES

In unfamiliar settings (e.g., PCP’s office), children may not fully display their communication skills. Parent report should thus be used to supplement observations. Parents should be asked to report on their child’s communication in his/her stronger language.

**Early Intervention** for speech and language delays:

• assists a child in attaining communication, social and academic milestones (through individual and peer-group therapy, and by teaching parents to provide enriched communication opportunities)

• ensures that caregivers and teachers set reasonable communication expectations to prevent a child’s frustration from turning into behavior problems or low self-esteem
CHAPTER FIVE
RED FLAGS IN SPEECH/LANGUAGE DEVELOPMENT

0-6 months
• Does not startle to or awaken to loud sounds or has been identified as hearing-impaired
• Does not respond to changes in tone of voice
• Has been identified with a neuro-developmental disorder or motor delay

9 months
• Is still making only vowel sounds, with no speech-like consonants (e.g., “aaa” instead of an occasional “mmm” or “bah”.)

12 months
• Is not babbling (saying “ba-ba-ba” or “dee-dee”)*
• Is not using eye gaze or gestures like pointing and showing, to communicate interests or needs*
• Has infrequent eye contact or little interest in interaction*
• Does not respond to own name, or common words like “no”, “bye-bye”, etc.

18 months
• Is not saying 10 single words (don’t have to be pronounced perfectly)

24 months
• Does not say at least 50 single words
• Is not combining words into two-word phrases* (e.g., “mommy go”, “daddy ball”)
• Does not follow simple directions (e.g., “Roll the ball”)
• Does not point to named body parts or pictures

36 months
• Says only one or two words at a time (e.g., “kick ball” instead of “I kick ball to daddy”)
• Cannot answer “what” or “who” questions.
• Does not initiate conversations; speaks only when spoken to, or only repeats what others say*
• Strangers understand less than half of what child says

4 years
• Talks only about the “here and now” rather than events in the past and future, objects/people that are not present, etc
• Puts words in the wrong order in sentences, and/or leaves out little words (in, the, of) and word endings (-ing, -ed,-s)
• Does not follow two-step directions
• Cannot listen to 2-3 lines of a story and answer simple questions about it
• Speech is still hard to understand (i.e., many sound errors)

5 years
• Uses only 3-4-word sentences to talk about “here and now”
• Talks a lot, but does not engage in reciprocal conversation and/or make comments relevant to the situation*
• Cannot answer “how” and “why” questions, or questions about past or future events
• Except for r, l and th, cannot say most sounds correctly.

*Signs of possible autism spectrum disorder

– If one or more red flags are present, referral for further speech/language assessment may be indicated.
– If a hearing loss is suspected at any age, refer for a complete audiological examination.
CHAPTER SIX
EXAMINATIONS OF INFANTS AND YOUNG CHILDREN

Much of the assessment of the infant well being is done during the interview through direct observation. Observe infant’s general appearance, comfort, well being, activity level, grooming, temperament, body habits and nutritional status.

After confirming that the infant has met the appropriate developmental milestones for age and after assessment of the somatic growth we do the physical examination.

Infants less than 6 months old can be examined on the examination table with the parent standing nearby. Here you can reinforce home safety precautions by asking parent to put hand on baby. Older infants who develop stranger anxiety may be examined on the parent’s lap. This usually applies to children less than 3 years old.

The child of 1-5 years needs to be relaxed in order for an adequate examination to be performed. It is very important to speak softly to the child and demonstrate the parts of the examination on his dolls or toy animals, on ourselves or on the parent. Allow the child to hold the penlight as this often distracts him enough in order to do the parts of the examination. Play with the child, talk to the child, have the child “blow out” the light. Describe to the child what is being done, such as “I am now going to listen to your heart beating.” The child should always be told what to do instead of being asked to do something, e.g. it is better to say “please turn your back” instead of “would you please turn your back.”

The infant or the child should be completely undressed for the examination. If the child is modest, remove only the clothing that is necessary for the examination. Respect the child modesty!

Start the examination by washing hands in warm water; warm hands are more comfortable for the child. The more difficult the portions of the examination, such as the evaluation of the pharynx and the otoscopic examination should be performed last. Areas of complain examined at the end.
**General Assessment**

The average pulse of a child during the first six months of life is 130 with a range of 80-160 at rest.

The average resting heart rate during the second six months of life is 110 with a range of 70-150 per minute.

The heart rate of a child 1-5 years of age ranges from 80-140 with an average rate of 100.

The normal respiratory rate varies from between 20 and 40 per minute.

Blood pressure is difficult to assess in an infant but may be determined by the flush method or more accurately by Doppler.

Blood pressure by auscultation is usually possible with children over the age of 3-4 years and should be performed on all children. It is important to inform a child that the cuff will get tight for a few moments. The size of the cuff is important. The cuff must cover two thirds of the arm. A cuff too large will result in a falsely high reading. Compare readings for published standards of blood pressure in boys and girls according to age.

**Chest and Heart:** It is usually advisable to start the examination by examining the chest and heart because it requires calm and cooperative infants.

**Chest:** Inspect for respiratory distress. The most important signs of distress are the use of accessory muscles, head bobbing and flaring of the nasal alae. Intercostal retractions are also commonly present. Also inspect the shape of the chest.

Percus and auscultate the lung fields. Don’t misdiagnose tracheal breath sounds as crackles. Auscultation of the chest of a toddler is best performed by listening to the child when he is unaware of this portion of the examination. Telling the child to “take a deep breath” frequently results in the child holding his breath.

Percussing the chest of a child is done gently, because overly vigorous percussion may produce vibration over a large area and obscure an area of dullness.
**Heart:** Inspect for cyanosis and for evidence of congestive heart failure (tachycardia, tachypnea and an enlarged liver). Palpate for the point of maximum impulse; for any lifts heaves or thrills. Auscultate for any murmurs or abnormal sounds. An S₃ and S₄ are very common in infants.

**Skin:** Inspect for dermatological conditions. An initial manifestation of infantile eczema is often a crusting of the scalp known as cradle cap. It is a type of seborrheic dermatitis. The greasy, salmon-colored, sharply delimited oval scales may involve the face, neck, axillae and groin. Often the entire body is involved with dry, scaly, nonpruritic dermatitis. Seborrheic dermatitis may be differentiated from atopic dermatitis by its early outset, a lack of pruritis and absence of vesicles.

Atopic dermatitis is the most common cause of eczema in children. It is characterized by pruritis, erythematous papules and vesicles, serious discharge and crusting.

The atopic skin is dry and itchy. The site of predilection in the child of 6 months is the face, whereas the extensor surfaces of the arms and legs are the most common sites in the 8-10 month old infant. Patients with atopic dermatitis have a tendency toward an extra groove of the lower eyelid called the “atopic pleat”.

Palpate the skin and assess the skin turgor.

Check for other rashes. Impetigo is one of the most common skin conditions of children 1-5 years of age.

Check for tufts of hair along the spine, especially over the sacrum, this may mask the location of a spina bifida occulta.

Is there any evidence of physical child abuse? Are there any bruises, welts, lacerations or unusual scars present? Inspect the buttocks and lower back for evidence of bruises. Is there evidence of traumatic alopecia from pulling out of the hair? Check for signs of burns. The diagnosis of physical child abuse is especially important in the first 6 months of life, because the risk of a fatal outcome is very high if the diagnosis is missed. If child abuse is suspected or verified, reporting is a must.

**Head:** Observe for shape, symmetry, lesions, tilt and hair abnormalities. Check for possible hydrocephaly or microcephaly.
Examine the lymph nodes; all of the chains in the head and neck must be examined.

Palpate the fontanelles. Normally they are flat. A bulging fontanel may indicate increased intracranial pressure; a depressed one may be seen in dehydration. Normally during crying, the fontanelles bulge. Pulsations of the fontanelles reflect the pulse. The anterior fontanelle normally closes by 18 months of age, but there is wide range of normality; the posterior fontanelle is normally closed by two months of age.

Palpate over the frontal and maxillary sinuses in children over the age of 2 years. Tenderness may indicate sinusitis.

**Neck:** Inspect for size and shape. Also for location of the trachea. Palpate lymph nodes for lymphadenopathy. Palpate the sternocleidomastoid muscle. Palpate the thyroid gland. Any child with an acute illness should be examined for nuchal rigidity resulting from meningeal irritation.

**Eyes:** Inspect for position and spacing of eyes. Is the eye red? Inspect for discharge and for the production of tears.

The production of tears begins at about 2-3 months of age, but the nasolacrimal duct is not fully patent until 5-7 months. If chronic tearing is present the nasolacrimal duct may not be patent. In this case, massaging over the nasolacrimal sac may yield a purulent or mucoid discharge, suggesting the diagnosis of nasolacrimal obstruction.

If nasolacrimal duct obstruction is still persistent at 9 months of age, refer to ophthalmology.

By the age of 4 weeks, the infant should be capable of fixation on a target. By 6 weeks, coordinated eye movements in following an object should be present. At the age of 3 months, the normal infant can follow an object moving across the midline. Conveyance is also present at this time. These are qualitative observations to assess the visual acuity for young infants.

Visual acuity in a child 1-3 years of age is assessed by his ability to identify brightly colored objects and by his ability to circumnavigate the examining room.
Snellen E charts can be used with cooperative 3 year old children. Visual acuity for a 3 year old is 20/40; and at age 4-5, 20/30.

Matching test is usually performed at the age of 3 years.

Confrontation visual field testing is performed in children over the age of 4 years in whom there is a suspicion of decreased acuity.

At 5-6 months, the child should be able to focus on objects but is farsighted. The child should be able to reach out for an object and grasp it. Recognition of objects and focus by 4-6 months of age suggests normal visual acuity.

The presence of optokinetic nystagmus indicates a complete pathway from the retina to the occipital visual cortex. The response can be elicited in the child of 3 months and passing it rapidly from one side to the other in the child’s view. The development of nystagmus as the child attempts to maintain fixation on a stripe is a normal response, indicating normal visual pathway.

Check ocular motility. In a child 3 months of age or older, have the child follow an object into the various positions of gaze. Alignment of the eye is best determined by the symmetry of the corneal light reflex and the alternate cover test.

Be aware that the child with large epicanthal folds that partially cover the globe may be thought to have strabismus. The eyes should be parallel in all fields of gaze. Shine a light from 2 feet away and have the child look at it. The light should fall in the centre of both pupils. Hold the patient’s head and turn it to the right and then to the left while position of the light is maintained. Is the corneal reflection symmetric in both eyes as the head is turned? If there is asymmetry, perform the cover test.

Any query about squint, or if parents have any doubt, the child needs to be referred to an ophthalmologist.

The red reflex is examined by holding the ophthalmoscope 10-12 inches (25-30 cm) away from the eyes. The presence of the red reflex bilaterally suggests grossly normal eyes and the absence of glaucoma or intraocular pathology i.e. there is no serious obstruction to light between the cornea
and the retina. If a red reflex is absent, fundoscopic examination is required at this time (refer to ophthalmologist). The red reflex and the right reflex are examined at 2, 4 and 6 months of age.

Pupillary Reflex: the pupils of neonates are usually constricted until about the third week of life. In an infant over 3 weeks of age, we can check the pupillary responses. A sluggishly reactive pupil is suggestive of congenital glaucoma.

**Nose:** Inspect the nostrils. Flaring indicates respiratory distress. Elevate the tip of the nose to view the nasal septum, floor of the nose, and the turbinates.

With history of chronic nasal discharge, consider foreign body presence. A permanent transverse crease near the lower part is commonly seen in allergy.

Purulent secretions from above and below the middle turbinates suggest sinusitis.

A clean discharge suggests a cerebrospinal fluid leak.

Nasal polyps may be associated with allergies or cystic fibrosis.

**Abdomen:** inspect the umbilicus. Check for umbilical granuloma. An umbilical hernia is not uncommon in infants. In older children ask the child to cough and look for bulges. Observe the abdomen for any masses.

Large peristaltic waves moving from the left to the right in the upper abdomen are occasionally seen in infants with pyloric stenosis. As the child grows older, the protuberant abdomen becomes more scaphoid, with the exception of those children who are obese. Auscultate the abdomen, for peristaltic sounds and for bruits. Abdominal bruits may suggest coarctation. Bruits over the kidneys posteriorly suggest renal artery stenosis. Palpate for any masses; as well as the liver, spleen. The estimated liver span of a six month old infant varies from 2.5 – 3.0 cm. At one year the span is approximately 3 cm. The liver span of a 3 year old child is approximately 4 cm. By 5 years of age, the span has increased to 5 cm. The spleen is commonly palpable to 2 cm below the left costal margin during the first month of life.

For tenderness, observe the child’s face while palpating. Facial expressions are more useful than asking the child “does this hurt?”
Palpate the femoral pulses. Place the tips of your fingers along the inguinal ligament, midway between the symphysis pubis and the iliac crest; time the pulse with the radial pulse, they should peak at the same time. Palpation for an inguinal hernia in an older child is the same as in the adult.

**Genitalia Inspections:** check for ambiguous genitalia. Check if there is diaper rash. If a male infant is still uncircumcised, check for phimosis.

Inspect the scrotum. Is unilateral swelling present? Enlargement may represent a hernia or a hydrocele.

Transilluminate any mass. Hydroceles will Transilluminate, but hernias will not. Auscultate the mass. Listening to a hernia containing bowel may reveal bowel sounds. Palpate the testes. Are they both in the scrotum? Can an undescended testicle be palpated in the inguinal canal? If not, while the infant is lying on the examination table, press on the abdomen while trying to palpate the undescended testicle in the inguinal canal with the other hand.

In children 1-5 yrs old, the testicles are often so retracted into the inguinal canal. If one or both testicles are not felt in the scrotum, tell the child to sit on a chair with his feet on the seat. Instruct him to grab his knees. Repeat the palpation. This additional abdominal pressure may force a retracted or undescended testicle into the scrotum. Warm hands and a warm room often make the difference.

Another useful maneuver to counteract an active cremasteric reflex is to have the child lie down and flex his leg at the knee, placing his foot on the opposite leg. This “tailor position” will bring the tendon of the sartorious muscle over the inguinal canal and prevent an active reflex from retracting the testicle.

Inspect the perinium for any rashes or lesions. Inspect the anus for any excoriations or bruises.

In the female, inspect the vaginal area. Are the labia fused? Is a rash present? Rashes in this area may be related to bubble baths especially in elder children. Is a discharge present? A discharge in the age group 2-6 is commonly related to a vaginal foreign body. Look for an intact hymen and a smooth vaginal opening. Be suspicious of sexual abuse. The most important signs of abuse include difficulty in walking, vaginal or anal infections, genital irritation or swelling, vaginal or anal bleeding and bruises.
**Musculoskeletal examination:** Palpate the clavicle. The presence of a callus formation suggests a healed clavicular fracture.

The hips must be re-examined for dislocation at every routine visit for the first year of life.

In children more than one year old, observe the gait by telling the child to walk back and forth with his shoes or socks on. Having the child walk on a cold floor without socks or shoes on may actually distort the gait. “In toeing” and “out toeing” are very common in children. Most are physiologic variants that arise from in utero positioning and correct spontaneously during the active growing period.

Check for bowing of legs. Ask the child to stand. Commonly a child may appear “bowlegged” (genu varum) for 1-2 years after starting to walk. “Knock knees” (genu valgum” are also frequently seen in children 2-4 years of age. The normal gait of a child 2-4 year of age is wide based with a prominent lumbar lordosis.

The child with a limp should be examined for evidence of trauma or localized bone tenderness.

Check the spine for abnormal curvature e.g. scoliosis

**Neurological examination:**

In the prone position, inspect the back for spinal defects, Mongolian spots, hair, scoliosis etc.

Inspect infant safety as many infants may pull up or push while in prone position.

In the supine position, assess strength and muscle tone. By the fourth month, when the supine infant is pulled into a sitting position, no head lag should be present. By the eighth month, the infant should be able to sit without support.

Coordination of the hands begins at about 5 months when the infant can reach and grasp objects. By 7 months, he can transfer these objects from hand to hand. At 8-9 months, the infant should be able to use a pincer grip to pick up small objects.
The development of speech; reading abilities and the ability to manipulate small objects, throw a ball and understand simple directions are the best indications of a normally developing neurological system in a child.

Cranial nerves 2, 3, 4 and 6 were tested by visual acuity and ocular movements. Cranial nerves 5, 7, 8, 9, 10, 11 and 12 are normally tested during examination by observation. Attempt to elicit deep tendon reflexes; distract the infant to help him relax. Plantar reflex or Babinski may be normal up to 2 years of age before myelination of the nervous system is complete.

Primitive Reflexes:
- The rooting reflex - usually disappears at 3-4 months.
- The plantar reflex - usually disappears at 9-12 months.
- The plamar grasp - usually disappears at 3-5 months.

The absence of this response in the new born period or its persistence after 5 months is suggestive of cerebral disease. The new born commonly holds his hand in a fist. After 2 months, however, the presence of this sign suggests neurological disease.
- Moro’s reflex or startle reflex - normally disappears by 3-5 months of age. Persistence past 6 months may indicate neurological disease.
- Gallant’s reflex - usually disappears at 2-3 months.
- Perez’s reflex – is normally present until 2-3 months of age.
- The placing and stepping response – usually disappears at 2-5 months of age.

Ears: Is any discharge present? Purulent discharges may be related to any bacterial injection. Eczema may cause a flaking of the ears and cracking behind the ears. A bloody discharge may be caused by irritation, injury, a foreign body or a basilar skull fracture.

The external canal and the tympanic membrane are inspected by the otoscope. Crying may cause redness of the tympanic membrane.

Palpate the mastoid tip and the posterior auricular lymph nodes.

Check hearing. Hearing is necessary for normal development of language beyond the one-word stage.
**Mouth and Pharynx:** The examination of the mouth and pharynx is the last part of the examination in infants and small children.

The infant should be seated on the parent’s lap, with the parent holding the child’s head. The crying infant can usually be examined without the tongue depressor. The frightened child with his mouth firmly closed can be examined by holding the child’s nose; this will make him open his mouth. The tongue depressor can then be slipped between the teeth and over the tongue. Be quick if you must be forceful.

The cooperative toddler can be asked to open his mouth “open your mouth; I am going to count your teeth”. The child should be seated when examining the posterior pharynx for best visualization.

If the child is uncooperative, lay him down on his back on the examination table. The parent should stand at the head of the table. The child’s hands are raised over his head and the parent squeezes the child’s elbows against the head so that the child doesn’t move. You can then lean over the child holding a tongue blade in one hand and a light in the other.

Inspect the lips for any lesions and for color. Inspect the gingivae, the buccal mucosa, the tongue, the palate, the tonsils and the posterior pharynx. Inspect the teeth for number and caries (e.g. milk caries - caused by the child going to sleep with a bottle of milk or juice in the month).

The first teeth to erupt are the lower centrals at about 6 months of age.

These are followed by the lower laterals at 7 months and the upper central teeth at 7-8 months of age. The upper lateral teeth begin to erupt at about 9 months.

The first lower teeth molars erupt at about 1 year. These are followed by the upper molars at 14 months, lower cuspids at 16 months, upper cuspids at 18 months, the second lower molars at 20 months and finally the second upper molars at 2 years. This completes the primary dentition of 20 teeth.
REFERENCES

5. http://www.gpnotebook.co.uk/simplepage.cfm
Immunization is an efficient and cost-effective measure to control most of the childhood infectious diseases. Vaccines protects against these diseases by producing immunity. More than one dose of the vaccine is usually required to ensure effective response. Vaccines are generally safe to administer but some side effects may occur which are usually minor. The following information is basically derived from the revised report of General Recommendations on Immunization and updates the 2002 statement by the Advisory Committee on Immunization Practices (ACIP). These information are directed to all health-care providers who administer vaccines to infants and children. They should be updated with the basic principles of immunization regarding spacing, administration and the important contraindications and precautions.

Optimal response to a vaccine depends on multiple factors, including the nature of the vaccine and the age and immune status of the recipient.

**Spacing of Multiple Doses of the Same Antigen**

- Vaccination providers should adhere as closely as possible to recommended vaccination schedules
- Doses administered too close together or at too young age can lead to a suboptimal immune response
- ACIP recommends that vaccine doses administered 4 or fewer days before the minimum interval or age be counted as valid.(not applied to rabies)
- Doses administered 5 or more days earlier than the minimum interval or age of any vaccine should not be counted as valid doses and should be repeated as age-appropriate
- Certain vaccines produce increased rates of local or systemic reactions in certain recipients when administered too frequently (e.g., adult tetanus-diphtheria toxoid). Optimal record keeping, maintaining patient histories, and adhering to recommended schedules can decrease the incidence of such reactions without adversely affecting immunity.
Simultaneous Administration
- An inactivated vaccine can be administered either simultaneously or at any time before or after a different inactivated vaccine or live vaccine
- The immune response to one live-virus vaccine might be impaired if administered within 30 days of another live-virus vaccine

Spacing of Vaccines and Antibody-Containing Products
- Blood (e.g., whole blood, packed red blood cells, and plasma) and other antibody-containing blood products (e.g., immune globulin, hyperimmune globulin, and intravenous immune globulin IGIV) can inhibit the immune response to measles and rubella vaccines for 3 or more months. The effect of blood and immune globulin preparations on the response to mumps and varicella vaccines is unknown, but commercial immune globulin preparations contain antibodies to these viruses.
- Administering inactivated vaccines and toxoids either simultaneously with or at any interval before or after receiving an antibody-containing product do not impair development of a protective antibody response

Lapsed Vaccination Schedule
Vaccines should be administered as close to the recommended intervals as possible. However, longer-than-recommended intervals between doses do not reduce final antibody concentrations, although protection might not be attained until the recommended number of doses has been administered.

Unknown or Uncertain Vaccination Status
Written records should only be accepted as evidence of vaccination

Contraindications and Precautions
A contraindication is a condition in a recipient that increases the risk for a serious adverse reaction. A vaccine should not be administered when a contraindication is present

General contraindications
- History of a severe allergic reaction after a previous dose of vaccine or to a vaccine constituent
- Severely immunocompromised persons should generally not receive live vaccines
- Children who experience encephalopathy within 7 days after administration of a previous dose of diphtheria and tetanus toxoids and whole-cell pertussis vaccine (DTP), DTaP, or Tdap not
attributable to another identifiable cause should not receive further doses of a vaccine that contains pertussis.

A precaution is a condition in a recipient that might increase the risk for a serious adverse reaction or that might compromise the ability of the vaccine to produce immunity.

**General precautions**
- Persons with moderate or severe acute illness should be vaccinated as soon as the acute illness has improved
- A history of previous seizures until the child's neurologic status has been assessed. Pertussis vaccine should not be administered to infants with evolving neurologic conditions until the condition has stabilized

**Immune deficiency states**
Immunodeficiencies may be primary (inherited) or secondary (acquired). These are general recommendations on vaccination in Immunodeficiency states:
- Vaccines might be less effective during the period of altered immunity.
- Live vaccines generally should be postponed until immune function has improved.
- Inactivated vaccines administered during the period of altered immunity might need to be repeated after immune function has improved.
- Persons with altered immunity might be at increased risk for an adverse reaction after administration of live-attenuated vaccines because of reduced ability to mount an effective immune response.
- Vaccination during chemotherapy or radiation therapy should be avoided if possible because antibody response might be suboptimal

**Vaccination of Contacts of Persons with Immune deficiency states**
These are general precautions to vaccination of contacts of persons with immune deficiency states:
- Live OPV and smallpox vaccine should not be given to close contacts of persons with altered Immunocompetence
- If after varicella vaccine, the recipient has a rash, contacts should be avoided until the rash disappears.
- Members of the household should employ hand hygiene measures after contact with feces of a rotavirus-vaccinated infant for at least 1 week
Household and other close contacts of persons with altered immunocompetence should receive annual influenza vaccination.

**Vaccination of Preterm Infants**
- Infants born prematurely, regardless of birthweight, should be vaccinated at the same chronological age and according to the same schedule and precautions as full-term infants and children.

**Breast Feeding and Vaccination**
Breast feeding is not a contraindication for any vaccine, inactivated or live, with the exception of smallpox vaccine.

**Vaccinating Persons with Bleeding Disorders and Persons Receiving Anticoagulant Therapy**
Avoid intramuscular injections among persons with bleeding disorders and use the subcutaneous or intradermal routes for vaccines.

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**Table 2. Guidelines for spacing of live and inactivated antigens**

<table>
<thead>
<tr>
<th>Antigen combination</th>
<th>Recommended minimum interval between doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two or more inactivated *</td>
<td>Can be administered simultaneously or at any interval between doses</td>
</tr>
<tr>
<td>Inactivated and live</td>
<td>Can be administered simultaneously or at any interval between doses</td>
</tr>
<tr>
<td>Two or more live intranasal or injectable †</td>
<td>4-week minimum interval, if not administered simultaneously</td>
</tr>
</tbody>
</table>

* Certain experts suggest a 1-month interval between tetanus toxoid, and reduced acellular pertussis vaccine and quadrivalent meningococcal conjugate vaccine if they are not administered simultaneously.

† Live oral vaccines (e.g., Ty21a typhoid vaccine and rotavirus vaccine) can be administered simultaneously or at any interval before or after inactivated or live injectable vaccines.

Table 8. Treatment of anaphylaxis with intramuscular or oral pharmaceuticals

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Primary regimen</strong></td>
<td></td>
</tr>
<tr>
<td>Epinephrine 1:1000 (aqueous) (1 mg/ml)*</td>
<td>0.01 n mg/kg up to 0.5 mg (administer 0.01 mL/kg/dose up to 0.5 mL) intramuscularly (IM) repeated every 10-20 minutes up to 3 does</td>
</tr>
<tr>
<td><strong>Secondary regimen</strong></td>
<td></td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>1-2 mg/kg oral, IM, or intravenously (IV), every 4-6 hours (maximum single dose; 100 mg)</td>
</tr>
<tr>
<td>Hydrolyzing</td>
<td>0.5-1 mg/kg oral, IM, every 4-6 hours (maximum single dose; 100 mg)</td>
</tr>
<tr>
<td>Prednisone</td>
<td>1.5-2 mg/kg oral (maximum single dose; 60 mg); use corticosteroids as long as needed</td>
</tr>
<tr>
<td><strong>Adult</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Primary regimen</strong></td>
<td></td>
</tr>
<tr>
<td>Epinephrine 1:1000 (aqueous)*</td>
<td>0.01 mg/kg up to 0.5 mg (give 0.01 mL/kg/dose up to 0.5 mL)</td>
</tr>
<tr>
<td><strong>Secondary regimen</strong></td>
<td></td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>1-2 mg/kg up to 100 mg IM or oral, every 4-6 hours</td>
</tr>
</tbody>
</table>


Specific information about childhood vaccination

7.2 Hepatitis B vaccine (HepB). (Minimum age: birth)

Type of vaccine: Recombinant HBsAg.

Efficacy: 95% (range, 80%-100%).

Duration of immunity: at least 20 years.

Number of Doses: 3 doses

Schedule: 3 doses.

Booster doses not routinely recommended.

Hepatitis B Vaccine Routine Infant Schedule
<table>
<thead>
<tr>
<th>Dose</th>
<th>Usual Age</th>
<th>Minimum Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary 1</td>
<td>2 months</td>
<td></td>
</tr>
<tr>
<td>Primary 2</td>
<td>4 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Primary 3</td>
<td>6 months</td>
<td>8 weeks</td>
</tr>
</tbody>
</table>

- It is not necessary to add doses or restart the series if the interval between doses is longer than recommended.
- If mother is hepatitis B surface antigen (HBsAg) positive or if mother’s HBsAg status is unknown, administer Hepatitis B vaccine and 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hours of birth intramuscularly at different site.

**Site of administration:** deltoid muscle for adult and children, anterolateral thigh for infants and neonates.

**Route of administration:** I M

**Storage temp:** 2 - 8 °C

**Contraindications and Precautions to Vaccination**
- A severe allergic reaction to a vaccine component or following a prior dose of hepatitis B vaccine is a contraindication to further doses of vaccine. Such allergic reactions are rare.
- Persons with moderate or severe acute illness should not be vaccinated until their condition improves.
- Hepatitis B vaccine dose not contain live virus, so it may be used in persons with immunodeficiency. However response to vaccination in such persons may be suboptimal.

**Adverse event following immunization**
- The most common adverse reaction following hepatitis B vaccine is pain at the site of injection, reported in 3%–9% of children.
- Mild systemic complaints, such as fatigue, headache, and irritability, have been reported 0% to 20% of children.
- Fever 37.7°C has been reported in 0.4% to 6.4% of children.
- Serious systemic adverse reactions and allergic reactions are rarely reported following hepatitis B vaccine.
Post vaccination Serologic Testing

Not routinely recommended following vaccination of infants, children, adolescents, or most adults.

Recommended for:
- Chronic hemodialysis patients.
- Other immunocompromised persons
- Persons with HIV infection.
- Sex partners of HBsAg+ person.
- Infants born to HBsAg+ women.
- Certain healthcare workers who have contact with patients or blood.

When necessary postvaccination testing should be performed 1-2 months after completion of the vaccine series.

All infants born to HBsAg positive women should be tested 3-12 months after their (third or fourth) dose of hepatitis B vaccine (i.e., at 9-18 months of age).

7.3 Rotavirus vaccine (Rota). (Minimum age: 6 weeks)

**Type of vaccine:** live virus (it contains a live, weakened form of human rotavirus.

**Number of Doses:** 3 doses (rotarix recommended in Bahrain 2 doses)

**Schedule:** 2& 4 months.
- Administer the first dose at age 6–12 weeks.
- Do not start the series later than age 12 weeks.
- Administer the final dose in the series by age 32 weeks. Do not administer any dose later than age 32 weeks.
- Data on safety and efficacy outside of these age ranges are insufficient.
- Minimum interval between doses is 4 weeks
- Administer simultaneously with all other indicated vaccines
- Breastfeeding infants should be vaccinated on usual schedule
- Vaccinate infants who have recovered from documented rotavirus infection
- Do not repeat dose if infant spits out or regurgitates vaccine- administer remaining doses on schedule
Site of administration: oral
Route of administration: oral
Storage temp: 2 - 8 °C

Contraindications and Precautions to Vaccination:
Severe allergic reaction to a vaccine component or following a prior dose of vaccine is a contraindication to vaccine

Precautions to Vaccination : (The decision to vaccinate if a precaution is present should be made on a case-by-case risk and benefit basis)
- Altered immunocompetence
- Recent receipt of blood product
- Acute, moderate to severe
gastroenteritis or other acute illness
- Pre-existing chronic GI disease
- Infants with history of intussusception

Adverse event following immunization:
- Vomiting (15%)
- Diarrhea (24%)
- Nasopharyngitis (7%)
- Fever (43%)

7. 4 Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP), DTP. (Minimum age: 6 weeks)
Type of vaccine: tetanus toxoid, reduced diphtheria toxoid and a cellular pertussis.
Number of Doses: 3 doses & 2 boosters
Schedule: 2, 4, 6, 18 Months and 5 to 6 Yrs
- The primary series of DTaP, DTP vaccine consists of four doses, the first three doses given at 4-6 weeks intervals (minimum of 4 weeks), and beginning at 6 weeks to 2 months of age. The fourth dose is given 6-12 months after the third to maintain adequate immunity for the ensuing preschool years.
• The fourth dose of all brands of DTaP, DTP, and recommended by ACIP, to be administered at 15-18 months of age.

• Children who received all four primary doses before the fourth birthday should receive a fifth (booster) dose of DTaP before entering school.

**Routine DTaP, DTP Primary Vaccination Schedule**

<table>
<thead>
<tr>
<th>Dose</th>
<th>Age</th>
<th>Minimum Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary 1</td>
<td>2 months</td>
<td>---</td>
</tr>
<tr>
<td>Primary 2</td>
<td>4 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Primary 3</td>
<td>6 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Primary 4</td>
<td>15-18 months</td>
<td>6 months</td>
</tr>
</tbody>
</table>

**Recommendations for DTaP Vaccination of Adolescents**

• Adolescents 11-12 years of age should receive a single dose of Tdap instead of Td.

• Adolescents 13-18 years who have not received Tdap should receive a single dose of Tdap as their catch-up booster instead of Td.

**Site of administration:** thigh

**Route of administration:** IM

**Storage temp:** 2 - 8 °C

**Contraindications and Precautions to Vaccination**

• Encephalopathy (e.g., coma, decrease level of consciousness, prolonged seizures) within 7 days of administration of previous dose of DTP or DTaP

• Progressive neurologic disorder, including infantile spasm, uncontrolled epilepsy, progressive encephalopathy.

• Severe allergic reaction to vaccine component or following a prior dose.

**Precautions**

• Temperature of 105°F (40.5°C) or higher within 48 hours that is not due to another identifiable cause.

• Collapse or shock-like state (hypotonic hypo responsive episode) within 48 hours.

• Persistent, inconsolable crying lasting 3 hours or longer, occurring within 48 hours.

• Convulsions with or without fever occurring within 3 days.
Adverse event following immunization

- Local reactions (pain, redness, swelling).
- Temperature of 105°F (40.5°C) or higher within 48 hours that is not due to another identifiable cause.
- Collapse or shock-like state (hypotonic hypo responsive episode) within 48 hours.
- Persistent, inconsolable crying lasting 3 hours or longer, occurring within 48 hours; and convulsions with or without fever occurring within 3 days.

7.5 Haemophilus influenzae type b conjugate vaccine (Hib). *(Minimum age: 6 weeks)*

**Type of vaccine:** Polysaccharide-Protein Conjugate

**Number of Doses:** 3 Doses & 1 Booster

**Schedule:** 2, 4, 6, 18 Months

- The recommended interval between primary series doses is 8 weeks, with a minimum interval of 4 weeks.
- At least 8 weeks should separate the booster dose from the previous dose.
- Hib vaccines may be given simultaneously with all other vaccines.
- A dose given before 6 weeks of age may reduce the response to subsequent doses. As a result, Hib vaccines, including combination vaccines that contain Hib conjugate, should never be given to a child younger than 6 weeks of age.

**Haemophilus influenza type b Vaccine Delayed Vaccination Schedule:**

- Children starting late may not need entire 3 or 4 dose series.
- Number of doses child requires depends on current age.
- All children 15-59 months of age need at least 1 dose.

**Site of administration:** Thigh

**Route of administration:** IM

**Storage temp:** 2 - 8 °C

**Contraindications and Precautions to Vaccination:**

- Vaccination with Hib conjugate vaccine is contraindicated for persons known to have experienced a severe allergic reaction (anaphylaxis) to a vaccine component or following a prior dose of that vaccine.
- Vaccination should be delayed for children with moderate or severe acute illnesses.
- Minor illnesses (e.g., mild upper respiratory infection) are not contraindications to vaccination.
- Hib conjugate vaccines are contraindicated for children younger than 6 weeks of age because of the potential for development of immunologic tolerance.

**Adverse event following immunization**
- Adverse reaction following Hib conjugate vaccines is not common.
- Swelling, redness, or pain have been reported in 5%–30% of recipients and usually resolve within 12–24 hours.
- Systemic reactions such as fever and irritability are infrequent. Serious adverse reactions are rare.

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### 7.6 Pneumococcal vaccine

(Minimum age: 6 weeks for pneumococcal conjugate vaccine [PCV]; 2 years for pneumococcal polysaccharide vaccine [PPV])

**Type of vaccine:** polysaccharide

**Number of Doses:**
- **Pneumococcal conjugate vaccine [PCV]:** 3 doses
- **Pneumococcal polysaccharide vaccine [PPV]:** single dose

**Pneumococcal conjugate vaccine [PCV]:**
- Highly immunogenic in infants and children, including those with high-risk medical conditions.
- >90% effective against invasive disease.
- Less effective against pneumonia and acute otitis media.

**Pneumococcal polysaccharide vaccine [PPV] vaccine recommendations:**
- Adults 65 years of age or older.
- Persons 2 years of age or older with:
  - chronic illness
  - anatomic or functional asplenia.
  - immunocompromised (disease, chemotherapy, steroids).
  - HIV infection
  - environments or settings with increased risk.
– cochlear implant.

**Revaccination with pneumococcal polysaccharide vaccine [PPV]:**
- Routine revaccination of immunocompetent persons is not recommended.
- Revaccination is recommended for persons 2 years of age and older who are at highest risk for serious pneumococcal infection.
- Only one PPV23 revaccination dose is recommended for high-risk persons. The second dose should be administered 5 or more years after the first dose.
- Revaccination 3 years after the previous dose may be considered for children at highest risk for severe pneumococcal infection who would be 10 years of age or less at the time of revaccination.

**Pneumococcal Polysaccharide Vaccine Candidates for Revaccination:**
Persons at highest risk include all persons 2 years of age and older with:
- Functional or anatomic asplenia (e.g., from sickle cell disease or splenectomy)
- HIV infection, leukemia, lymphoma, Hodgkin disease, multiple myeloma, generalized malignancy, chronic renal failure, nephrotic syndrome, or other conditions associated with immunosuppression (e.g., organ or bone marrow transplantation) and those receiving immunosuppressive chemotherapy, including long-term Corticosteroids.
- Persons aged 65 years and older should be administered a second dose of pneumococcal vaccine if they received the vaccine more than 5 years previously, and were younger than 65 years of age at the time of the first dose.

**Schedule:**

**Pneumococcal conjugate vaccine [PCV]:**
- All children younger than 24 months of age and children age 24–59 months with a high-risk medical condition should be routinely vaccinated with PCV7.
- The primary series beginning in infancy consists of three doses routinely given at 2, 4, and 6 months of age.
- PCV7 should be administered at the same time as other routine childhood immunizations, using a separate syringe and injection site.
- For children vaccinated at younger than 12 months of age, the minimum interval between doses is 4 weeks.
- Doses given at 12 months of age and older should be separated by at least 8 weeks.
**The number of doses a child needs to complete the series depends on the child’s current age:**

- Unvaccinated children aged 7–11 months should receive two doses of vaccine at least 4 weeks.
- Unvaccinated children aged 12–23 months should receive two doses of vaccine, at least 8 weeks apart.
- Previously unvaccinated healthy children 24–59 months of age should receive a single dose of PCV7.
- Unvaccinated children 24–59 months of age with sickle cell disease, asplenia, HIV infection, chronic illness, cochlear implant, or immunocompromising conditions should receive two doses of PCV7 separated by at least 8 weeks.
- PCV7 is not routinely recommended for persons older than 59 months of age.

**Pneumococcal Polysaccharide Vaccine**

Pneumococcal polysaccharide vaccine should be administered routinely to all adults 65 years of age and older. The vaccine is also indicated for persons 2 years of age and older with the following conditions:

- normal immune system but have a chronic illness, including cardiovascular disease, pulmonary disease, diabetes, alcoholism, cirrhosis, cerebrospinal fluid leak, or a cochlear implant.
- Immunocompromised persons 2 years of age and older who are at increased risk of pneumococcal disease or its complications should also be vaccinated. This group includes persons with splenic dysfunction or absence (either from disease or surgical removal), Hodgkin’s disease, lymphoma, multiple myeloma, chronic renal failure, nephrotic syndrome, or conditions such as organ transplantation associated with immunosuppression.
- Persons immunosuppressed from chemotherapy or high-dose corticosteroid therapy (14 days or longer) should be vaccinated.
- Persons 2 years of age and older with asymptomatic or symptomatic HIV infection should be vaccinated.
- If elective splenectomy or cochlear implant is being considered, the vaccine should be given at least 2 weeks before the procedure. If vaccination prior to the procedure is not feasible, the vaccine should be given as soon as possible after surgery.
- There should also be a 2-week interval between vaccination and initiation of cancer chemotherapy or other immunosuppressive therapy, if possible.

**Site of administration:** thigh-child, deltoid-adult.
Route of administration: IM
Storage temp: 2 - 8 °C

Contraindications and Precautions to Vaccination:
For both pneumococcal polysaccharide and conjugate vaccines

- A severe allergic reaction to a vaccine component or following a prior dose is a contraindication to further doses of vaccine.
- Persons with moderate or severe acute illness should not be vaccinated until their condition improves.
- Minor illnesses, such as upper respiratory infections, are not a contraindication to vaccination.

Adverse event following immunization:

Pneumococcal Polysaccharide Vaccine:
- The most common adverse reactions following either pneumococcal polysaccharide or conjugate vaccine are local reactions. For PPV23, 30%–50% of vaccinees report pain, swelling, or erythema at the site of injection. These reactions usually persist for less than 48 hours.
- Local reactions are reported more frequently following a second dose of PPV23 vaccine than following the first dose.

Moderate systemic reactions (such as fever and myalgia) are not common (fewer than 1% of vaccinees), and more severe systemic adverse reactions are rare.

A transient increase in HIV replication has been reported following PPV23 vaccine. No clinical or immunologic deterioration has been reported in these persons.

Pneumococcal Conjugate Vaccine:
Local reactions following PCV7 occur in 10%–20% of recipients. Fewer than 3% of local reactions are considered to be severe (e.g., tenderness that interferes with limb movement)

Local reactions are more common with the fourth dose than with the first three doses.

7.7. Influenza vaccine. (Minimum age: 6 months for trivalent)

Type of vaccine: inactivated
Number of Doses:

- Administer annually to children aged 6–59 months and to all eligible close contacts of children aged 0–59 months.
- Administer annually to children 5 years of age and older with certain risk factors, to other persons (including household members) in close contact with persons in groups at higher risk, and to any child whose parents request vaccination.
- For healthy persons (those who do not have underlying medical conditions that predispose them to influenza complications) ages 2–49 years, either live attenuated influenza vaccine (LAIV) or trivalent inactivated vaccine (TIV) may be used.
- Administer 2 doses (separated by 4 weeks or longer) to children younger than 9 years who are receiving influenza vaccine for the first time or who were vaccinated for the first time last season but only received one dose.

Inactivated Influenza Vaccine Dosage, By Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Dosage</th>
<th>Number of Doses</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-35 months</td>
<td>0.25 ml</td>
<td>1*or 2</td>
<td>IM</td>
</tr>
<tr>
<td>3-8 years</td>
<td>0.50 ml</td>
<td>1*or 2</td>
<td>IM</td>
</tr>
<tr>
<td>≥9 years</td>
<td>0.50 ml</td>
<td>1</td>
<td>IM</td>
</tr>
</tbody>
</table>

*only one dose is needed if the child received 2 doses of influenza vaccine during the previous influenza season

Schedule: annually

Site of administration: thigh-child, deltoid- older children and adult

Route of administration: IM

Storage temp: 2 - 8 °C

Inactivated Influenza Vaccine Recommendations:

- All persons 50 years of age or older.
- Children 6-59 months of age.
- Residents of long-term care facilities.
- Pregnant women.
- Persons 6 months to 18 years receiving chronic Aspirin therapy.
- Persons ≥6 months of age with chronic illness including:
  - 1) Pulmonary (e.g.; asthma, COPD).
  - 2) Cardiovascular (e.g.CHF)
3) Metabolic (e.g., diabetes)
4) Renal dysfunction
5) Hemoglobinopathy
6) Immunosuppression, including HIV infection

**Contraindications and Precautions to Vaccination:**

- Persons with a severe allergic reaction to a prior dose of inactivated influenza vaccine, or to a vaccine component (e.g., eggs) should not receive TIV.
- Persons with a moderate or severe acute illness normally should not be vaccinated until their symptoms have decreased.
- Pregnancy, breastfeeding, and immunosuppression are not contraindications to inactivated influenza vaccination.

**Adverse event following immunization:**

**Local reactions** are the most common adverse reactions following vaccination with TIV. Local reactions include soreness, erythema, and induration at the site of injection. These reactions are transient, generally lasting 1 to 2 days.

**Nonspecific systemic symptoms**, including fever, chills, malaise, and myalgia, are reported in fewer than 1% of TIV recipients. These symptoms usually occur in those with no previous exposure to the viral antigens in the vaccine.

**Rarely, immediate hypersensitivity**, presumably allergic, reactions (such as hives, angioedema, allergic asthma, or systemic anaphylaxis) occur after vaccination with TIV. These reactions probably result from hypersensitivity to a vaccine component. The majority are most likely related to residual egg protein. Although current influenza vaccines contain only a small quantity of egg protein, this protein may induce immediate allergic reactions in persons with severe egg allergy.

Inactivated vaccines have not been clearly associated with an increased frequency of Guillain-Barré syndrome (GBS).

7.8 Measles, mumps, and rubella vaccine (MMR). (Minimum age: 12 months)
Type of vaccine: Live virus

Number of Doses: 2 Doses (The second dose of MMR may be administered as soon as1 month (i.e., minimum of 28 days) after the first dose).

Schedule: 1 Yr and 5-6Yrs

Site of administration: thigh – child, deltoid – adult.

Route of administration: SC

Storage temp: 2 - 8 °C

MMR Vaccine Indicators:

- All children 12 months of age and older.
- Susceptible adolescents and adults without documented evidence of immunity.
- 12 months is the recommended and minimum age.
- MMR given before 12 months should not be counted as a valid dose.
- Revaccinate at 12 months of age or older.
- Second dose of MMR intended to produce measles immunity in persons who failed to respond to the first dose (primary vaccine failure) and may boost the antibody titer in some persons.

Contraindications and Precautions to Vaccination

- Severe allergic reaction (i.e., hives, swelling of the mouth or throat, difficulty breathing, hypotension, shock) following a prior dose of measles vaccine or to a vaccine component (e.g., gelatin, neomycin), should generally not be vaccinated with MMR.
- In the past, persons with a history of anaphylactic reactions following egg ingestion were considered to be at increased risk for serious reactions after receipt of measles- or mumps containing vaccines, which are produced in chick embryo fibroblasts. However, data suggest that anaphylactic reactions to measles- and mumps-containing vaccines are not associated with hypersensitivity to egg antigens but to other components of the vaccines (such as gelatin). Therefore, MMR may be administered to egg allergic children without prior routine skin testing or the use of special protocols.
- Pregnancy.
- Persons who are immunosuppressed or immunodeficient. Patients with leukemia in remission who have not received chemotherapy for at least 3 months may receive MMR or its component vaccines.
- Measles disease may be severe in persons with HIV infection. Available data indicate that vaccination with MMR has not been associated with severe or unusual adverse reactions in
HIV-infected persons without evidence of severe immunosuppression, although antibody responses have been variable.

- Persons with moderate or severe acute illness should not be vaccinated until the illness has improved.
- Receipt of antibody-containing blood products (e.g., immune globulin, whole blood or packed red blood cells, intravenous immune globulin) may interfere with seroconversion after measles vaccine. The length of time that such passively acquired antibody persists depends on the concentration and quantity of blood product received.
- Persons who have a history of thrombocytopenic purpura or thrombocytopenia may be at increased risk for developing clinically significant thrombocytopenia after MMR vaccination. No deaths have been reported as a direct consequence of vaccine-induced thrombocytopenia. The decision to vaccinate with MMR depends on the benefits of immunity to measles, mumps, and rubella and the risks for recurrence or exacerbation of thrombocytopenia after vaccination or during natural infection with measles or rubella. The benefits of immunization are usually greater than the potential risks, and administration of MMR vaccine is justified because of the even greater risk for thrombocytopenia after measles or rubella disease. However, deferring a subsequent dose of MMR vaccine may be prudent if the previous episode of thrombocytopenia occurred within 6 weeks after the previous dose of the vaccine.
- Tuberculin skin testing (TST) is not a prerequisite for vaccination with MMR or other measles-containing vaccine. TST has no effect on the response to MMR vaccination. However, measles vaccine (and possibly mumps, rubella, and varicella vaccines) may transiently suppress the response to TST in a person infected with Mycobacterium tuberculosis. If tuberculin skin testing is needed at the same time as administration of measles-containing vaccine, TST and vaccine can be administered at the same visit. Simultaneously administering TST and measles-containing vaccine does not interfere with reading the TST result at 48–72 hours and ensures that the person has received measles vaccine. If the measles-containing vaccine has been administered recently, TST screening should be delayed at least 4 weeks after vaccination.

**Adverse event following immunization**

- Fever is the most common adverse reaction following MMR vaccination. Although measles, rubella, and mumps vaccines may cause fever after vaccination, the measles component of MMR vaccine is most often associated with this adverse reaction. After MMR vaccination,
5%–15% of susceptible persons develop a temperature of 103°F (39.4°C) or higher, usually occurring 7–12 days after vaccination and generally lasting 1–2 days.

- Measles- and rubella-containing vaccines, including MMR, may cause a transient rash. Rashes, usually appearing 7–10 days after MMR or measles vaccination, have been reported in approximately 5% of vaccinees.
- Rarely, MMR vaccine may cause thrombocytopenia (low platelet count) within 2 months after vaccination. The clinical course of these cases was usually transient and benign, although hemorrhage occurred rarely.
- Transient lymphadenopathy sometimes occurs following receipt of MMR or other rubella-containing vaccine, and parotitis has been reported rarely following receipt of MMR or other mumps-containing vaccine.
- Arthralgias and other joint symptoms are reported in up to 25% of susceptible adult women given MMR vaccine. This adverse reaction is associated with the rubella component.
- Allergic reactions following the administration of MMR or any of its component vaccines are rare.
- To date there is no convincing evidence that any vaccine causes autism or autism spectrum disorder. Concern has been raised about a possible relation between MMR vaccine and autism by some parents of children with autism.

7.9 Varicella vaccine. (Minimum age: 12 months)

Type of vaccine: Live virus
Number of Doses: 2 Doses
Schedule:
  - 12 months through 12 years of age: 2 doses 3 months apart.
  - 13 years of age or older: 2 doses 4 weeks apart.

Site of administration: thigh – child, deltoid – adult.
Route of administration: SC
Storage temp: 2 - 8 °C

No simultaneous Administration of Live Virus Vaccines:

- If varicella vaccine is not administered on the same day as MMR or live attenuated influenza vaccine, the vaccines should be separated by at least 4 weeks
- If separated by less than 4 weeks the vaccine given second should be repeated
Contraindications and Precautions to Vaccination:

- Severe allergic reaction to vaccine component or following a prior dose
- Immunosuppression
- Pregnancy
- Moderate or severe acute illness
- Recent blood product (except herpes zoster vaccine)

Adverse event following immunization

- Local reactions – 20% (pain, erythema)
- Rash – 3%-4%
  - may be maculopapular rather than vesicular
  - average 5 lesions
- Temp >102 F - 10%-15%

Zoster Following Vaccination

- Most cases in children.
- Risk from vaccine virus appears to be less than from wild-type virus.
- Usually a mild illness without complications.

Varicella Vaccine Post exposure Prophylaxis:

- Varicella vaccine is recommended for use in persons without evidence of varicella immunity after exposure to varicella.
  - 70%-100% effective if given within 72 hours of exposure.
  - Not effective if administered more than 5 days after exposure but will produce immunity if not infected.

9.10 Hepatitis A vaccine (HepA).

Type of vaccine: inactivated whole-virus

Number of Doses: 2 doses

Schedule:

- Administer to all children aged 1 year (i.e., aged 12–23 months).
- Administer the 2 doses in the series at least 6-12 months apart.
- Children not fully vaccinated by age 2 years can be vaccinated at subsequent visits.
Site of administration: thigh
Route of administration: IM
Storage temp: 2 - 8 ºC

ACIP Recommendation for Routine Hepatitis A V vaccination of Children:
- All children should receive hepatitis A vaccine at 12-23 months of age.
- Vaccination should be integrated into the routine childhood vaccination schedule.
- Children who are not vaccinated by 2 years of age can be vaccinated at subsequent visits.

Hepatitis A Vaccine Recommendations:
- International travelers.
- Men who have sex with men.
- Persons who use illegal drugs.
- Persons who have clotting factor disorders.
- Persons with occupational risk.
- Persons with chronic liver disease.
- Healthcare workers: not routinely recommended.
- Childcare centers: not routinely recommended.
- Food handlers: may be considered based on local circumstances.

Contraindications and Precautions to Vaccination
Hepatitis A vaccine should not be administered to persons with a history of a severe allergic reaction to a vaccine component or following a prior dose of hepatitis A vaccine,
- Hypersensitivity to alum or, in the case of HAVRIX, to the preservative 2-phenoxyethanol.
- Vaccination of persons with moderate or severe acute illnesses should be deferred until the person’s condition has improved.

Adverse event following immunization:
- The most commonly reported adverse reaction following vaccination is a local reaction at the site of injection.
- Injection site pain, erythema, or swelling is reported by 20% to 50% of recipients. These symptoms are generally mild and self-limited.
- Mild systemic complaints (e.g., malaise, fatigue, low-grade fever) are reported by fewer than 10% of recipients.
7.11 Meningococcal Polysaccharide Vaccine MPSV (Minimum age: 2 years)

Type of vaccine: quadrivalent A, C, Y, W-135 polysaccharide vaccine. Each dose consists of 50 mcg of each of the purified bacterial capsular polysaccharides.

Schedule: 2 years.

Number of Doses: One dose

Meningococcal Vaccine Recommendations:

Recommended for persons at increased risk of meningococcal disease:

- Microbiologists who are routinely exposed to isolates of N. meningitides.
- Military recruits.
- Persons who travel to and U.S. citizens who reside in countries in which N. meningitides is hyper endemic or epidemic.
- Terminal complement component deficiency.
- Functional or anatomic asplenia.

Revaccination

- Revaccination may be indicated for persons previously vaccinated with MPSV who remain at increased risk for infection, particularly for children who were first vaccinated when they were younger than 4 years of age. Such children should be considered for revaccination after 2–3 years if they remain at high risk.
- Although the need for revaccination of older children and adults after receiving MPSV has not been determined, antibody levels rapidly decline in 2–3 years, and if indications still exist for vaccination, revaccination may be considered 5 years after receipt of the first dose.

Site of administration: thigh – child, deltoid - adult

Route of administration: subcutaneous

Storage temp: 2 - 8 °C

Contraindications and Precautions to Vaccination:

For both MCV and MPSV

- Severe allergic (anaphylactic) reaction to a vaccine component or following a prior dose of either vaccine is a contraindication to receipt of further doses.
- A moderate or severe acute illness is reason to defer routine vaccination.
- Breastfeeding and immunosuppression are not contraindications to vaccination.
Adverse event following immunization:
Adverse reactions to MPSV are generally mild.

- The most frequent are local reactions, such as pain and redness at the injection site. These reactions last for 1–2 days, and occur in up to 48% of recipients.
- Fever (100o–103oF) within 7 days of vaccination is reported for up to 3% of recipients.
- Systemic reactions, such as headache and malaise, within 7 days of vaccination are reported for up to 60% of recipients. Fewer than 3% of recipients reported these systemic reactions as severe.

7.12 Oral Polio Vaccine (OPV) Minimum age: 6 weeks

Type of vaccine: Live virus
Number of Doses: 3 Doses & 2 boosters
Schedule: 2, 4, 6, 18 Months and 5 to 6 Yrs
Site of administration: oral
Route of administration: oral
Storage temp: 2 - 8 °C

Contraindications and Precautions to Vaccination:
- Immunodeficiency or household contact with Immunodeficiency.
- Pregnancy.
- A moderate or severe acute illness is reason to defer routine vaccination.

Adverse events following immunization:
Vaccine-associated paralytic polio is a rare adverse reaction.

- Increased risk in persons 18 years and older.
- Increased risk in persons with immunodeficiency.
- No procedure available for identifying persons at risk of paralytic disease.
- 5-10 cases per year with exclusive use of OPV.
- Most cases in healthy children and their household contacts.

7.13 Injectable Polio vaccine (IPV) Minimum age: 6 weeks

Type of vaccine: inactivated virus
**Number of Doses:** 3 Doses & 2 boosters  
**Schedule:** 2, 4, 6, 18 Months and 5 to 6 Yrs  
**Site of administration:** Thigh  
**Route of administration:** IM  
**Storage temp:** 2 - 8 °C  
**Contraindications and Precautions to Vaccination:**  
- Pregnancy  
- Moderate or severe acute illness is reason to defer routine vaccination.

**Adverse event following immunization:**  
- Minor local reactions (pain, redness),  
- Allergic reactions may occur in persons sensitive to streptomycin, polymyxin B, and neomycin.

**7.14 Typhoid vaccine Minimum age: 2 years**

**Type of vaccine:** inactivated Bacteria  
**Number of Doses:** One dose every 3 years  
**Schedule:** Travellers to endemic countries  
**Site of administration:** thigh – child & deltoid - adult  
**Route of administration:** IM  
**Storage temp:** 2 - 8 °C  

**Contraindications and Precautions to Vaccination:**  
* Severe allergic (anaphylactic) reaction to a vaccine component or following a prior dose of vaccine is a contraindication to receipt of further doses.  
* A moderate or severe acute illness is reason to defer vaccination

**Adverse event following immunization:**  
**Mild Reactions**  
- Fever (up to about 1 person per 100).  
- Headache (up to about 3 people per 100).  
- Redness or swelling at the site of the injection (up to 7 people per 100).

**7.15. Yellow Fever Vaccine (Minimum age: 6 months)**
Type of vaccine: Live virus
Number of Doses: One dose every 10 years
Schedule: Single dose every 10 years
Site of administration: thigh – child & deltoid - adult
Route of administration: SC
Storage temp: 2 - 8 °C

Contraindications and Precautions to Vaccination:

- Allergy to egg
- Immunodeficiency except HIV
- Infant below 6 month
- Pregnancy

Adverse event following immunization:

Reactions are less likely to occur after a booster dose of yellow fever vaccine than after the first dose.

Mild problems:

- Soreness, redness, or swelling where the vaccine was given
- Fever
- Aches

If these problems occur, they usually begin soon after the vaccine and last for 5 to 10 days. In studies, they occurred in as many as 25 percent of vaccine recipients.

Severe problems (estimates based on passive reporting):

- Life-threatening allergic reaction (approximately 1 reported per 131,000 doses).
- Severe nervous system reactions (approximately 1 reported per 150,000 to 250,000 doses).
- Life-threatening severe illness with major organ system failure (approximately 1 reported per 200,000 to 300,000 doses, or 1 reported per 40,000 to 50,000 doses in people 60 years of age and older). More than half of the people who suffer these side effects die.

7.16 Bacille Calmette-Guérin (BCG) Vaccine (Minimum age: Birth)

Type of vaccine: live Bacteria
Number of Doses: one
Schedule:
The BCG vaccine should be considered only for very select persons who meet specific criteria and in consultation with a TB expert.

**Recommendations for Children:**
BCG vaccination should only be considered for children who have a negative tuberculin skin test and who are continually exposed, and cannot be separated from, adults who:
* Are untreated or ineffectively treated for TB disease (if the child cannot be given long-term treatment for infection); or
* Have TB caused by strains resistant to isoniazid and rifampin.

**Site of administration:** left deltoid  
**Route of administration:** intradermal  
**Storage temp:** 2 - 8 °C

**Contraindications and Precautions to Vaccination:**
* **Immunosuppressed Persons.** BCG vaccination should not be given to persons who are immunosuppressed (e.g., persons who are HIV-infected) or who are likely to become immunocompromised (e.g., persons who are candidates for organ transplant).
* **Pregnant Women.** BCG vaccination should not be given during pregnancy. Even though no harmful effects of BCG vaccination on the fetus have been observed, further studies are needed to prove its safety.

**Adverse event following immunization:**
* Reactions that can be expected after vaccination include moderate axillary or cervical lymphadenopathy and induration and subsequent pustule formation at the injection site; these reactions can persist for as long as 3 months after vaccination. BCG vaccination often results in permanent scarring at the injection site.

More severe local reactions include ulceration at the vaccination site, regional suppurative lymphadenitis with draining sinuses, and caseous lesions or purulent drainage at the puncture site; these manifestations might occur within the 5 months after vaccination and could persist for several weeks. Higher rates of local reactions may result from using subcutaneous injection in comparison with reactions from intradermal injection.

The most serious complication of BCG vaccination is disseminated BCG infection. BCG osteitis affecting the epiphyses of the long bones, particularly the epiphyses of the leg, can occur from 4 months to 2 years after vaccination.
Testing for TB in BCG-Vaccinated Persons

Many foreign-born persons have been BCG vaccinated. BCG vaccination may cause a positive reaction to the tuberculin skin test (TST), which may complicate decisions about prescribing treatment.

Despite this potential for BCG to interfere with test results, the TST is not contraindicated for persons who have been vaccinated with BCG. The presence or size of a TST reaction in these persons does not predict whether BCG will provide any protection against TB disease. Furthermore, the size of a TST reaction in a BCG vaccinated person is not a factor in determining whether the reaction is caused by LTBI or the prior BCG vaccination.

Treatment for LTBI in BCG-Vaccinated Persons

Treatment of LTBI substantially reduces the risk that TB infection will progress to disease. Careful assessment to rule out the possibility of TB disease is necessary before treatment for LTBI is started.

Evaluation of TST reactions in persons vaccinated with BCG should be interpreted using the same criteria for those not BCG-vaccinated.

7.17 Rabies (Minimum age: ≥ 2 yrs)

Type of vaccine: Inactivated virus

Number of Doses: 5 doses

Schedule: 5 dose series on days 0, 3, 7, 14, 28

Vaccination after an Exposure

• A person who is exposed and has never been vaccinated against rabies should get 5 doses of rabies vaccine - one dose right away, and additional doses on the 3rd, 7th, 14th, and 28th days. They should also get a shot of Rabies Immune Globulin at the same time as the first dose. This gives immediate protection.

• A person who has been previously vaccinated should get 2 doses of rabies vaccine - one right away and another on the 3rd day. Rabies Immune Globulin is not needed.

Rabies vaccine can prevent rabies.

Site of administration: thigh - child, deltoid – adult

Route of administration: IM

Storage temp: 2 - 8 °C
Contraindications and Precautions to Vaccination:
* A severe allergic reaction to a vaccine component or following a prior dose of the vaccine is a contraindication to further doses of vaccine. Such allergic reactions are rare.
* A weakened immune system because of:
  - HIV/AIDS or another disease that affects the immune system,
  - treatment with drugs that affect the immune system, such as steroids,
  - cancer, or cancer treatment with radiation or drugs.

Adverse event following immunization:

Mild problems:
• soreness, redness, swelling, or itching where the shot was given (30% - 74%)
• headache, nausea, abdominal pain, muscle aches, dizziness (5% - 40%)

Moderate problems:
• hives, pain in the joints, fever (about 6% of booster doses)
• illness resembling Guillain-Barré Syndrome (GBS), with complete recovery (very rare)

Other nervous system disorders have been reported after rabies vaccine, but this happens so rarely that it is not known whether they are related to the vaccine.

7.18 Commonly asked questions about immunizations

Polio vaccine
Why IPV is given instead of oral polio as a 1st dose?
Introduction of IPV as a first dose followed by OPV was intended to reduce the occurrence of vaccine-associated paralytic polio by producing humoral immunity to polio vaccine viruses with inactivated polio vaccine prior to exposure to live vaccine virus.

Why do we still immunize people with OPV?
There are several reasons. OPV is cheaper and easier to administer than IPV. The shedding of the virus in the stool to contacts is beneficial in an area where the disease is endemic or has recently been endemic because it enhances herd immunity. Current supplies of IPV are also inadequate to meet the needs of polio eradication.

What is Vaccine-associated paralytic polio (VAPP)?
Vaccine-associated paralytic polio is a rare adverse reaction following live oral poliovirus vaccine. Inactivated poliovirus vaccine does not contain live virus, so it cannot cause VAPP. The paralysis that results is identical to that caused by wild virus, and may be permanent. VAPP is more likely to occur in persons 18 years of age and older than in children, and is much more likely to occur in immunodeficient children than in those who are immunocompetent. Compared with immunocompetent children, the risk of VAPP is almost 7,000 times higher for persons with certain types of immunodeficiencies, particularly B-lymphocyte disorders (e.g., agammaglobulinemia and hypogammaglobulinemia), which reduce the synthesis of immune globulins. There is no procedure available for identifying persons at risk of paralytic disease, except excluding older persons and screening for immunodeficiency.

**MMR**

**If a student give a personal history of measles and mumps, but never had MMR vaccine. Is rubella vaccine recommended in such a situation?**

Actually, this student should receive two doses of MMR, separated by at least 28 days. (It is recommended that all persons attending school receive two doses of MMR vaccine.) A personal history of measles and mumps is NOT acceptable as proof of immunity. Acceptable evidence of measles and mumps immunity includes a positive serologic test for antibody, physician diagnosis of diseases, birth before 1957, or written documentation of vaccination. For rubella, only serologic evidence or documented vaccination should be accepted as proof of immunity. Additionally, persons born prior to 1957 may be considered immune to rubella unless they are women who have the potential to become pregnant.

**Why is a second dose of MMR necessary?**

About 2%-5% of persons do not develop measles immunity after the first dose of vaccine. This occurs for a variety of reasons. The second dose is to provide another chance to develop measles immunity for persons who did not respond to the first dose.

**If you can give the second dose of MMR as early as 28 days after the first dose, why do we routinely wait until school entry to give the second dose?**

The second dose of MMR may be given as early as a month after the first dose, and be counted as a valid dose if both doses were given after the first birthday. It is convenient to give the second dose at school entry, since the child will have an immunization visit for other school entry vaccines. The risk of measles is higher in school-age children than those of preschool age, so it is important to receive the second dose by school entry. The second dose is not a "booster"; it is intended to produce immunity in the small number of persons who fail to respond to the first dose.
A patient has had two documented doses of MMR. Her rubella titer was nonreactive at a prenatal visit. What should be done?

It is possible that she failed to respond to both doses. It is also possible that she did respond but has a low level of antibody. **Failure to respond to two properly timed doses of MMR vaccine would be expected to occur in one or two persons per thousand vaccinees, at most.** A small number of people appear to develop a relatively small amount of antibody following vaccination with rubella and other vaccines. This level of antibody may not be detectable on relatively insensitive commercial screening tests. Controlled trials with sensitive tests indicate a response rate of >99% following two doses of rubella-containing vaccine. It is suggested that a note of her documented vaccination is done and testing is stopped. Another approach would be to administer one additional dose of MMR. However, there are no data on the administration of additional doses of rubella-containing vaccine in this situation.

**Can MMR be given to a child whose sibling is receiving chemotherapy for leukemia?**

Yes. MMR and varicella vaccines should be given to the healthy household contacts of immunosuppressed children. Oral polio is the only vaccine that should not be given to a healthy child if an immunosuppressed person resides in the household.

**Is it true that egg allergy is no longer considered a contraindication to MMR vaccine?**

Several studies have documented the safety of measles and mumps vaccine (which are grown in chick embryo tissue culture) in children with severe egg allergy. No longer egg allergy is considered a contraindication to MMR vaccination. The new ACIP statement on MMR also recommends routine vaccination of egg-allergic children without the use of special protocols or desensitization procedures.

**Is it contraindicated to give MMR to a breastfeeding mother or to a breastfed infant?**

No. Breastfeeding does not interfere with the response to MMR vaccine. Vaccination of a woman who is breastfeeding her infant poses no risk to the infant being breastfed. Although it is believed that rubella vaccine virus, in rare instances, may be transmitted via breast milk, the infection in the infant is asymptomatic.

**Can a PPD (tuberculin skin test) be given on the same day as a dose of MMR vaccine?**

A PPD can be applied before or on the same day that MMR vaccine is given. However, if MMR vaccine is given on the previous day or earlier, the PPD should be delayed for at least one month. Live measles vaccine given prior to the application of a PPD can reduce the reactivity of the skin test because of mild suppression of the immune system.
A story on "60 Minutes" suggested administering each component of MMR in separate injections to decrease the risk of autism. Is there any reason to do this?

There is no scientific reason for or benefit from separating the injections. There is no credible evidence that measles vaccine or MMR increases the risk of autism. Separating the doses puts children (and pregnant women who may be exposed to them) at increased risk for these diseases by extending the amount of time children remain unvaccinated. Studies have shown that if parents have to schedule additional appointments for vaccinations, there is an increased risk that their children may not receive all the vaccines they need.

How likely is it for a person to develop arthritis from rubella vaccine?

Arthralgia (joint pain) and transient arthritis (joint redness or swelling) following rubella vaccination occurs only in persons who were susceptible to rubella at the time of vaccination. Joint symptoms are uncommon in children and in adult males. About 25% of post-pubertal women report joint pain after receiving rubella vaccine, and about 10% report arthritis-like signs and symptoms. When joint symptoms occur, they generally begin 1–3 weeks after vaccination, persist for 1 day to 3 weeks, and rarely recur. Chronic joint symptoms attributable to rubella vaccine are very rare, if they occur at all.

If a person develops a rash and low-grade fever after MMR vaccine, is s/he infectious?

Approximately 5-15% of susceptible persons who receive MMR vaccine will develop a low-grade fever and/or mild rash 7-12 days after vaccination. However, the person is not infectious, and no special precautions (e.g., exclusion from work) need to be taken.

Hepatitis B Vaccine

Is it too late to start the series after the exposure?

The vaccine is part of the recommended prevention treatment following an exposure along with HBIG, which provides temporary antibody protection until the person’s immune system can develop antibodies in response to the vaccine series. If the person was not infected by the exposure, the vaccine will offer protection from possible future exposures. If the person was infected, the vaccine will not harm, but would be of no benefit.

What is the hepatitis B vaccine minimum intervals?

The hepatitis B minimum intervals are as follows:

Dose 2 should be separated from dose 1 by at least one month (4 weeks or 28 days).
Dose 3 should be separated from dose 2 by at least 2 months (8 weeks) AND from dose 1 by at least 4 months (16 weeks).
You may use weeks (1 month = 4 weeks) to calculate intervals up to 4 months. Beyond 4 months, you should use calendar months. (6/26/03)

If a person received the first two shots in the hepatitis B series, but did not receive the third, and it is now 10 years later, should he go ahead now and get the last one?
Regardless of when he started the hepatitis B series, he should just pick up where he left off and complete the series. It is not necessary to add doses or restart the series if the interval between doses is longer than recommended.

If inactivated fractional vaccines, specifically Td, require booster doses every ten years, why are routine hepatitis B booster doses not recommended?
Available data show that vaccine-induced hepatitis B antibody levels do decline with time. Nevertheless, immune memory remains intact for at least 15 years following immunization, and both adults and children with declining antibody levels are still protected against significant hepatitis B virus (HBV) infection (e.g., clinical disease, HBsAg antigenemia, or significant elevation of liver enzymes). Exposure to HBV results in an anamnestic anti-HBs response that prevents clinically significant HBV infection. Chronic HBV infection has only rarely been documented among vaccine responders.
For adults and children with normal immune status, booster doses of vaccine are not recommended nor is routine serologic testing to assess immune status. The need for booster doses after longer intervals will continue to be assessed as additional information becomes available.

What is the recommendation if a person who is tested for Hep B antibodies following completion of vaccination is found to be nonreactive to the Hep B antibodies?
Also, what if a person has a blood exposure and is found to be nonreactive to Hep B antibodies even though they have completed the vaccination for hep B and may have had an earlier reactive antibody result to Hep B antibodies.
And what if someone has not had a previous reactive antibody test done after completion of vaccination?
The key to the first question is how long after the hepatitis B series the testing is done. As the question is worded, it appears to be about testing done immediately after vaccination (1-2 months). In this case, the answer is that this person should get another 3-dose vaccine series and be tested again after the third dose. (NOTE: If the person has already had two complete hepatitis B vaccine series, additional doses are not recommended. The person should be considered a non-responder.)
A person whose immune status is in doubt, who has a percutaneous or permucosal exposure to blood known to be infected with hepatitis B virus, should get one dose of HBIG and a booster dose of hepatitis B vaccine. Routine post-vaccination antibody testing is not recommended, except for certain groups (e.g., people at high risk of blood exposures) and only if it is done within 2 months of vaccination. Otherwise the result could be negative, even if the person responded to the vaccine.

We give HIV+ patients a 4-dose series of hepatitis B vaccine (40 mcg) at 0, 1, 2, and 6 months. If they are anti-HBs negative after the 4th dose, we give a 40 mcg booster at 12 months. If they remain negative after this dose, what should we do?

The primary schedule for the 40 mcg formulation of Engerix-B is four doses at 0, 1, 2, and 6 months. Vaccinees should be tested for anti-HBs 1-2 months after the last primary dose to determine their response to the vaccine (adequate = ≥10 mIU/mL). If the response to the primary series is inadequate, then the patient should be revaccinated with three additional doses and retested for response. No additional doses of vaccine are warranted for those who do not respond to the second series.

Is hepatitis B surface antigen (HBsAg) detectable in the serum after vaccination with the hepatitis B vaccine?

A false positive reading for hepatitis B surface antigen can persist for 3-4 weeks after a dose of hepatitis B vaccine.

**DTP,DT,Td and TDaP vaccines**

- **What precautions should be followed for newborns when the mother has not been immunized against tetanus since her childhood series?**

  The mother should be educated about the risk of tetanus, especially regarding care of the cord stump and circumcision. It is extremely important to caution these mothers about keeping these sites clean and not introducing dirt/feces into the site.

- **If there is no diphtheria or very little of it in this country, why do we even bother vaccinating against it?**
Diphtheria can be imported at any time. Just because it is not common does not mean it can't occur. We should all be protected from diphtheria with a booster every 10 years.

- A 7 month old child received the 4th DTP 6 weeks after the 3rd DTP and the 4th dose of Hib at the same time. Does this child require any repeated doses?

Yes, the 4th doses of DTP and Hib should not be administered before the 1st birthday. Also, there should be a minimum of 2 months between the 3rd and 4th doses of Hib, and 6 months between the 3rd and 4th doses of DTaP. Doses administered 5 or more days earlier than these minimum intervals or ages should be repeated as age-appropriate.

- A child receives the first 3 doses of DTP on time and then does not return until just before the 4th birthday. Should we give a dose now and another in 6 months or wait until they turn 4 years and give one more dose?

Do not wait. Give a dose now and the 5th dose later. There should be at least 6 months between the 4th and 5th doses.

If a 17-month-old child has received five doses of DTP, but two doses were invalid because of interval problems, how many doses will this child need?

The child will need two more doses. The 6 doses before 7 years of age rule applies to valid doses. The concern about the number of doses is the risk of an Arthus reaction (an exaggerated local reaction in the limb where the injection is administered). This can happen when too many doses of tetanus- and diphtheria-containing vaccines are given too close together. However, it is important to ensure that the child has adequate protection against pertussis. Any time you go beyond the 6 doses, as in this situation, you should at least explain carefully to the parents that the child could have a stronger-than-usual local reaction, but that the extra doses are necessary for protection against pertussis. Preparing them for the possibility of such a reaction, and telling them how to take care of it, could help them handle it better if it occurs.

- An autistic child has not had any of the primary immunizations but receives a dose of Td when injured. This child has had two doses of Td four years apart. How much protection would this child have?

The immune system doesn’t forget, so the child has the benefit of immune memory from the first two doses, but needs the 3rd primary dose for adequate immunity, as well as routine boosters since immunity does wane with time.
A 14-year-old received one dose of DTaP at 6 years of age. How many Td doses are needed to complete the series?

Because the dose was administered after one year of age, the primary series should consist of 3 doses. This child needs 2 doses to complete the series, spaced at least 6 months apart. One of these doses should be Tdap, and the other Td. After that, a routine booster of Td should be given every 10 years.

A patient was given single antigen tetanus rather than Td. Should he revaccinate? If so, when?

Now that Tdap is available, ACIP recommends that a dose of Tdap may be given 5 years after the last dose of Td for adolescents or adults who have not gotten a dose of Tdap. The same interval would apply after an inadvertently administered dose of TT. A shorter interval is acceptable if the patient is at increased risk for pertussis, or has close contact with an infant younger than 12 months of age. Remember that Tdap is not licensed for children younger than 10.

Wound Management:

How long can a person wait after a wound to get a Td booster?

The urgency of tetanus prophylaxis is a function of several factors, including the nature and location of the wound and the person's previous vaccination status.

The incubation period of tetanus can be as short as 1 day, or as long as several months. Most cases occur within 3 days to 3 weeks of the injury. Once the disease starts it must run its course.

Factors that increase the urgency of prophylaxis include lack of prior vaccination with tetanus toxoid, or vaccination in the remote past without a booster dose within the last 10-20 years; unknown vaccination status (you should always assume the worst case scenario, i.e., that the person is unvaccinated unless they can prove otherwise); and a wound contaminated with dirt or feces. The situation is most urgent when the person is unvaccinated or inadequately vaccinated, and the wound is contaminated and on or near the head. Puncture wounds are dangerous because of the anaerobic condition that results.
Factors that reduce the urgency are evidence of primary vaccination with a booster dose within the prior 10-20 years, or a clean wound (i.e., uncontaminated with dirt or feces).

Tetanus is unlikely (but not impossible) to result from a clean wound in a person who has been vaccinated. The other end of the scale (come in right now) is an unvaccinated person with a dirty head puncture wound. If there is any doubt about the person's vaccination status, get them in sooner rather than later. Puncture and contaminated wounds need to be seen immediately for treatment of the wound itself. And because the incubation period of tetanus can be very long, it is never "too late" to receive prophylaxis.

**Pneumococcal vaccine**

**If a child has been diagnosed with pneumococcal disease are they immune?**
They are only immune to that serotype of pneumococcus. There are at least 90 serotypes of *Streptococcus pneumoniae*. The child should still be vaccinated as age-appropriate to protect against other serotypes in the vaccine.

**For children over 24 months of age, which pneumococcal vaccine is preferred?**
If the child between 24 and 59 months of age is at high risk for pneumococcal disease, then both pneumococcal conjugate (PCV) & pneumococca polysaccharide (PPV) are indicated. If the child is not at high risk, then only PCV is indicated.

**What is the recommended and minimum intervals between doses of PCV vaccine?**
The recommended interval between the 3 doses given under 12 months of age is 8 weeks. The minimum interval is 4 weeks.

**Will the pneumococcal polysaccharide vaccine protect against Mycoplasma pneumonia?**
No. Pneumococcal vaccines protect only against certain serotypes of *Streptococcus pneumoniae*.

**When is it appropriate to give both PCV7 and PPV23 vaccines?**
A child who has received pneumococcal conjugate vaccine AND who has a high-risk condition for which PPV23 is recommended, should receive PPV23 vaccine as long as they are at least 2 years of age and it has been at least 2 months since the last dose of PCV7. PPV23 offers protection against additional pneumococcal serotypes, but children less than 2 years of age do not respond well to polysaccharide vaccines.
Should pneumococcal vaccine be given to someone with asthma?
"Asthma has not been associated with an increased risk for pneumococcal disease unless it occurs with chronic bronchitis, emphysema, or long-term use of systemic corticosteroids.

Is a history of pneumonia a high risk factor for pneumococcal vaccine?
Pneumococcal vaccine is indicated for persons with chronic lung disease (e.g., COPD and emphysema). Pneumonia without a history of chronic lung disease is not an indication for pneumococcal immunization.

What vaccines are indicated for someone with a splenectomy and is there concern that a person with a splenectomy may have a less than optimum response to vaccines?
Persons who do not have a functioning spleen or who have had a splenectomy do not handle encapsulated bacteria well and, therefore, are at increased risk for infection with encapsulated bacteria, especially Neisseria meningitidis and *Streptococcus pneumoniae*. They should be vaccinated with age-appropriate pneumococcal vaccine and meningococcal vaccine.

Persons two years of age and older should receive two doses of pneumococcal polysaccharide vaccine separated by 3-5 years, depending on the age at time of revaccination. One dose of meningococcal vaccine should be administered. The recommendation for a booster dose is somewhat vague because polysaccharides aren’t the best antigens and don’t boost antibody titers very much with subsequent doses. However, high-risk people, including those without a functioning spleen can receive a one-time revaccination 3-5 years after the first dose. Certainly no more than a total of two doses should be given. Some providers also choose to administer one pediatric dose of Haemophilus influenzae type b vaccine, regardless of age. Ideally the Hib dose should be given a couple of weeks prior to a scheduled splenectomy.

Immunosuppression is not an issue unless the patient has other health issues or treatments that are suppressing the immune system. Their response to vaccination should not be affected by the lack of a functioning spleen.

Should an adult who has had a cochlear implant be vaccinated with meningococcal or pneumococcal vaccine?
The recommendation is to include people who have had a cochlear implant in the high risk group for pneumococcal disease. If the person is under 2 years of age, give pneumococcal conjugate vaccine. If the person is between 2 and 5 years of age, give two doses of pneumococcal conjugate
vaccine and one dose of pneumococcal polysaccharide vaccine, separating the doses by a two months each. Persons 5 years of age and older should get a single dose of pneumococcal polysaccharide vaccine.

The cases of meningitis reported to date have been mostly pneumococcal. There have only been one or two cases caused by Neisseria meningitidis and none caused by Haemophilus influenzae. There are no recommendations at this time to vaccinate these individuals with meningococcal vaccine.

**Should you complete the pneumococcal vaccination series prior to a scheduled cochlear implant if possible?**
Yes, if you can. You can accelerate the schedule since the child will become high risk after the implant. You want to get in as many doses as possible, then complete the series after the implant if necessary. The child will probably need a booster after a year anyway. A child less than 2 years of age should receive only pneumococcal conjugate vaccine. A child 2 to 5 years of age should receive both pneumococcal conjugate and pneumococcal polysaccharide vaccines. A person 5 years of age or older should receive the pneumococcal polysaccharide vaccine.

**If an adult with a cochlear implant receives a dose of PPV, when should they receive the second dose?**
Persons aged 5 to 64 years with a cochlear implant should receive a single dose of pneumococcal polysaccharide vaccine. These persons should receive a second dose of pneumococcal polysaccharide vaccine at age 65 years, if at least 5 years have elapsed since their last dose. People with cochlear implants should be treated like other people with underlying illness like cardiac or renal disease. They are not in the highest risk group like persons with asplenia or other immunocompromising conditions for whom a second dose is recommended 5 years after the first dose.

**If a child less than 24 months of age with a cochlear implant receives the recommended doses of PCV, will the child need a dose of PPV23 at 24 months of age?**
Yes, these children should also receive one dose of pneumococcal polysaccharide vaccine, at least 2 months after the last dose of pneumococcal conjugate vaccine.

**Why isn’t there a recommendation to give pneumococcal polysaccharide vaccine (PPV23) boosters to high-risk individuals every 5 years? Is it because of severe local reactions?**
No. Ongoing booster doses are not recommended because pneumococcal polysaccharide vaccine does not boost well. Current data do not indicate that administering multiple boosters of PPV23 provides any more protection than one dose followed by a one-time booster 5 years later.

**Rota vaccine**

**Wouldn’t good hygiene be enough to prevent rotavirus disease?**
Better hygiene and sanitation have not been very effective in reducing rotavirus disease. This is illustrated by the fact that virtually everyone in the world is infected by rotavirus disease by age five years, despite differences in sanitation between countries. What kind of vaccine is it? Rota is a live vaccine. It is a combination between a cow rotavirus and human rotavirus. The vaccine contains five different rotavirus strains.

**How is this vaccine given?**
The Rota vaccine is a liquid given by mouth.

**What is the recommended schedule for getting this vaccine?**
Children should get 2 doses of rotavirus vaccine, at age 2 months, and age 4 months. The first dose should be given between age 6-12 weeks. Rotavirus vaccine may be given at the same time as other childhood vaccines.

**Should an infant who has already been infected with rotavirus still be vaccinated?**
Infants who have recovered from a rotavirus infection may not be immune to all five serotypes present in the vaccine. These infants should complete the dose series if they can do so by age 32 weeks.

**Varicella (chicken pox vaccine)**

**How effective are the varicella-containing vaccines in preventing varicella disease?**
vaccine-effectiveness studies of one dose of the single-antigen varicella vaccine have shown high levels of protection (70%-90%) against any form of varicella disease and more than 90% protection against severe disease. In the randomized clinical trial of one versus two doses of single-antigen varicella vaccine administered 3 months apart, the estimated vaccine efficacy of two doses was 98%, which was significantly higher than after one dose. The two-dose regimen was 100% efficacious against severe varicella. If a vaccinated person does get varicella, it is usually a very
mild case with fewer lesions (usually less than 50, which are frequently not vesicular), mild or no fever, and a quicker recovery. Persons with rash, however, are infectious.

**What adverse events are associated with varicella-containing vaccines?**

Varicella-containing vaccines are very safe. In uncontrolled trials, vaccine recipients reported minor injection site complaints (20% reported pain, swelling or redness) and rashes (3%-5% reported a localized rash, and an additional 3%-5% developed a generalized varicella-like rash 5-26 days after vaccination). However, the rate of adverse events was much lower in the only randomized, controlled clinical trial conducted in children. In this trial, 1% of vaccine recipients developed injection site rash compared with 0.3% of placebo recipients, and 3.2% of vaccine recipients developed generalized rash compared with 1.7% of placebo recipients. These rashes had an average of 2-5 lesions and were likely to be maculopapular rather than vesicular. The incidence of fever did not differ between the vaccination and placebo groups.

The safety profile for the two-dose regimen was comparable to that of the one-dose regimen. Injection site complaints were slightly higher after dose two (25% versus 21%), but clinical complaints, including fever (7% after dose 1 and 4% after dose 2) and varicelliform rash (3% after dose 1 and 1% after dose 2), were lower after dose two. A comparison of MMRV to MMR given concomitantly with Varivax at separate injection sites showed that fever (22% versus 15%) and measles-like rash (3% vs 2%) occurred more often in those receiving MMRV. Fever and rash usually occurred within 5-12 days following vaccination, were of short duration, and resolved with no long-term sequelae. Pain/soreness/tenderness at the injection site was lower in persons receiving MMRV (22%) compared to those receiving MMR and Varivax (27%). Finally, studies looking at the safety of MMRV given as a second dose demonstrated that the rates of adverse events were generally lower after the second dose of MMRV than after the first dose and the incidence of varicella-like rashes was lower after the second dose of MMRV than after single dose of MMR and Varivax. No vaccine-related serious adverse experiences were reported during clinical trials.

From March 1995 to December 2005, almost 48 million doses of varicella vaccine were distributed in the US. The widespread use of the single-antigen vaccine allowed the detection of adverse events not previously described. Among all adverse events reported, 5% were classified as serious (approximately 2.2 per 100,000 doses distributed). Serious adverse events including seizures, encephalitis, pneumonia, anaphylaxis, and death have occurred., although not all of them have been laboratory confirmed as associated with the vaccine virus. Note: Reporting a serious adverse event after vaccination does not indicate a causal association between vaccination and the event.
What data are available concerning transmission of varicella vaccine virus to contacts?
Available data suggest that the risk of vaccine virus transmission from healthy vaccinees is very low and occurs only if the vaccinee has a rash. With the currently licensed single-antigen varicella vaccine, there have been 5 documented cases of transmission resulting in 6 secondary infections. Four of the cases of transmission occurred from healthy vaccinated children and the fifth occurred from an immunocompetent adolescent. The risk for transmission from vaccinees who are immunocompromised may be higher.

Will post-exposure use of the vaccine prevent or modify varicella?
Yes, the single-antigen varicella vaccine may prevent or modify illness when administered within 3 to 5 days after exposure. The ACIP now recommends vaccination of persons without evidence of immunity to varicella who are eligible for vaccination as soon as possible after exposure--ideally within 3 days but possibly up to 5 days of an exposure--to prevent illness or modify disease severity. Studies have shown that vaccination administered within 3 days of exposure to rash is 90% or more effective in preventing varicella, while vaccination within 5 days of exposure to rash is approximately 70% effective in preventing varicella and 100% effective in modifying severe disease. If a person has already been infected, and the single-antigen varicella vaccine is given soon enough, disease may be modified or prevented. If exposure to varicella does not cause infection, postexposure vaccination should induce protection against subsequent exposure. No data are available on the potential benefit from administering a second dose to one-dose vaccinees following exposure. However, administration of a second dose should be considered for persons who have previously received one dose to bring them up-to-date. Finally, exposure even in a household setting does not result in transmission 100% of the time. So, if the exposed person has not been infected, vaccination will confer protection against subsequent exposures. No data are available on the use of MMRV for postexposure prophylaxis.

BCG Vaccine
What is BCG vaccine?
BCG, or bacille Calmette-Guérin, is a vaccine for tuberculosis (TB) disease. BCG is used in many countries with a high prevalence of TB to prevent childhood tuberculous meningitis and miliary disease.

What is the recommendations of BCG vaccine?
Children. BCG vaccination should only be considered for children who have a negative tuberculin skin test and who are continually exposed, and cannot be separated from, adults who
*Are untreated or ineffectively treated for TB disease (if the child cannot be given long-term treatment for infection); or

* Have TB caused by strains resistant to isoniazid and rifampin.

**What are the contraindications of BCG?**

Immunosuppressed Persons. BCG vaccination should not be given to persons who are immunosuppressed (e.g., persons who are HIV-infected) or who are likely to become immunocompromised (e.g., persons who are candidates for organ transplant).

Pregnant Women. BCG vaccination should not be given during pregnancy. Even though no harmful effects of BCG vaccination on the fetus have been observed, further studies are needed to prove its safety.

**How you interpret Testing for TB in BCG-Vaccinated Persons?**

Many persons have been BCG vaccinated. BCG vaccination may cause a positive reaction to the tuberculin skin test (TST), which may complicate decisions about prescribing treatment.

Despite this potential for BCG to interfere with test results, the TST are not contraindicated for persons who have been vaccinated with BCG. The presence or size of a TST reaction in these persons does not predict whether BCG will provide any protection against TB disease.

Furthermore, the size of a TST reaction in a BCG vaccinated person is not a factor in determining whether the reaction is caused by LTBI or the prior BCG vaccination.

**Recommended Immunization Schedule in kingdom of Bahrain**

<table>
<thead>
<tr>
<th>AGE</th>
<th>VACCINE</th>
<th>DOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>At birth</td>
<td>BCG for non Bahraini newborns</td>
<td>Single Dose</td>
</tr>
<tr>
<td>2 months</td>
<td>DPT + HB + Hib (Penta)</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td></td>
<td>+ Hib + IPV (Hexavalent)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conjugated Pneumococal</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td></td>
<td>Rota vaccine (oral)</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td>4 months</td>
<td>DPT + HB + Hib (Penta)</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td></td>
<td>OPV</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td></td>
<td>Conjugated Pneumococal</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td></td>
<td>Rota vaccine (oral)</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td>6 months</td>
<td>DPT + HB + Hib</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td>Age</td>
<td>Vaccine</td>
<td>Schedule</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>12 months</td>
<td>OPV</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td></td>
<td>Conjugated Pneumococcal</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td></td>
<td>MMR</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td></td>
<td>Hepatitis A</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td>18 months</td>
<td>DPT + OPV</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Booster</td>
</tr>
<tr>
<td></td>
<td>Hepatitis B + Hib</td>
<td>Booster</td>
</tr>
<tr>
<td>2 years</td>
<td>Meningococcal</td>
<td>Single Dose</td>
</tr>
<tr>
<td></td>
<td>Hepatitis A</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td>5-6 years</td>
<td>DTaP</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Booster</td>
</tr>
<tr>
<td></td>
<td>OPV</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Booster</td>
</tr>
<tr>
<td></td>
<td>MMR</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Dose</td>
</tr>
</tbody>
</table>

**ADOLESCENTS**

<table>
<thead>
<tr>
<th>Age</th>
<th>Vaccine</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 years</td>
<td>HA</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td>13 years</td>
<td>TdaP</td>
<td>DTaP Booster</td>
</tr>
<tr>
<td></td>
<td>HA</td>
<td>HA 2&lt;sup&gt;nd&lt;/sup&gt; Dose</td>
</tr>
<tr>
<td>14 years</td>
<td>Hepatitis B</td>
<td>3 Doses</td>
</tr>
</tbody>
</table>

**FOR PREVIOUSLY UNIMMUNISED WOMEN**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus Diphtheria (Td)</td>
<td>At first contact</td>
</tr>
<tr>
<td></td>
<td>Td1</td>
</tr>
<tr>
<td></td>
<td>At least 4 weeks after Td1</td>
</tr>
<tr>
<td></td>
<td>Td2</td>
</tr>
<tr>
<td></td>
<td>At least 6 months after Td2</td>
</tr>
<tr>
<td></td>
<td>Td3</td>
</tr>
<tr>
<td></td>
<td>At least 1 year after Td3</td>
</tr>
<tr>
<td></td>
<td>Td4</td>
</tr>
<tr>
<td></td>
<td>At least 1 year after Td4</td>
</tr>
<tr>
<td></td>
<td>Td5</td>
</tr>
</tbody>
</table>

**ELDERLY AND HIGH RISK GROUPS**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumococcal Polysaccharide</td>
<td>Single dose and booster for ≥ 2 years</td>
</tr>
<tr>
<td>Pneumococcal Conjugate</td>
<td>3 doses for infants and booster</td>
</tr>
<tr>
<td>Influenza</td>
<td>Annually</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>Single dose from 1-12 yr of age. 2 doses 6 weeks apart for ≥ 13 yr of age</td>
</tr>
</tbody>
</table>

**ADULTS AND HAJII**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningococcal</td>
<td>Single dose every 3 years</td>
</tr>
<tr>
<td>Td</td>
<td>3 primary series and a booster every 10 years</td>
</tr>
<tr>
<td>Influenza (elderly)</td>
<td>Annually</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------</td>
</tr>
</tbody>
</table>

**OTHER VACCINES**

<table>
<thead>
<tr>
<th>Travellers</th>
<th>Yellow fever</th>
<th>Single dose every 10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Typhoid</td>
<td>Single dose every 3 years</td>
</tr>
<tr>
<td>Post exposure</td>
<td>Rabies</td>
<td>5 doses plus RIG (single)</td>
</tr>
<tr>
<td>Contacts</td>
<td>Hepatitis B + Hepatitis A</td>
<td>HB 3 doses +HA 2 doses</td>
</tr>
<tr>
<td>Immunocompromised</td>
<td>Killed Polio</td>
<td>5 doses</td>
</tr>
</tbody>
</table>
REFERENCES

4. CDC. Measles, mumps, and rubella—vaccine use and strategies for elimination of measles, rubella, and congenital rubella syndrome and control of mumps. MMWR 1998; 47 (RR-8)
8. CDC. Notice to readers: Revised ACIP recommendation for avoiding pregnancy after receiving a rubella-containing vaccine. MMWR 2001; 50 (49)