Child vaccination schedule and what vaccines children need by age

How the childhood vaccine schedule is organized

The childhood immunization schedule is designed around three practical questions: when a child's immune system can respond well, when exposure risk becomes meaningful, and when disease complications are most severe. For example, hepatitis B vaccination begins at birth because infection early in life is much more likely to become chronic. DTaP, Hib, pneumococcal, polio, and rotavirus vaccines begin in early infancy because these pathogens can cause severe disease before a baby's first birthday.

The schedule also distinguishes between routine, catch-up, and risk-based recommendations. Routine vaccines are recommended for most children in a defined age window. Catch-up guidance helps clinicians protect children who started late or missed doses, using minimum ages and minimum intervals. Risk-based recommendations apply to children with factors such as immunocompromise, chronic lung or heart disease, asplenia, diabetes, certain medications, international travel, outbreak exposure, or pregnancy in adolescence.

Parents often worry that the number of vaccines at one visit is too much. From an immunologic perspective, vaccines expose children to a small, controlled set

of antigens compared with everyday microbial exposures. Giving recommended vaccines on time reduces the period when a child is susceptible. When appropriate, combination vaccines can reduce injections while maintaining protection against several diseases.

Birth to 6 months: early protection against high-risk infections

At birth, most infants should receive the first dose of hepatitis B vaccine. If the birthing parent has hepatitis B infection or unknown status, clinicians follow additional urgent steps for the newborn, which may include hepatitis B immune globulin and careful post-vaccination testing later. This is one reason birth-dose timing matters.

At 2 months, infants typically begin several primary series: DTaP for diphtheria, tetanus, and acellular pertussis; IPV for polio; Hib for Haemophilus influenzae type b; PCV for pneumococcal disease; rotavirus vaccine; and the next hepatitis B dose if not already given in the allowed interval. Rotavirus vaccine is oral, but it has strict upper age limits for starting and completing the series, so delays can mean a dose is no longer eligible.

At 4 months, many of these vaccines are repeated: DTaP, IPV, Hib, PCV, and rotavirus, depending on the product used. At 6 months, infants usually receive another DTaP dose, another PCV dose, and sometimes Hib, IPV, hepatitis B, or rotavirus depending on vaccine brand and prior timing. Annual influenza vaccination begins at 6 months. Children receiving flu vaccine for the first time may need two doses in the first season, spaced as advised by their clinician.

Respiratory syncytial virus prevention is now also part of infant planning. Some infants are protected through maternal RSV vaccination during pregnancy, while others may be eligible for RSV monoclonal antibody, often called RSV-mAb, during or just before RSV season. This is not a traditional vaccine, but it provides passive antibody protection against severe RSV disease, including RSV bronchiolitis in infants.

6 to 18 months: completing infant series and preparing for toddler boosters

Between 6 and 18 months, clinicians focus on completing infant primary series

and giving doses in the correct windows. Hepatitis B is usually completed with a final dose no earlier than the minimum age specified by the schedule. IPV often includes a dose in the 6 through 18 month window, with the final booster later in childhood. DTaP continues at 6 months, followed by a toddler booster later.

Hib and pneumococcal schedules vary slightly by product and age at initiation. A child who started late may need fewer total Hib doses than a child who started at 2 months, because immune maturity changes the required dose count. This is why catch-up schedules can look different from the routine schedule; fewer doses does not necessarily mean less complete protection when the child is older.

By 12 through 15 months, children commonly receive MMR for measles, mumps, and rubella; varicella vaccine for chickenpox; final or booster doses of Hib and PCV; and the first dose of hepatitis A vaccine. Hepatitis A is given as a two-dose series, with the second dose at least 6 months after the first. The MMR and varicella vaccines are live attenuated vaccines, so clinicians review immune status, recent blood products, and certain medications before administration.

At 15 through 18 months, a DTaP booster is recommended. This dose reinforces protection against pertussis, which can be particularly dangerous for infants and still clinically significant in toddlers. Mild fever, soreness, or fussiness can occur after some vaccines; families should ask their clinician about supportive care for childhood fever and when symptoms warrant medical advice.

4 to 6 years: kindergarten boosters and durable immunity

The 4 through 6 year visit is often when children receive booster doses needed before school entry. These commonly include DTaP, IPV, MMR, and varicella. The purpose is not only administrative school readiness; these boosters help sustain immunity after the primary series given in infancy and toddlerhood.

The DTaP dose at this age is usually the fifth dose, unless specific prior-dose timing means a fifth dose is not needed. IPV is usually completed with a final dose at 4 years or older, with appropriate spacing from earlier doses. The

second MMR dose and second varicella dose are also typically given in this period, although they may be given earlier if minimum intervals are met or if travel or outbreak conditions justify earlier protection.

This is a good age to verify documentation. Parents may have records in a pediatric office portal, state immunization registry, school file, or paper vaccine card. If records are incomplete, clinicians generally prefer documented doses rather than verbal recall. Depending on the vaccine and situation, the clinician may recommend catch-up vaccination or, less commonly, serologic testing for immunity.

Annual influenza vaccination continues for all children 6 months and older unless a specific contraindication exists. COVID-19 vaccination recommendations also evolve by formulation, age, and prior vaccination status; pediatric clinicians can help families understand the current product and timing recommended for their child.

11 to 12 years: adolescent platform vaccines

The preteen visit is intentionally used as an adolescent vaccine platform. At 11 through 12 years, children routinely receive Tdap, HPV vaccine, and meningococcal ACWY vaccine. Tdap boosts protection against tetanus, diphtheria, and pertussis using an adolescent and adult formulation. After Tdap, tetanus-containing boosters continue later in life according to adult recommendations and wound-management guidance.

HPV vaccination prevents infections with human papillomavirus types associated with cervical, anal, oropharyngeal, penile, vulvar, and vaginal cancers, as well as genital warts. When the HPV series is started before the 15th birthday, most children need a two-dose series. Those who start at 15 years or older, or who have certain immunocompromising conditions, usually need three doses. Framing HPV vaccination as routine cancer prevention can make the conversation less emotionally loaded and more medically accurate.

Meningococcal ACWY vaccine protects against several serogroups of Neisseria meningitidis, a cause of meningitis and bloodstream infection that can progress rapidly. A booster is routinely recommended at 16 years. Some children with high-risk conditions, specific exposures, or travel needs may require earlier

or additional meningococcal vaccination, including meningococcal B vaccine in selected circumstances.

Adolescence is also a time to catch up on any missed childhood vaccines. If MMR, varicella, hepatitis A, hepatitis B, IPV, or other series are incomplete, the clinician can map out doses using catch-up intervals. This visit can also address needle anxiety, fainting risk, and observation after vaccination in a calm, respectful way.

16 to 18 years: meningococcal boosters, catch-up, and transition to adult care

At 16 years, adolescents should receive the meningococcal ACWY booster if they received the first dose earlier. Meningococcal B vaccination may be considered for many adolescents and young adults, especially ages 16 through 23, using shared clinical decision-making. It may be specifically recommended for people with certain high-risk conditions, outbreak exposure, complement inhibitor therapy, or functional or anatomic asplenia.

Older adolescents should also remain current with annual influenza vaccination and any recommended COVID-19 vaccination. If they are entering college, military service, healthcare training, childcare work, international travel, or shared residential settings, vaccine documentation may be reviewed carefully. These settings can increase exposure risk or require proof of immunization.

For adolescents who are pregnant or may become pregnant, vaccination planning becomes more individualized. Tdap is recommended during each pregnancy to help protect the newborn from pertussis. Influenza and COVID-19 vaccination may also be recommended during pregnancy, depending on season and current guidance. Live vaccines such as MMR and varicella are generally not given during pregnancy, so preconception or postpartum planning may be needed.

This age range is also the bridge to adult preventive care. Families can help teens learn what vaccines they have received, where records are stored, and why boosters matter. A young person who understands their vaccine history is better prepared for travel medicine visits, occupational health requirements, and future pregnancy-related care.

When the schedule may change: medical conditions, travel, outbreaks, and missed

doses

Some children need vaccines earlier, later, or in a modified pattern. Examples include children with immunocompromising conditions, HIV, cancer therapy, transplant history, cochlear implants, cerebrospinal fluid leak, chronic kidney disease, chronic liver disease, diabetes, heart or lung disease, or asplenia. In these situations, clinicians may recommend additional pneumococcal, meningococcal, Hib, influenza, COVID-19, or other vaccines, and they may avoid certain live vaccines depending on immune status.

Travel can also change timing. Infants traveling internationally may need an early MMR dose before the routine 12-month dose, but that early dose may not count toward the standard two-dose series. Travel to areas with hepatitis A, polio, typhoid, yellow fever, Japanese encephalitis, or meningococcal risk may require specialist advice. A travel clinic or pediatric infectious disease clinician can help interpret destination-specific recommendations.

If a child is behind, the usual principle is to continue rather than restart. The catch-up schedule uses minimum intervals to build protection safely and efficiently. Parents should bring all available records, including birth hospital documentation, prior pediatric records, immigration records, pharmacy vaccination receipts, and school forms. If records cannot be verified, clinicians may recommend revaccination because extra doses of many vaccines are generally safer than leaving a child unprotected, though this decision should be individualized.

True contraindications are uncommon but important. A severe allergic reaction to a previous dose or vaccine component, certain severe immune deficiencies for live vaccines, and pregnancy for some live vaccines require careful review. Moderate or severe acute illness may lead clinicians to defer vaccination temporarily. Mild upper respiratory symptoms without significant illness usually do not automatically prevent vaccination, but the vaccinating clinician should assess the child on the day of the visit.