

Table 2: Recommended Routine Immunizations for Children - Summary of WHO Position Papers

Antigen	Age of 1 st Dose	Doses in Primary Series	Interval Between Doses			Booster Dose	Considerations (see footnotes for details)
			1 st to 2 nd	2 nd to 3 rd	3 rd to 4 th		
Recommendations for all children							
BCG ¹	As soon as possible after birth	1					Exceptions HIV
DTP ²	6 weeks (min)	3	4 weeks (min)	4 weeks (min)		1-6 years of age (see footnote)	Delayed/ interrupted schedule Combination vaccine
<i>Haemophilus influenzae</i> type b ³	6 weeks (min) with DTP1, 24 months (max)	3	4 weeks (min) with DTP2	4 weeks (min) with DTP3		(see footnote)	Single dose if >12 months of age Delayed/ interrupted schedule Co-administration and combination vaccine
Hepatitis B ⁴	Option 1 with DTP1	3	4 weeks (min),with DTP2	4 weeks (min),with DTP3			Co-administration and combination vaccine
	Option 2 as soon as possible after birth (<24h)	3	4 weeks (min),with DTP1	4 weeks (min),with DTP3			
	Option 3 as soon as possible after birth (<24h)	4	4 weeks (min),with DTP1	4 weeks (min),with DTP2	4 weeks (min),with DTP3		
HPV ⁵	Quadrivalent 9 -13 years of age Bivalent 10- 13 years of age	3	Quadrivalent - 2 months (min 4 weeks) Bivalent - 1 month (max 2.5 months)	Quadrivalent - 4 months (min 12 weeks) Bivalent - 5 months			Vaccination of males for prevention of cervical cancer is not recommended at this time
Pneumococcal (Conjugate) ⁶	6 weeks (min) with DTP1	3	4 weeks (min) with DTP2	4 weeks (min) with DTP3		(see footnote)	Single dose if 12-24 months of age Delayed/interrupted schedule Co-administration
Polio (Oral polio vaccine) ⁷	6 weeks (min) (See footnote for birth dose)	3	4 weeks (min) with DTP2	4 weeks (min) with DTP3			Birth dose Inactivated polio vaccine
Measles ⁸	9-15 months (6 months min, see footnote)	2	4 weeks (min) See footnote				Combination vaccine
Recommendations for children residing in certain regions							
Japanese Encephalitis ⁹	Mouse-brain derived	1 year	2	4 weeks (min)		after 1 year and every 3 years up to 10-15 years of age	Vaccine options
	Live attenuated	9-12 months	1			after 1 year	
Yellow Fever ¹⁰	9-12 months with measles	1					Co-administration
Rotavirus ¹¹	Rotarix	6 weeks 6 weeks (min), 12 weeks (max)	2	4 weeks (min) and no later than 24 weeks of age			Maximum age limits for starting/completing vaccination
	RotaTeq	6 weeks 6 weeks (min), 12 weeks (max)	3	4 weeks (min)	4 weeks (min) and no later than 32 weeks of age		
Recommendations for children in some high-risk populations							
Typhoid ¹²	Vi	2 years (min)	1			every 3 years	Definition of high risk
	Ty21a	Capsules 5 years (min) (see footnote)	3 or 4	1 day	1 day	1 day	every 3-7 years
Cholera ¹³	2 years (min)	2	7 days (min)				Definition of high risk
Meningococcal (polysaccharide) ¹⁴	2 years (min)	1					Definition of high risk Conjugate vaccine
Hepatitis A ¹⁵	1 year (min)	2	6-18 months				Definition of high risk
Rabies ¹⁶	as required	3	6 days	14 days		every 5 years (see footnote)	Definition of high risk
Recommendations for children receiving vaccinations from immunization programmes with certain characteristics							
Mumps ¹⁷	12-18 months with measles	2	1 month (min) to school entry				Coverage criteria > 80% Combination vaccine
Rubella ¹⁸	9-15 months with measles	1					Coverage criteria > 80% Combination vaccine
Influenza (Inactivated) ¹⁹	6 months (min)	2	1 month				Revaccinate annually: 1 dose only Priority targets

Refer to <http://www.who.int/immunization/documents/positionpapers/> for table and position paper updates

This table summarizes the WHO vaccination recommendations for children. The ages and intervals cited are for the development of country specific schedules and are not for health care workers. Country specific schedules should be based on local epidemiologic, programmatic, resource and policy considerations. While vaccines are universally recommended, some children may have contraindications to particular vaccines.

Summary Table 2 Notes

- The attached table summarizes the recommendations for routine vaccination for children found in the WHO position papers which are published in the Weekly Epidemiological Review. Its purpose is to assist planners to develop an appropriate immunization schedule. Health care workers should refer to their national immunization schedules.
- Vaccines can generally be co-administered (i.e. more than one vaccine given at different sites during the same visit). Recommendations that explicitly endorse co-administration are indicated in the table, however, lack of an explicit co-administration recommendation does not imply that the vaccine cannot be co-administered; further, there are no recommendations against co-administration.
- Doses administered by campaign may or may not contribute to a child's routine immunization schedule depending on type and purpose of campaign (e.g. supplemental versus routine/pulse campaign for access reasons).
- For some antigens, recommendations for the age of initiation of primary immunization series and/or booster doses are not available. Instead, the criteria for age at first dose must be determined from local epidemiologic data.
- If a catch-up schedule for interrupted immunization is available, it is noted in the footnotes.
- Other vaccines, such as varicella and pneumococcal polysaccharide vaccine, may be of individual benefit but have not been generally recommended for routine immunization. See the specific position papers for more details.
- For further background on immunization schedules refer to "Immunological Basis for Immunization" series which is available at http://www.who.int/immunization/documents/immunological_basis_series/en/index.html
- Refer to <http://www.who.int/immunization/documents/positionpapers/> for the most recent version of this table and position papers.

¹ BCG

- Position paper reference: [Weekly Epid. Record \(2004, 79: 27-38\) \[pdf 468kb\]](#)
- Recommended for children living in countries with a high-disease burden and for high-risk children living in countries with low-disease burden. See position paper for details.
- While BCG vaccination is especially important in countries with significant HIV prevalence, children who are HIV positive or unknown HIV status with symptoms consistent with HIV should not be vaccinated. Reference: [Weekly Epid. Record \(2007, 82: 193-196\) \[pdf 378kb\]](#)

² DTP (Diphtheria, Tetanus and Pertussis)

- Position paper reference: Diphtheria- [Weekly Epid. Record \(2006, 81: 24-32\) \[pdf 329kb\]](#); Tetanus- [Weekly Epid. Record \(2006, 81: 198-208\) \[pdf 229kb\]](#); Pertussis- [Weekly Epid. Record \(2005, 80: 31-39\) \[pdf 285kb\]](#)
- Recommended for three doses during the first year of life. In areas where pertussis is of particular risk to young infants, DTP should be started at 6 weeks with 2 subsequent doses at least 4 weeks apart.
- The duration of immunological protection will be extended in many instances if an additional booster is given later.
- Diphtheria booster - to compensate for the loss of natural diphtheria boosting in some areas, childhood boosters should be given. The optimal timing of and number of diphtheria-containing booster doses should be based on epidemiological surveillance as well as on immunological and programmatic considerations.
- Tetanus toxoid containing booster - A childhood tetanus immunization schedule of 5 doses is recommended. Boosters are ideally administered in early childhood and during adolescence e.g. 12-15 years. Tetanus booster doses may use either DTP or Td vaccines depending on the child's age. Td should be used for tetanus and diphtheria booster doses after the age of 7 years.
- Pertussis vaccine: Use of acellular (aP) or whole cell pertussis (wP) component in the combination vaccine is considered to be equivalent for administration to children, but whole cell vaccine is not recommended for use in adolescents or adults. DTwP or DTaP may be used for children less than 7 years of age,
- Pertussis containing booster - A booster should be administered 1-6 years after the completion of the primary series, but before the child is 7 years of age. Need for additional pertussis booster doses should be assessed by the individual national immunization programmes.
- Delayed or interrupted DTP series - For children 1 to less than 7 years of age with no previous immunization: Three doses should be given, with an interval of 2 months between the first and second dose and an interval of 6-12 months between the second and third. Children whose vaccination series has been interrupted should have their series resumed, without repeating previous doses. For unvaccinated individuals 7 years of age and older, Td combination vaccine can be administered, 2 doses 1-2 months apart and a third dose after 6-12 months can be used with subsequent boosters at least 1 year apart for a total of 5 appropriately spaced doses to obtain same long term protection. See position paper for details of interrupted immunization schedules.

³ Haemophilus influenzae type b

- Position paper reference: [Weekly Epid. Record \(2006, 81: 210-20\) \[pdf 209kb\]](#)
- Immunization should start as early as possible after the age of 6 weeks
- The 3-dose primary series is given at the same time as the DTP primary series often in combination vaccines.
- The vaccine is not generally offered to children aged >24 months owing to the limited burden of Hib disease among children older than that age.
- Delayed series- if a child 12-24 months of age has not received their primary vaccination series, a single dose of the vaccine is sufficient.
- Booster dose may be administered to children aged between 12-18 months although there is no WHO recommendation on this yet.

⁴ Hepatitis B

- Position paper reference: [Weekly Epid. Record \(2004, 79: 255-263\) \[pdf 343kb\]](#)
- Three recommended schedule options are available for Hepatitis B vaccination (options 1-3 in table). The most appropriate schedule is determined based on epidemiologic and programmatic considerations. Please see position paper for details.
- In countries of high disease endemicity, Hepatitis B surface antigen (HBsAg) ≥8%, schedules providing the first vaccine dose as soon as possible after birth (<24 hours) are recommended.
- Hepatitis B vaccine can be given at the same time as DTP vaccine doses often in combination vaccines.

⁵ Human Papillomavirus (HPV)

- Position paper reference: [Weekly Epid. Record \(2009, 84:118-131\) \[pdf 267kb\]](#)
- Two vaccines are currently available. Quadrivalent (HPV types 6,11,16 and 18) licensed for use in females as young as 9 years of age to prevent cervical precancers and cancers. In addition, the quadrivalent vaccine is licensed for prevention of vulvar and vaginal precancers and cancers as well as of anogenital warts in females. In some countries, the vaccine is also licensed for the prevention of anogenital warts in males. Bivalent (HPV types 16 and 18) has been licensed for use in females as young as 10 years of age to prevent cervical precancers and cancers.
- Both vaccines are intended for females before the onset of sexual activity, i.e. before first exposure to HPV infection. A three-dose schedule is recommended. The quadrivalent is given at baseline and after 2 and 6 months. A minimum interval of 4 weeks between the first and second dose, and a minimum interval between the second and third doses of 12 weeks is recommended by the manufacturer. The bivalent vaccine is given at baseline and after 1 and 6 months. If flexibility in the schedule is necessary the manufacturer recommends that the second dose is administered between 1 and 2.5 months after the first dose.
- For both vaccines alternative schedules are being explored. Restarting the 3-dose series is not necessary if interrupted, but remaining doses should be administered as close to the schedule intervals as possible.
- Currently, the manufacturers do not recommend any booster dose following completion of the primary series.
- HPV vaccination of males for prevention of cervical cancer is not recommended at this time because vaccination strategies that achieve high coverage (>70%) in the primary target population of young adolescent girls are expected to be more cost-effective in reducing cervical cancer than including vaccination of males.

⁶ Pneumococcal (Conjugate)

- Position paper reference: [Weekly Epid. Record \(2007, 82: 93-104\) \[pdf 321kb\]](#)
- A three dose schedule compatible with DTP, Hepatitis B, *Haemophilus influenzae* type b and OPV administration should be initiated before 6 months of age to maximize benefits of vaccination.
- Maximized individual and community-level protection at the time of introduction of the vaccine can be achieved by providing a single catch-up dose to unvaccinated children aged 12-24 months and to children aged 2-5 years who are at high risk.
- Booster - the additional benefit of administering an additional dose in the second year of life requires further investigation in developing country settings.
- Co-administration- may be administered concurrently with, though at a different injection site from, other vaccines in infant immunization programmes, including DTP, hepatitis B, *H. influenzae* type b and polio vaccines.
- For polysaccharide pneumococcal vaccine see position paper: [Weekly Epid. Record \(2008, 83: 373-384\) \[pdf 308kb\]](#)

⁷ Polio

- Reference: [Weekly Epid. Record \(1989, 64: 273-279\) \[pdf 1.10Mb\]](#)
- Recommendations are for oral polio vaccine. For information about inactivated polio vaccine (IPV) see [Weekly Epid. Record \(2003, 78:241-250\) \[pdf 409kb\]](#) and [Weekly Epid. Record \(2006 81: 137-144\) \[pdf 167kb\]](#).
- An additional dose of oral polio vaccine administered at birth is only recommended in endemic or recently endemic countries.

⁸ Measles

- Position paper reference: [Weekly Epid. Record \(2004, 79: 130-142\) \[pdf 1.01Mb\]](#)
- The first dose should be given at 9 months (80-85% seroconversion rates), unless the country has low measles circulation in which case the first dose should be given between 12-15 months (>90% seroconversion rates). While the minimum age for first dose is 9 months in healthy children, HIV-positive children should receive their first dose at 6 months followed by an additional dose at 9 months. See position paper for details.
- To ensure optimum population immunity, all children should be given a second dose of measles vaccine through routine vaccination and/or supplemental immunization activities. Although generally administered at school entry (age 4–6 years), the second dose may be given as early as one month following the first dose, depending on the local programmatic and epidemiological situation.
- In countries aiming at measles elimination, a one-time supplementary immunization campaign is often conducted targeting all children aged 9 months to 14 years regardless of disease history or previous vaccination status.
- Combined vaccines (Measles and Rubella or Measles, Mumps and Rubella) may not be optimal for use in countries where vaccine coverage for measles vaccine of at least 80% cannot be achieved or maintained.

⁹ Japanese encephalitis (JE)

- Position paper reference: [Weekly Epid. Record \(2006, 81: 331-340\) \[pdf 192kb\]](#)
- JE vaccine should be given in all areas where JE constitutes a public health problem.
- Vaccine options- Three types of vaccines are available: (1) a cell-culture based live attenuated, (2) a cell-culture-based inactivated and (3) an inactivated mouse brain-derived. The WHO position paper provides recommendations for the mouse brain-derived and live attenuated vaccines.
- Booster - If administering cell-culture based live-attenuated vaccine, a booster dose is currently recommended after an interval of one year, even though observational data studies suggest long-term protection after a single dose. If using mouse brain-derived vaccine, a booster dose should be administered after an interval of one year then every 3 years until 10-15 years of age.

¹⁰ Yellow Fever

- Position paper reference: [Weekly Epid. Record \(2003, 78: 349-359\) \[pdf 332kb\]](#)
- Recommended for use in countries at risk of Yellow Fever.
- For convenience and improved coverage, Yellow Fever vaccine should be administered simultaneously with the measles vaccine, but in a separate syringe and at a different injection site.

Table 2: Recommended Routine Immunization for Children (Updated April 21, 2009)

- Yellow Fever vaccine should be offered to all travellers to and from at-risk areas, unless they belong to the group of individuals for whom Yellow Fever vaccination is contraindicated.

11 Rotavirus

- Position paper reference: [Weekly Epid. Record \(2006, 81: 2-11\) \[pdf 295kb\]](#)
- Strongly recommended for inclusion into the national immunization programmes of regions where vaccine efficacy data suggest a significant public health impact and able to sustain vaccine utilization (currently in the United States, Europe, and Latin America).
- There are important time restrictions for the administration of Rotavirus vaccines. Vaccination should not be initiated above 12 weeks of age for the first dose, and must be completed by 24 weeks of age (Rotarix™, 2 dose schedule) or 32 weeks of age (RotaTeq™, 3 dose schedule) for the last dose of the series.

12 Typhoid

- Position paper reference: [Weekly Epid. Record \(2008, 83: 49-59\) \[pdf 297kb\]](#)
- Recommended for school-age and/or preschool-age children in areas where typhoid fever in these age groups is shown to be a significant public health problem, particularly where antibiotic-resistant S. Typhi is prevalent.
- Vaccine option- Typhoid Vi vaccine requires one parenterally administered dose which maybe given after the age of 2 years; the liquid form of Ty21a (for use in individuals from the age of 2 years) is no longer available; the capsule form of Ty21a (for use in individuals from the age of 5 years) requires 3 or 4 orally administered doses. See position paper for further details.
- Booster- In most endemic settings, a booster dose of the concerned vaccine 3 to 7 years after the primary immunization seems appropriate.

13 Cholera

- Position paper reference: [Weekly Epid. Record \(2001, 76: 117-124\) \[pdf 155kb\]](#)
- Age of initial administration is when epidemiologically appropriate after the age of 2 years of age.
- The oral killed whole cell vaccine (WC/rBS) is recommended for populations at imminent risk of cholera (e.g. urban slum residents and refugees).
- The oral live vaccine (CVD 103-HgR) is no longer available.

14 Meningococcus

- Position paper reference: [Weekly Epid. Record \(2002, 77: 331-339\) \[pdf 124kb\]](#)
- Recommended for high-risk groups (e.g. those in armed forces units, training camps, or boarding schools, and travellers to epidemic areas), and for persons with immunological predisposition to meningococcal disease (such as persons with asplenia and inherited immunological deficiencies).
- Polysaccharide and conjugate vaccines are available for group C disease. Inclusion of a conjugated group C vaccine should be considered in areas where group C meningococcal disease is a substantial public health problem among young children. Where disease in children above 2 years of age is the main concern or where resources are limited, several years of protection may be achieved with a single injection of the combined groups A and C polysaccharide vaccine. Choice of vaccine (conjugate or polysaccharide) depends on local epidemiology and availability of sufficient resources to acquire and administer vaccine. See position paper for details.

15 Hepatitis A

- Position paper reference: [Weekly Epid. Record \(2000, 75: 38-44\) \[pdf 189kb\]](#)
- Minimum age of administration is specified by the manufacturer and found on the product label.
- Suggested for persons at high-risk in countries with low endemicity of hepatitis A as well as those populations living in countries of intermediate endemicity. High-risk groups include certain ethnic or religious groups. See position paper for details.

16 Rabies

- Position paper reference: [Weekly Epid. Record \(2007, 82: 425-436\) \[pdf 306kb\]](#)
- Recommended for anyone at increased risk of exposure, including children living in rabies enzootic-regions.
- Age for initiation of the series is based on epidemiologic and programmatic considerations. The series is given at 0, 7, and 21 days.
- Timing of booster dose is based upon neutralizing antibody titre. If testing is not available, booster doses may be given every 5 years to people with occupations that put them at continuous risk.

17 Mumps

- Position paper reference: [Weekly Epid. Record \(2007, 82: 49-60\) \[pdf 321kb\]](#)
- Recommended for use in high performing immunization programs with the capacity to maintain coverage over 80% and where mumps reduction is a public health priority.
- If implemented, a combination vaccine of measles, mumps and rubella is recommended.

18 Rubella

- Position paper reference: [Weekly Epid. Record \(2000, 75: 161-169\) \[pdf 222.4kb\]](#)
- Recommended for countries wishing to prevent the occurrence of congenital rubella infection including congenital rubella syndrome (CRS). Two approaches are recommended: (a) prevention of CRS only, through immunization of adolescent girls and/or women of childbearing age; or, (b) if high coverage can be achieved and maintained, elimination of rubella as well as CRS through universal vaccination of infants, surveillance and assuring immunity in women of childbearing age. Unless high coverage (>80%) can be achieved, large-scale childhood vaccination programmes against rubella are not recommended. See position paper for details.
- The rubella schedule is based on the measles schedule as administration of rubella and measles vaccine should occur using a combined vaccine.

¹⁹ **Seasonal Influenza (Inactivated Vaccine)**

- Position paper reference: [Weekly Epid. Record \(2006, 81: 210-20\) \[pdf 163kb\]](#)
- The World Health Assembly recommended increased immunization coverage of high-risk groups including the elderly, in those countries where influenza vaccination policies exist (Reference: WHA56.19, 2003). See position paper for detailed description of high-risk groups.
- Dose- If a child under 9 years of age requires vaccination and has not previously received influenza vaccine, a two-dose series with doses one-month apart should be administered. Annual re-vaccination in all individuals and initial vaccination in individuals 9 years of age or older require only a single dose. For children aged 6-36 months should receive half the adult dose.