

Immunization Schedule for Thai Children Recommended by The Pediatric Infectious Disease Society of Thailand 2017

Vaccination required for ALL children											
Age vaccine	at birth	1 month	2 month	4 month	6 month	9 month	12 month	18 month	2 ½ years	4-6 years	11-12 years
BCG ¹	BCG										
HBV ²	HBV1	(HBV2)									
DTwP ³			DTwP-HB1	DTwP-HB2	DTwP-HB3			DTwP booster1		DTwP booster2	Td; every10 yrs
OPV ⁴			OPV1	OPV2 + IPV	OPV3			OPV booster 1		OPV booster 2	
MMR ⁵						MMR1			MMR2		
Live JE ⁶						JE1			JE2		

Optional or Alternate Vaccines												
Age Vaccine	2 month	4 month	6 month	9 month	12 month	18 month	2 yrs	2 ½ yrs	4 yrs	6 yrs	9 yrs	11-12 yrs
DTaP ³ , Tdap	DTaP1	DTaP2	DTaP3			DTaP booster1			Tdap or DTaP booster 2			Tdap; Then Td every 10 yrs
IPV ⁴	IPV1	IPV2	IPV3			(IPV4)			IPV5			
Hib ⁷	Hib1	Hib2	Hib3			(Hib4)						
Inactivated JE ⁶				JE1, JE2 at 4 weeks apart			JE 3					
HAV ⁸						HAV 2 doses given 6-12 months apart						
VZV ⁹ MMRV						VZV1 (or MMRV1)		VZV2 (or MMRV2)				
Influenza ¹⁰			Annual Influenza for age 6 months -18 years (preferably age 6-24 months); give 2 doses 4 weeks apart for the first year									
PCV ¹¹	PCV1	PCV2	(PCV3)			PCV4						
Rota ¹²	Rota1	Rota2	Rota3 (pentavalent)									
HPV ¹³											HPV 2 doses 6-12 months apart	
DEN ¹⁴											DEN 3 doses 0, 6 and 12 months	

Footnote

1. **Bacillus Calmette–Guérin vaccine (BCG)**

- 1) BCG is recommended 0.1 ml intradermally at left deltoid at birth. It is not recommended to inoculate at the buttock.
- 2) BCG can be given in children without BCG scar and no documented receipt of BCG vaccination.
- 3) There is no need to revaccinate in the children with documented receipt of BCG vaccination despite absence of BCG scar.

2. **Hepatitis-B vaccine (HBV)**

- 1) All children should receive 3-dose series of HBV if not contraindicated, the last dose should not be given before 6 months of age.
- 2) For infants born to the mothers with negative HBsAg, 3-dose series at birth, 1-2 months and at 6 months of age is recommended. If the mother's HBsAg status is unknown, the 1st dose is recommended within 12 hours of life, followed by the 2nd and 3rd dose at 1 month and 6 months of age, respectively.
- 3) For infants born to the mothers with positive HBsAg (particularly in those with positive HBeAg), infants should receive both HBIG 0.5 ml within 12 hours of life at the same time of 1st dose of HBV at the different sites.
 - Infants who received HBIG should get the 2nd dose of HBV at 1-2 months of age and the 3rd dose at age 6 months of age.
 - Infants who did not receive HBIG, the 1st dose of HBV should be given within 12 hours of life, followed by at age 1 month and 6 months of age, respectively.
- 4) In infants whose maternal positive HBsAg status is determined later, HBIG is recommended as soon as possible but no later than 7 days after HBV vaccination.
- 5) As per recommendation of The Thailand Ministry of Public Health, children may receive combined vaccines consisting of DTP-HBV at 2, 4 and 6 months of age for the HBV series. Infants with positive HBsAg mothers who did not receive HBIG at birth, and to get the combined DTP-HB vaccine, should also receive additional monovalent HBV vaccine at 1 month of age (making total of 5 doses of HBV vaccination).
- 6) Unvaccinated children under 11 years of age should receive 3-dose series at 0, 1 and 6 months interval. For those above 11 years of age, the 2-dose series of 1.0 ml dosage of HBVax Pro™ (manufactured by MSD) at 0 and 4-6 months interval may be considered.
- 7) Infants born to positive HBsAg mothers should be tested for HBsAg and Anti-HBs between 9-12 months of age.

3. **Diphtheria-Tetanus-Pertussis vaccine (DTP)**

- 1) Whole-cell vaccine (DTwP) can be substituted with acellular vaccine (DTaP) at any dose.
- 2) The same type of DTaP should be used for first 3-dose series at 2, 4, 6 months of age. However, different type of vaccine can be used if the same vaccine is not available.
- 3) Either DTwP or DTaP can be used for the booster dose at 18 months of age.
- 4) Either DTwP, DTaP, or Tdap can be used for the booster dose at 4-6 years of age.
- 5) Td or Tdap is recommended to all adolescents age 11-12 years regardless of previous immunization with Tdap or DTP at 4-6 years of age; then followed by Td every 10 yrs.
- 6) All adults should receive 1 dose of Tdap regardless of previous immunization with TT or Td; then followed by Td every 10 years.
- 7) Pregnant women should receive 1 dose of Tdap at 27-36 weeks gestational age for every pregnancy.

4. Polio vaccine (OPV, IPV)

1) Bivalent oral polio vaccine (OPV type1, 3) is recommended for 5 doses at the same time as DTP with an additional 1 dose of injectable IPV at age 4 months.

2) OPV can be substituted with IPV. The 4-dose series is considered in those who receive IPV-only regimen (omit the dose at 18 months of age).

5. Measles-Mumps-Rubella vaccine (MMR)

1) The first dose of MMR is recommended at 9-12 months of age and the second dose at 2½ years of age. In non-endemic areas, the first dose of MMR should be given at 12 months of age and the second dose at 2½ -4 years of age. (The Thailand Ministry of Public Health recommends the second dose at 2½ years of age in all.)

2) In case of outbreak or exposure to the measles, the first dose can be given as early as 6 months of age. However, children who receive MMR before 9 months of age should be revaccinated the first MMR at the age of 12 months and the second dose at age of 2½-4 years.

3) In case of outbreak, those who have received the first dose should get the second dose right away even before the age of 2½ years provided that 3 months have elapsed since the first dose.

4) Combined MMRV vaccine may be used in children who require MMR and VZV between the age of 1-12 years of age. There was no difference in adverse effects reported using MMRV compare with using MMR and VZV separately at age 2½-4 years. However, children who receive the first dose of MMRV at age 12-23 months may be at higher chance of developing febrile convulsion compared to those receiving MMR and VZV separately. The second dose of MMRV is should be at least 3 months apart from the first MMR or VZV.

6. Japanese Encephalitis vaccine (JE)

1) Inactivated JE vaccine, consists of strain P3 which is cultured in vero cell (JEVAC™), is recommended in 3-dose series starting at age 6 months or older, followed by 4 weeks and 1 year later.

2) Live-attenuated vaccine (live JE; strain SA 14-14-2) is recommended at 9-12 months of age. Two types of vaccines are available, CD-JEVAX™ which requires a booster dose at 3-12 months after the initial dose; and chimeric JE (IMOJEV™/THAI JEV™) which requires a booster dose at 12-24 months after the initial dose. Both types of live JE are interchangeable. The Thailand Ministry of Public Health recommends that both live JE vaccines should be given at 12-18 months interval between the initial and the booster dose.

3) Live JE vaccines can substitute inactivated JE as initial or booster dose. Follow the Table below for children who have previously received inactivated JE vaccine:

Doses of inactivated JE vaccines received	Recommendation for subsequent live-attenuated JE
1 dose	2-dose series with 3-24 months interval between 2 doses (interval depending on the type of vaccine)
2-3 doses	1 dose with one year interval from previous dose
≥ 4 doses	not required*

* may consider one additional dose of live JE with interval of 1 year since the last dose of the inactivated vaccine.

4) Children who initially received 1 dose of live JE vaccine can be given a booster dose using inactivated JE vaccine with at least 1 year apart.

7. Haemophilus Influenzae type B vaccine (Hib)

1) Currently available vaccine in Thailand is tetanus toxoid conjugate (PRP-T). The recommended schedule is 3-doses primary series at age 2, 4 and 6 months.

- 2) Healthy children may not require booster dose at age 12-18 months but the booster dose is required in high-risk children.
- 3) Hib vaccine is not required for healthy children older than 2 years of age.
- 4) In case of delayed initiation of vaccination, the schedule in the below Table should be followed:

Age at initial dose	Schedule in months for Hib (PRP-T)
2-6 months	0, 2, 4, booster 12-18 months
7-11 months	0, 2, booster 12-18 months
12-24 months	single dose
> 24 months for high-risk group*	0, 2

*High-risk group include immunocompromised, asplenia, and splenic dysfunction.

8. Hepatitis-A vaccine (HAV)

The 2-dose series at 0, and 6-12 months is recommended at 1 year of age or older. The vaccine from different manufacturer can be used interchangeably.

9. Varicella vaccine (VZV)

- 1) The first dose of VZV can be given at 1 year of age or older; the recommended age of the first dose is between 12-18 months.
- 2) The second dose is recommended at age 2½-4 years using either MMRV or separate VZV monovalent. In cases of exposure of VZV or in the outbreak, consider the second dose before 2½-4 years of age but should be at least 3 months lapsed from initial dose.
- 3) For children 13 years or older, the recommended schedule is 2-dose series at least 1 month apart.

10. Influenza vaccine

- 1) Recommend influenza vaccination annually in children 6 months – 18 years old (according to the package insert of each vaccine), especially those under 2 years old and those with conditions at risk for severe Influenza illness such as chronic lung disease (include asthma), heart disease, obesity with BMI > 35, immunocompromised, pregnant women (from second trimester) and other chronic illnesses. The vaccine is recommended before rainy season but can be given at anytime of the year.
- 2) In children under 9 years of age receiving influenza vaccine for the first time or did not receive 2 doses in the year before, the 2-dose series at least 1 month apart is recommended then followed by 1 dose annually.
- 3) The dose of influenza vaccine given can be either 0.25 ml or 0.5 ml for children under 3 years of age
- 4) Either trivalent or quadrivalent influenza vaccine can be used.

11. Pneumococcal conjugate vaccine (PCV)

- 1) PCV is recommended in children at risk of invasive or severe pneumococcal disease (high risk group, see Table below) and also in healthy children under 5 years of age.
- 2) There are two types of PCV vaccine currently available, the 10-valent (PCV10) and 13-valent (PCV13). The recommended schedule is 3-dose primary series of either vaccine at 2, 4 and 6 months of age; followed by a booster at age 12-15 months with at least 2 months lapse after the last dose of the primary series. In cases of delayed initiation of vaccination, follow the schedule provided in the Table below.
- 3) Healthy children may opt to take vaccine scheduled as 2+1 (total 3 doses) at age 2, 4 and 12-15 months.

Age at initial dose	Amount of Doses	Booster dose
2-6 months	PCV 3 doses; 6-8 weeks apart	PCV 1 dose at age 12-15 months

7-11 months	PCV 2 doses; 6-8 weeks apart	PCV 1 dose at age 12-15 months
12-23 months	PCV 2 doses; 6-8 weeks apart	not required
Healthy child 2- 5 years	PCV10 2 doses and 1 dose of PCV13	not required
High-risk* - age 2- 6 years - > 6-18 years	PCV13 2 doses; 8 weeks apart PCV13 1 dose	booster with 1 dose of PS-23; at least 8 weeks apart from the last dose of PCV

Note : PCV = Pneumococcal conjugate vaccine, PS-23 = 23-Valent pneumococcal polysaccharide vaccine

- *High-risk group are children who are more susceptible to invasive or severe pneumococcal infections from various conditions such as immunocompromised, asplenia, thalassemia, chronic lung diseases, heart diseases, liver disease, renal impairment, diabetes, and conditions at risk of meningitis e.g. CSF leak, cochlear implantation

- Children in day-care are not high-risk group but may be considered for PCV immunization.

- *All high-risk children should receive PCV vaccine as recommended. High-risk children over 2 years of age should always receive PS-23 regardless whether to get or not to get PCV. The higher efficacy is achieved if PCV is given prior to PS-23 rather than vice-versa or giving only PS-23 vaccine. Those who are immunocompromised, asplenia, and thalassemia should receive the second dose of PS-23 about 5 years apart from the first PS-23 dose.

12. Rotavirus vaccine (Rota)

- 1) Human monovalent rota vaccine is recommended in 2-dose series orally at 2 and 4 months of age.
- 2) Bovine-Human pentavalent rota vaccine is recommended in 3-dose series orally at 2, 4 and 6 months of age.
- 3) Both rota vaccines should be initiated at 6-15 weeks of age and the last dose should not exceed 8 months of age; each dose should be at least 4 weeks apart.
- 4) It is recommended to use the same vaccine for the whole series. However, if the different vaccine was used in a child, it is recommended to give in 3-dose series.
- 5) Rota vaccine can be administered concomitantly with oral polio vaccine.
- 6) The contraindications of rota vaccine are severe combined immune deficiency (SCID) and history of intussusception.

13. Human Papilloma virus vaccine (HPV)

- 1) There are 2 types of HPV vaccines currently available, bivalent (types 16, 18) and quadrivalent (types 6, 11, 16, 18).
- 2) Either HPV vaccine can be given in girls and women 9-26 years of age with the recommend age of 11-12 years. The 3-dose series is recommended at 0, 1-2 and 6 months.
- 3) For healthy adolescents who initiate the first dose before 15 years of age, the 2-dose series at 0 and 6-12 months is recommended.
- 4) Thailand Ministry of Public Health provides HPV vaccine for all children at fifth grade at school using 2-dose series 6 months apart starting in 2017.
- 5) Efficacy of HPV vaccine higher when given prior to sexual debut.
- 6) May consider HPV vaccination in adults older than 26 years with individual case consideration.
- 7) Only quadrivalent HPV is recommended in boys and men who have sex with men 9-26 years of age; preferred at 11-12 years of age.

14. Dengue vaccine (DEN)

- 1) The currently available DEN vaccine is the chimeric vaccine consisting of 4 strains (DEN 1-4). DEN can be given without prior antibody test.
- 2) DEN vaccine is recommended at 9-45 year of age using 3-dose series at 0, 6, and 12 months.