

Table 3: Recommendations* for Interrupted or Delayed Routine Immunization Summary of WHO Position Papers

Antigen		Age of 1st Dose	Doses in Primary Series (min interval between doses)**	Interrupted primary series***	Doses for those who start vaccination late		Booster
					If ≤ 12 months of age	If > 12 months of age	
Recommendations for all							
BCG 1		As soon as possible after birth	1 dose	NA	1 dose	Not recommended	Not recommended
Hepatitis B 2	Option 1	As soon as possible after birth (<24h)	Birth dose <24 hrs plus 2-3 doses with DTP (4 weeks)	Resume without repeating previous dose	3 doses	3 doses	Not recommended
Polio 3	OPV	6 weeks (see footnote for birth dose)	3 doses with DTP (4 weeks)	Resume without repeating previous dose	3 doses	3 doses	Not recommended
	IPV / OPV Sequential	8 weeks (IPV 1 st)	1-2 doses IPV and 2 doses OPV (4 weeks)	Resume without repeating previous dose	1-2 doses IPV and 2 doses OPV	1-2 doses IPV and 2 doses OPV	Not recommended
	IPV	8 weeks	3 doses (4 weeks)	Resume without repeating previous dose	3 doses	3 doses	If the primary series begins < 2 months of age, booster to be given at least 6 months after the last dose
DTP 4		6 weeks (min)	3 doses (4 weeks)	Resume without repeating previous dose	3 doses	3 doses with interval of 2 months between 1st & 2nd dose, and 6-12 months between 2nd & 3rd dose (if > 6 yrs use only aP containing vaccine; if > 7 yrs of age use Td containing vaccine)	DTP booster at 1-6 yrs of age (preferable in 2nd yr of life); Use DTaP if > 6 yrs and dTap if > 7 yrs Td booster in adolescence, and another in adulthood or pregnancy (for total of 6 doses if primary series started in childhood).
Haemophilus influenzae type b 5		6 weeks (min)	3 doses with DTP (4 weeks)	Resume without repeating previous dose	3 doses	1-2 yrs: 1 dose >2 yrs: Not recommended	Not recommended
Pneumococcal (Conjugate) 6		6 weeks (min)	2-3 doses with DTP (4 weeks)	Resume without repeating previous dose	2-3 doses	1-2 yrs: 1 dose 2-5 yrs at high-risk: 1 dose	Booster at 9-15 months if following 2 dose schedule
Rotavirus 7	Rotarix	6 weeks (min)	2 doses with DTP (4 weeks)	Resume without repeating previous dose	2 doses Do not initiate if older than 15 weeks	Not recommended	Not recommended
	Rota Teq	6 weeks (min)	3 doses with DTP (4 weeks)	Resume without repeating previous dose Do not give 3rd dose if > 32 weeks	3 doses Do not initiate if older than 15 weeks and do not give any doses > 32 weeks	Not recommended	Not recommended
Measles 8		9 or 12 months (6 months min, see footnote)	2 doses (4 weeks)	Resume without repeating previous dose	2 doses	2 doses	Not recommended
Rubella 9		9 or 12 months	1 dose with measles	NA	1 dose	1 dose	Not recommended
HPV 10		9 or 10 years	3 doses (1st to 2nd 4 weeks; 2nd to 3rd 3 months for quadrivalent and 5 months for bivalent)	Resume without repeating previous dose	NA	Girls: 9-13 yrs: 3 doses	Not recommended

* For some antigens the WHO position paper does not provide a recommendation on interrupted or delayed schedules at this present time. When the position paper is next revised this will be included. In the meantime, some of the recommendations are based on expert opinion.

** See Table 2: Summary of WHO Position Papers - Recommended Routine Immunizations for Children for full details (www.who.int/immunization/documents/positionpapers/).

*** Same interval as primary series unless otherwise specified.

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Antigen		Age of 1st Dose	Doses in Primary Series	Interrupted primary series***	Doses for those who start vaccination late		Booster Dose
					If ≤ 12 months of age	If > 12 months of age	
Recommendations for children residing in certain regions							
Japanese Encephalitis ¹¹	Mouse-brain derived	1 year	2 (4 weeks)	Resume without repeating previous dose	2 doses	2 doses	After 1 year and every 3 years up to 10-15 years of age
	Live attenuated	9-12 months	1 dose	NA	1 dose	1 dose	After 1 year
Yellow Fever ¹²		9-12 months	1 dose with measles	NA	1 dose	1 dose	Not recommended
Tick-Borne Encephalitis ¹³	FSME-Immun & Encepur	≥ 1 yr	3 doses (1st to 2nd 1-3 mos; 2nd to 3rd 12 mos)	Resume without repeating previous dose	3 doses	3 doses	At least 1 booster
	TBE_Moscow & EnceVir	≥ 3 yr	3 doses (1st to 2nd 1-7 mos; 2nd to 3rd 12 mos)	Resume without repeating previous dose	3 doses	3 doses	Every 3 years
Recommendations for children in some high-risk populations							
Typhoid ¹⁴	Vi PS	2 years (min)	1 dose	NA	Not recommended	1 dose	Every 3 years
	Ty21a	Capsules 5 years (min) (see footnote)	3-4 doses (1 day)	If interruption between doses is < 21 days resume without repeating previous dose; If > 21 days restart primary series	Not recommended	> 5 yrs: 3-4 doses	Every 3-7 years
Cholera ¹⁵	Dukoral (WC-rBS)	2 years (min)	2-5 yrs: 3 doses ≥ 6 yrs: 2 doses (≥ 7 days)	If interval since last dose ≥ 6 weeks restart primary series	Not recommended	2-5 yrs: 3 doses > 6 yrs: 2 doses	2-5 yrs: every 6 months. If booster is delayed > 6 months the primary series must be repeated. >6 yrs: every 2 years. If booster is delayed > 2 yrs the primary series must be repeated.
	Shanchol and mORCVAX	1 year (min)	2 doses (2 weeks)	Resume without repeating previous dose	Not recommended	2 doses	After 2 years
Meningococcal ¹⁶	MenA conjugate	1-29 years	1	NA	Not recommended	1 dose	2-11 months of age after 1 year
	MenC conjugate	2-11 months	2 (8 weeks min)	Resume without repeating previous dose	2 doses	1 dose	
		>12 months	1	NA			
	Quadrivalent conjugate	9-23 months	2 (12 weeks min)	Resume without repeating previous dose	2 doses	1 dose	
≥ 2 years		1	NA				
Hepatitis A ¹⁷		1 year (min)	2 doses (6-18 mos)	Resume without repeating previous dose	Not recommended	2 doses	
Rabies ¹⁸		As required	3 doses (1st to 2nd 7 days; 2nd to 3rd 14-21 days)	Resume without repeating previous dose; Interval between last two doses should be 14 days minimum	3 doses	3 doses	Only if occupation puts a frequent or continual risk of exposure
Recommendations for children receiving vaccinations from immunization programmes with certain characteristics							
Mumps ¹⁹		12-18 months	2 doses with measles (4 weeks)	Resume without repeating previous dose	Not recommended	2 doses	Not recommended
Influenza (Inactivated) ²⁰		6 months (min)	< 9 yrs: 2 doses > 9 yrs: 1 dose	Resume without repeating previous dose	2 doses	< 9 yrs: 2 doses > 9 yrs: 1 dose	Revaccinate annual 1 dose only

Summary Table 3 - Notes

- The attached table summarizes the WHO recommendations for interrupted or delayed routine vaccination. Its purpose is to assist national decision-makers and programme managers to develop appropriate policy guidance in relation to their national immunization schedule.
- This table is designed to be used together with two other summary tables - Table 1: Summary of WHO Position Papers - Recommendations for Routine Immunization; and Table 2: Summary of WHO Position Papers - Recommended Routine Immunization for Children.
- 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 footnotes. Lack of an explicit co-administration recommendation is often due to a lack of evidence and does not necessarily imply that the vaccine cannot be co-administered. Exceptions to co-administration are stated.
- Refer to <http://www.who.int/immunization/positionpapers/> for the most recent version of this table (and Tables 1 and 2) and position papers.

¹ BCG

- Position paper reference: [Weekly Epid. Record \(2004, 79: 27-38\)](#) [pdf 468kb]
- Expert opinion indicates that vaccination of children older than 12 months of age is usually of limited benefit (although it is not harmful or contraindicated).
- BCG vaccination of adolescents and adults has shown variation in protective efficacy with geographical region, possibly as a consequence of differences in previous exposure to environmental mycobacteria. See position paper for details.
- Infants 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 167kb]

² Hepatitis B

- Position paper reference: [Weekly Epid. Record \(2009, 84: 405-420\)](#) [pdf 830kb]
- In general, the dose for infants and children (aged < 15 years) is half the recommended adult dose.
- Co-administration of HepB vaccine does not interfere with the immune response to any other vaccine and vice versa.
- Data on immunogenicity suggest that in any age group, interruption of the vaccination schedule does not require restarting the vaccine series. If the primary series is interrupted after the first dose, the second dose should be administered as soon as possible and the second and third doses separated by a minimum interval of 4 weeks; if only the third dose is delayed, it should be administered as soon as possible.

³ Polio

- Reference: [Weekly Epid. Record \(2010, 85: 213-228\)](#) [pdf 815.1kb]
- The primary series of 3 OPV vaccinations should be administered according to the respective national immunization schedule, for example at 6, 10 and 14 weeks, or 2, 4, and 6 months of age. The interval between doses should be at least 4 weeks.
- Where the potential for poliovirus importation is very high (i.e. countries bordering endemic countries, or in countries with recurrent outbreaks) or high (i.e. country with a history of importation plus high traffic across the border), and the transmission potential high (e.g. <90% DTP3 coverage, low socio-economic status, majority of areas with open sewage) or moderate (e.g. <90% DTP3 coverage, all states/provinces with moderate socio-economic status, only secondary sewage treatment) an OPV birth dose should be given as soon as possible after

birth.

- OPV alone, including a birth dose, is recommended in all polio-endemic countries and those at high risk for importation and subsequent spread. A birth dose is not considered necessary in countries where the risk of polio virus transmission is low, even if the potential for importation is high/very high.
- Where the risk of wild polio virus importation is high/very high, the transmission potential should be low (>90-95% DTP3 coverage, high socio-economic status, tertiary sewage treatment) before alternatives to OPV alone may be considered.
- In countries with very high risk of wild polio virus importation, a sequential IPV/OPV schedule should not be introduced unless immunization coverage is approximately 95%, or, with low importation risk, approximately 90%. Where sequential IPV/OPV is used, the initial administration of 1 or 2 doses of IPV should be followed by 2 or more doses of OPV to ensure both sufficient levels of protection in the intestinal mucosa and a decrease in the burden of VAPP. For IPV/OPV sequential schedules WHO recommends that IPV be administered at 2 months of age (e.g. an IPV-OPV-OPV schedule) or at 2 months and 3-4 months of age (e.g. a 4-dose schedule of IPV-IPV-OPV-OPV). Each dose of the primary series, whether IPV or OPV, should be separated by an interval of 4-8 weeks, depending on the risk of exposure to polio in early childhood.
- IPV alone can be considered as an alternative to OPV alone (or an IPV/OPV sequential schedule) only in countries with the lowest risk of both wild polio importation and WPV transmission. IPV may be offered as a component of combination vaccines. A primary series of 3 IPV doses should be administered beginning at 2 months of age. If the primary series begins earlier (e.g. with a 6, 10, and 14 week schedule) then a booster dose should be administered with an interval of at least 6 months (4-dose IPV schedule).
- Switching from OPV to IPV for routine vaccination during the pre-eradication era is not cost-effective based on the existing economic analyses and current IPV costs.
- Both IPV and OPV may be administered simultaneously with other vaccines in national childhood immunization programmes

⁴ DTP (Diphtheria, Tetanus and Pertussis)

- Position paper reference: Diphtheria - [Weekly Epid. Record \(2006, 81: 24-32\)](#) [pdf 214kb]; Tetanus - [Weekly Epid. Record \(2006, 81: 198-208\)](#) [pdf 229kb]; Pertussis - [Weekly Epid. Record \(2010, 85: 385-400\)](#) [pdf 320kb]
- WHO recommends that the primary series of 3 doses should be given in infancy (aged < 1 year). The exact timing of the booster should be flexible to take account of the most appropriate health service contacts in different countries. Ideally a DTP booster should be provided at 1-6 years of age. A Td booster should be provided in adolescence, and another in adulthood to further assure life-long protection against tetanus (a total of 6 doses when DTP primary series is given in infancy).
- Delayed or interrupted DTP series - For children 1-7 years or older who have not previously been immunized should receive three doses of wP or aP vaccine, 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.
- For previously non-immunized adolescents and adults, the recommended tetanus schedule is 2 doses administered at least 4 weeks apart followed by a third dose administered at least 6 months after the second dose, and subsequent boosters at least 1 year apart. Those who receive their first tetanus vaccine doses as adolescents or adults require a total of only 5 appropriately spaced doses to obtain long-term protection. See position paper for details.

⁵ *Haemophilus influenzae* type b (Hib)

- Position paper reference: [Weekly Epid. Record \(2006, 81: 210-220\)](#) [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.
- 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.
- 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.

⁶ Pneumococcal (Conjugate)

- Position paper reference: [Weekly Epid. Record \(2007, 82: 93-104\)](#) [pdf 324kb]; **NOTE: This position paper is currently being revised in light of the vaccination schedule recommendations made by SAGE at their November 2011 meeting. [Weekly Epid. Record \(2012, 1: 13-15\)](#) [pdf 869kb]**
- Previously, WHO recommended that a three dose PCV schedule without a booster (3p+0) compatible with DTP, Hepatitis B, Hib and OPV administration should be initiated before 6 months.
- Evidence from randomized controlled trials of immunogenicity, efficacy against disease and carriage, observational studies reporting effectiveness and reductions in pneumonia and invasive disease following PCV introduction from both industrialized and developing countries, supported the use of a 3p+0 schedule. In these studies doses were administered typically at 6, 10, and 14 weeks or 2, 4, and 6 months. Emerging evidence also supported the use of 2p+1 as an alternative schedule, with a booster dose given between 9 and 15 months.
- 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, meningococcal C conjugate, measles, mumps, rubella and polio vaccines.
- For polysaccharide pneumococcal vaccine see position paper: [Weekly Epid. Record \(2008, 83: 373-384\)](#) [pdf 308kb]

⁷ Rotavirus

- Position paper reference: [Weekly Epid. Record \(2009, 84: 533-540\)](#) [pdf 764kb]
- Recommended to be included in all national immunization programmes.
- Rotarix vaccine is administered orally in a 2-dose schedule with the first and second doses of DTP. RotaTeq requires a oral 3-dose schedule with DTP1, DTP2, and DTP3 with an interval of 4-10 weeks between doses.
- First dose of either RotaTeq or Rotarix be administered at age 6-15 weeks. The maximum age for administering the last dose of either vaccine should be 32 weeks.
- The interchangeability of the current rotavirus vaccines is unknown.
- In various settings, rotavirus vaccines have been found not to interfere significantly with the immunogenicity of safety of OPV or other childhood vaccines.
- The current rotavirus vaccines should not be used in catch-up vaccination campaigns where the exact age of vaccinees may be difficult to ascertain and there is the danger that a first dose may mistakenly be given to children >12 weeks of age.
- The use of rotavirus vaccines should be part of a comprehensive strategy to control diarrhoeal

diseases and should include, among other interventions, improvements in hygiene and sanitation, zinc supplementation, community-based administration of oral rehydration solution and overall improvements in case management.

⁸ Measles

- Position paper reference: [Weekly Epid. Record \(2009, 84: 349-360\)](#) [pdf 724kb]
- Reaching all children with two doses of measles vaccine should be the standard for all national immunization programmes.
- Delivery of the second dose (MCV2) may occur either at a scheduled age through routine services or periodically through mass campaigns, depending on which strategy achieves the higher coverage. A MCV2 dose may be added to the routine immunization schedule in countries that have achieved > 80% coverage of measles first dose (MCV1) at the national level for 3 consecutive years as determined by the most accurate means available (e.g. survey or WHO/ UNICEF estimates). In general, countries that do not meet this criterion should prioritize improving MCV1 coverage and conducting high-quality follow-up SIAs, rather than adding MCV2 to their routine schedule.
- In countries with ongoing transmission in which the risk of measles mortality remains high, MCV1 should be given at age 9 months. MCV2 should be given between 12-18 months, as providing MCV2 in the 2nd year of life reduces the rate of accumulation of susceptible children and the risk of an outbreak.
- In countries with low rates of measles transmission (that is, those that are near elimination) and where there is a low risk of measles infection among infants, the first dose may be administered at age 12 months to take advantage of the higher seroconversion rates achieved at this age (>90% seroconversion). In these countries the optimal age for delivering a routine 2nd dose of measles is based on programmatic considerations that achieve the highest coverage and hence the highest population immunity. Administration of the second dose at age 15-18 months ensures early protection of the individual, slows accumulation of susceptible young children and may correspond with other routine immunizations (for example, DTP booster). If first dose coverage is high (>90%) and school enrolment is high (>95%), giving the second dose at school entry may be an effective strategy for achieving high coverage and preventing outbreaks in schools.
- 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.
- In areas where there is a high incidence of both HIV infection and measles, MCV1 may be offered as early as age 6 months. Two additional doses of measles vaccine should be administered to these children according to the national immunization schedule.
- As a general rule, live vaccines should be given either simultaneously, or at intervals of 4 weeks. An exception to this rule is OPV, which can be given at any time before or after measles vaccination, without interference in the response to either vaccine.
- Available data suggest that vaccines against measles, yellow fever, and Japanese encephalitis may be administered at the same time at different injection sites. Interference may occur between MMR and yellow fever vaccines if they are simultaneously administered to children < 2 years of age.

⁹ Rubella

- Position paper reference: [Weekly Epid. Record \(2011, 86: 301-316\)](#) [pdf 413kb]
- All countries that have not yet introduced rubella vaccine, and are providing 2 doses of measles vaccine using routine immunization, or SIAs, or both, should consider including rubella containing vaccines (RCVs) in their immunization programme. Countries planning to introduce RCVs should review the epidemiology of rubella, including the susceptibility profile of the

population; assess the burden of CRS; and establish rubella and CRS prevention as a public health priority.

- Because rubella is not as highly infectious as measles and because the effectiveness of 1 dose of an RCV is > 95% even at 9 months of age, only 1 dose of rubella vaccine is required to achieve rubella elimination if high coverage is achieved. However, when combined with measles vaccination, it may be easier to implement a second dose of RCV's using the same combined MR vaccine or MMR vaccine for both doses.
- RCV's can be administered concurrently with inactivated vaccines. As a general rule, live vaccines should be given either simultaneously with RCV's, or at least 4 weeks apart. An exception to this is oral polio vaccine, which can be given at any time before or after RCV's without interfering in the response to either vaccine.
- Interference may occur between MMR and yellow fever vaccines if they are simultaneously administered to children < 2 years of age.
- Because of a theoretical, but never demonstrated, teratogenic risk rubella vaccination in pregnant women should be avoided in principle, and those planning a pregnancy are advised to avoid pregnancy for 1 month following vaccination.
- Administration of blood or blood products before or shortly after vaccination may interfere with vaccine efficacy. If using only rubella vaccines persons who received blood products should wait at least 3 months before vaccination and, if possible, blood products should be avoided for up to 2 weeks post-vaccination. Vaccinated persons are not eligible to donate blood for 1 month after vaccination.

10 Human Papillomavirus (HPV)

- Position paper reference: [Weekly Epid. Record \(2009, 84; 118-131\)](#) [pdf 267kb]
- HPV vaccines are most efficacious in females who are naïve to vaccine-related HPV types. Programmes should initially prioritize high coverage in the primary target population of young adolescent girls 9-10 through to 13 years of age prior to sexual debut. Vaccination of secondary target populations of older adolescent females or young women is recommended only if this is feasible, affordable, cost-effective.
- Alternative schedules for HPV vaccines 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.

11 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.

- As a general rule, live vaccines should be given either simultaneously, or at intervals of 4 weeks.
- Available data suggest that vaccines against measles, yellow fever, and Japanese encephalitis may be administered at the same time at different injection sites. Interference may occur between MMR and yellow fever vaccines if they are simultaneously administered to children < 2 years of age.

12 Yellow Fever

- Position paper reference: [Weekly Epid. Record \(2003, 78; 349-359\)](#) [pdf 339kb]
- 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.
- Interference may occur between MMR and yellow fever vaccines if they are simultaneously administered to children < 2 years of age
- 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.

13 Tick-Borne Encephalitis (TBE)

- Position paper reference: [Weekly Epid. Record \(2011, 86; 241-256\)](#) [pdf 318kb]
- Since the incidence of tick-borne encephalitis may vary considerably between and even within geographical regions, public immunization strategies should be based on risk assessments conducted at country, regional or district level, and they should be appropriate to the local endemic situation. Therefore, establishing case reporting of the disease is essential before deciding on the most appropriate preventive measures to be taken.
- In areas where the disease is highly endemic (that is, where the average prevaccination incidence of clinical disease is ≥ 5 cases/100 000 population per year), implying that there is a high individual risk of infection, WHO recommends that vaccination be offered to all age groups, including children.
- Because the disease tends to be more serious in individuals aged >50-60 years this age group constitutes an important target for immunization.
- Where the prevaccination incidence of the disease is moderate or low (that is, the annual average during a 5-year period is <5/100 000) or is limited to particular geographical locations or certain outdoor activities, immunization should target individuals in the most severely affected cohorts.
- People travelling from non-endemic areas to endemic areas should be offered vaccination if their visits will include extensive outdoor activities.
- Vaccination against the disease requires a primary series of 3 doses; those who will continue to be at risk should probably have ≥ 1 booster doses.
- Within the considerable range of acceptable dose intervals, the relevant national authorities should select the most rational primary schedule for their national, regional or district immunization programmes.
- For the vaccines manufactured in Austria and Germany (FSME-Immun and Encepur) that can be given starting from > 1year of age an interval of 1-3 months is recommended between the first 2 doses, and 5-12 months between the second and third doses. When rapid protection is required, for example for people who will be travelling to endemic areas, the interval between

the first 2 doses may be reduced to 1–2 weeks.

- With the vaccines manufactured in the Russian Federation (TBE-Moscow and EnceVir) the recommended intervals are 1–7 months between the first 2 doses, and 12 months between the second and third doses. Booster doses are recommended every 3 years for those at continued risk of exposure.
- The currently recommended booster interval should be maintained until more data have been obtained on the duration of protection induced by the Russian vaccines.
- Regardless of the duration of the delay, interrupted schedules should be resumed without repeating previous doses.

14 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- Vi polysaccharide typhoid vaccine requires one parentally administered dose which may be given after the age of 2 years; the liquid form of Ty21a live oral vaccine (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.
- If the schedule for Ty21a is interrupted by an interval longer than 21 days, expert opinion indicates that the series should be restarted from the beginning. If the interruption is less than 21 days, resume vaccination without repeating the previous dose.
- Booster- In most endemic settings, a booster dose of the concerned vaccine 3 to 7 years after the primary immunization seems appropriate.

15 Cholera

- Position paper reference: [Weekly Epid. Record \(2010, 85, 117-128\)](#) [pdf 283kb]
- In cholera-endemic countries, vaccinating the entire population is not warranted. Rather, vaccination should be targeted at high-risk areas and population groups. The primary targets for cholera vaccination in many endemic areas are preschool-aged and school aged children. Other groups that are especially vulnerable to severe disease and for which the vaccines are not contraindicated may also be targeted, such as pregnant women and HIV-infected individuals. Consider vaccinating older age groups if funding is available.
- Two types of oral cholera vaccines are available: (i) Dukoral (WC-rBS) and (ii) Sanchol and mORCVAX. The live attenuated single-dose vaccine (CVD 103-HgR) is no longer produced. The injectable vaccine is still manufactured in a few countries but its use is not recommended mainly because of its limited efficacy and short duration of protection.
- Dukoral is not licensed for children < 2 years. Children aged 2-5 years should receive 3 doses >7 days apart (but not more than 6 weeks). Intake of food and drink should be avoided for 1 hour before and after vaccination. If the interval between doses is delayed >6 weeks, primary vaccination should be restarted. One booster dose is recommended every 6 months, and if the interval between primary immunization, and the booster is >6 months, primary immunization must be restarted.
- Adults and children > 6 years should receive 2 doses of Dukoral > 7 days apart (but not more than 6 weeks). Intake of food and drink should be avoided for 1 hour before and after vaccination. If the interval between doses is delayed >6 weeks, primary vaccination should be restarted. A booster dose every 2 years is recommended. If the interval between the primary series and booster immunization is > 2 years, primary immunization must be repeated.
- Sanchol and mORCVAX: two liquid doses orally 14 days apart for individuals > 1 year. A booster dose is recommended after 2 years.

16 Meningococcal

- Position paper reference: [Weekly Epid Record \(2011, 86: 521-540\)](#) [pdf 1.01mb].
- Conjugate vaccines are preferred over polysaccharide vaccines due to their potential for herd protection and their increased immunogenicity, particularly in children <2 years of age.
- Both conjugate and polysaccharide vaccines are efficacious and safe when used in pregnant women.
- Monovalent MenA conjugate vaccine should be given as one single intramuscular dose to individuals 1-29 years of age. The possible need for a booster is not yet established.
- For monovalent MenC conjugate vaccine one single intramuscular dose is recommended for children aged >12 months, teenagers and adults. Children 2-11 months require 2 doses administered at an interval of a least 2 months and a booster about 1 year after. If the primary series is interrupted, vaccination should be resumed without repeating the previous dose.
- Quadrivalent conjugate vaccines (A,C,W135,Y-D and A,C,W135,Y-CRM) should be administered as one single intramuscular dose to individuals > 2 years. A,C,W135,Y-D is also licensed for children 9-23 months of age, and given as a 2-dose series, 3 months apart beginning at age 9 months. If the primary series is interrupted, vaccination should be resumed without repeating the previous dose.
- Meningococcal polysaccharide vaccines are less, or not, immunogenic in children under 2 years of age.
- Meningococcal polysaccharide vaccines can be used for those > 2 years of age to control outbreaks in countries where limited economic resources or insufficient supply restrict the use of meningococcal conjugate vaccines. Polysaccharide vaccines should be administered to individuals > 2 years old as one single dose. One booster 3-5 years after the primary dose may be given to persons considered to be a continued high risk of exposure, including some health workers. See position paper for details.

17 Hepatitis A

- Position paper reference: [Weekly Epid. Record \(2000, 75: 38-44\)](#) [pdf 193kb]
- 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 injection drug users, homosexual men, persons travelling to high-risk areas, and certain ethnic or religious groups. See position paper for details.

18 Rabies

- Position paper reference: [Weekly Epid. Record \(2010, 85: 309-320\)](#) [pdf 370]
- Production and use of nerve-tissue rabies vaccines should be discontinued and replaced with cell-culture-based vaccines (CCVs).
- Recommended for anyone who will be at continual, frequent or increased risk of exposure to the rabies virus, either as a result of their residence or occupation. Travellers with extensive outdoor exposure in rural high-risk areas where immediate access to appropriate medical care may be limited should also be vaccinated regardless of the duration of stay. Where canine rabies is a public health problem, WHO encourages studies on the feasibility, cost-effectiveness, and long-term impact of incorporating rabies vaccination into the immunization programme for infants and children.
- The series is given by intramuscular or intradermal injection at 0, 7, and 21 or 28 days.

- Intramuscular administration: For adults and children aged ≥ 2 years, the vaccine should always be administered in the deltoid area of the arm; for children aged < 2 years, the anterolateral area of the thigh is recommended. Rabies vaccine should not be administered in the gluteal area, as the induction of an adequate immune response may be less reliable.
- Booster doses of rabies vaccines are not required for individuals living in or travelling to high-risk areas who have received a complete primary series of pre-exposure or post-exposure prophylaxis with a cell-culture-based rabies vaccine (CCV).
- Periodic booster injections are recommended only for people whose occupation puts them at continual or frequent risk of exposure. If available, antibody monitoring is preferred to the administration of routine boosters.
- Because vaccine-induced immunity persists in most cases for years, a booster is recommended only if rabies-virus neutralizing antibody titres fall to < 0.5 IU/ml.
- Antibody testing should be done every 6 months for people at risk of laboratory exposure to high concentrations of live rabies virus, and every 2 years for professionals who are not at continual risk of exposure through their activities, such as certain categories of veterinarians and animal health officers.

19 Mumps

- Position paper reference: [Weekly Epid. Record \(2007, 82: 49-60\)](#) [pdf 311kb]
- 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.
- As a general rule, live vaccines should be given either simultaneously, or at intervals of 4 weeks.
- Interference may occur between MMR and yellow fever vaccines if they are simultaneously administered to children < 2 years of age.

20 Seasonal Influenza (Inactivated Vaccine)

- Position paper reference: [Weekly Epid. Record \(2005, 33: 279-287\)](#) [pdf 220kb]
- 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.