
Adverse Event

Diphtheria vaccine (WHO position paper)

[WER 2006, vol. 81, 3, pp 24-32](#)
page 31

In most cases, diphtheria toxoid is administered in fixed combination with other vaccines. For childhood vaccination, DTwP or DTaP is generally used, often in combination with other antigens administered at the same time, such as Haemophilus influenzae type b, poliomyelitis, and hepatitis B vaccines, in order to reduce the number of injections. This is a positive development as long as adverse events remain infrequent and the immunogenicity of the individual components is ensured.

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 332

The cell culture-based, live attenuated (JE) vaccine appears to require fewer doses for longterm protection, is in most cases less expensive, and seems to represent an attractive alternative to the mouse brain-derived vaccine. However, more needs to be known on its safety and efficacy when used in immunodeficient people, as well as on the impact of co-administrating this vaccine with other vaccines (page 332.)

The live attenuated vaccine induces protection for several years after 1 or 2 doses, whereas durable protection by the mouse brain-derived vaccine may require 2-3 initial doses followed by boosters at intervals of approximately 3 years. As the price per dose of the mouse brain-derived vaccine in most countries is higher than that of the live attenuated vaccine, the need for repeated doses renders the former vaccine unaffordable in many JE-endemic countries (page 339)

BCG

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See Appendix 6_19 for chart entitled, "Administering vaccines to infants" BCG, DTP, DTP-HepB, HepB, measles, yellow fever, OPV"

BCG vaccine (WHO position paper)

[WER 2004, vol. 79, 4, pp 27-38](#)
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WHO recommends intradermal application of the (BCG) vaccine, preferably on the deltoid region of the arm using syringe and needle, although other application methods such as the multiple puncture technique are practised in some countries. Newborn vaccinees normally receive half the dose given to older children. BCG vaccine can be given simultaneously with other childhood vaccines.

DPT

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

[WHO/V&B/01.29](#)
page 2

Hib conjugate vaccine is administered by intramuscular or subcutaneous injection in the anterolateral aspect of the thigh (infants) or the deltoid muscle (older children). If given as a combination with DTP in the same syringe, it should be given intramuscularly.

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Administration summary: DTP vaccine (see Appendix 2_1)

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See Appendix 6_19 for chart entitled, "Administering vaccines to infants" BCG, DTP, DTP-HepB, HepB, measles, yellow fever, OPV"

Diphtheria vaccine (WHO position paper)

[WER 2006, vol. 81, 3, pp 24-32](#)
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In most cases, diphtheria toxoid is administered in fixed combination with other vaccines. For childhood vaccination, DTwP or DTaP is generally used, often in combination with other antigens administered at the same time, such as Haemophilus influenzae type b, poliomyelitis, and hepatitis B vaccines, in order to reduce the number of injections. This is a positive development as long as adverse events remain infrequent and the immunogenicity of the individual components is ensured.

Diphtheria

Diphtheria vaccine (WHO position paper)

[WER 2006, vol. 81, 3, pp 24-32](#)
page 31

In most cases, diphtheria toxoid is administered in fixed combination with other vaccines. For childhood vaccination, DTwP or DTaP is generally used, often in combination with other antigens administered at the same time, such as Haemophilus influenzae type b, poliomyelitis, and hepatitis B vaccines, in order to reduce the number of injections. This is a positive development as long as adverse events remain infrequent and the immunogenicity of the individual components is ensured.

Diphtheria vaccine (WHO position paper)

[WER 2006, vol. 81, 3, pp 24-32](#)
page 28

(Vaccines containing diphtheria toxoid should be administered) by intramuscular injection only.

General

Varicella vaccines (WHO position paper)

When given at separate sites and with separate syringes, simultaneous vaccination of varicella with other vaccines is as safe and immunogenic as when the vaccines are given at intervals of several weeks.

[WER 1998, vol. 73, 32, pp 241-248](#)
page 245

Varicella vaccines (WHO position paper)

Due to the theoretical risk of Reye syndrome, the use of salicylates is discouraged for 6 weeks following varicella vaccination.

[WER 1998, vol. 73, 32, pp 241-248](#)
page 246

Introducing hepatitis B vaccine into national immunization services

HepB vaccine is given by intramuscular injection in the anterolateral aspect of the thigh (infants) or deltoid muscle (older children).
If HepB vaccine is given on the same day as another injectable vaccine, it is preferable to give the two vaccines in different limbs.

[WHO/V&B/01.28](#)
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Introducing hepatitis B vaccine into national immunization services

HepB vaccine can safely be given at the same time as other vaccines (e.g. DTP, Hib, measles, OPV, BCG, and yellow fever).

[WHO/V&B/01.28](#)
page 2

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

Hib conjugate vaccine is administered by intramuscular or subcutaneous injection in the anterolateral aspect of the thigh (infants) or the deltoid muscle (older children). If given as a combination with DTP in the same syringe, it should be given intramuscularly.

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page 2

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

Hib conjugate vaccine can be given safely at the same time as other vaccines such as DTP, polio, hepatitis B, measles, BCG, and yellow fever vaccines.

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page 2

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

The injection equipment for Hib conjugate vaccine is the same type as that for DTP or hepatitis B:

0.5 ml (auto-disable), 1.0ml or 2.0ml syringe
25mm, 22 or 23 gauge needle

Sterile auto-disable (AD) injection devices are recommended.

The standard paediatric dose is 0.5 ml.

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[WHO/IVB/04.06](#)
page 4

Administration summary: DTP vaccine (see Appendix 2_1)

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)
page 6

Hib vaccine is given by intramuscular injection in the anterolateral aspect of the thigh (infants) or deltoid muscle (older children).

- The interval between (Hib vaccine) doses is not less than one month.
- The size of a dose is 0.5 ml.

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)
page 6

The (Hib) vaccine may be given at the same time as DTP, OPV, and (if applicable) HepB vaccines. It can be given at the same time as DTP, OPV, IPV, and HepB vaccines without ill effect. However, if used as a monovalent vaccine, it should not be injected in the same limb at the same time as other vaccines.

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)
page 4

Types and formulations of Hib vaccines can be interchanged, so vaccines from different manufacturers can be used for each dose that a child receives.

Diluents, both in saline form and made from other vaccines, are produced to go with specific Hib vaccines and are not interchangeable.

Measles vaccines (WHO position paper)

[WER 2004, vol. 79, 14, pp 130-142](#)
page 140

Administration of immunoglobulins or other antibody-containing blood products may interfere with the immune response to the vaccine. Vaccination should be delayed for 3-11 months after administration of blood or blood products, depending on the dose of measles antibody. Following measles vaccination, administration of such blood products should be avoided for 2 weeks, if possible.

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 10

Administration summary: OPV (see Appendix 2_5)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 12

Administration summary: TT vaccine and tetanus toxoid immunization schedule for routine immunization of pregnant women (see Appendix 2_9)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 16

Administration summary: HepB vaccine and Administration summary: DTP-HepB combination vaccine (see Appendix 2_12.)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 20

Administration summary: Hib vaccine and DTP-HepB+Hib combination vaccines (see Appendix 2_13.)

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[WHO/IVB/04.06](#)
page 22

Administration summary: Meningococcal vaccine (see Appendix 2_16.)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 23

Administration summary: YF vaccine (see Appendix 2_17.)

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[WHO/IVB/04.06](#)
page 25

If you are giving more than one vaccine, do not use the same syringe and do not use the same arm or leg for more than one injection.
Do not give more than one dose of the same vaccine to a woman or child in one session.
Give doses of the same vaccine at the correct intervals.

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page 26

Summary of injection sites (see Appendix 2_25.)

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)
page 13

Injection equipment for Hib vaccine and for reconstitution are indicated in Appendix 15_17.

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

Infants above 1 year of age and who are not fully vaccinated, should still receive the missing doses (usually countries set 23 months as the upper limit, but this limit can be higher).

If the mother does not know if the infant has been immunized or there is no

record in the immunization register, give doses of all eligible vaccines.

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[WHO/IVB/04.06](#)

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If the infant is eligible for more than one type of vaccine, the vaccines may all be given at the same session, but at different injection sites.

- _ Never give more than one dose of the same vaccine at one time.
- _ If the delay between doses exceeds the minimum delay, do not restart the schedule. Simply provide the next needed dose in the series.
- _ If there is a delay in starting primary vaccination, immunize the infant while maintaining the recommended dosage intervals.
- _ For practical reasons, most countries do not offer the primary series of routine immunization beyond 23 months (refer to national policy).

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If vitamin A was distributed during NIDs in your program area within the past four months:

- _ Assume that all infants and children 6-59 months of age have received a dose (or 12-59 months in countries where infants under 12 months are not given vitamin A with NIDs).
- _ Do not give another dose unless the caretaker says the child did not participate in NIDs.
- _ Do not look for records as vitamin A doses given at NIDs are not meant to be recorded due to the difficulty of recording at mass campaigns.

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To assess a woman's eligibility for TT immunization:

First ask if the woman has a TT vaccination card. If she has, give the dose required according to the national TT schedule. If the woman does not have a record, ask her if she has ever had a dose of TT in the past:

If she says NO: give the first dose of TT and an appointment for the second dose one month later, and give her an immunization card.

If she says YES: ask how many doses she has received in the past and give the next doses in series. Take into account any dose given in SIAs.

If she cannot remember or does not know, you should give her a dose of TT and a follow-up appointment for the next dose.

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See Appendix 6_19 for chart entitled, "Administering vaccines to infants" BCG, DTP, DTP-HepB, HepB, measles, yellow fever, OPV"

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

Immunization cards should be kept by the parents and not by the health

staff.

BCG vaccine (WHO position paper)

WHO recommends intradermal application of the (BCG) vaccine, preferably on the deltoid region of the arm using syringe and needle, although other application methods such as the multiple puncture technique are practised in some countries. Newborn vaccinees normally receive half the dose given to older children. BCG vaccine can be given simultaneously with other childhood vaccines.

[WER 2004, vol. 79, 4, pp 27-38](#)
page 34

Hepatitis B vaccines (WHO position paper)

The recommended dose (of hepatitis B vaccine) varies by product and with the age of the recipient. In most cases, infants and adolescents receive 50% of the adult dose.

The vaccine is administered by intramuscular injection in the anterolateral aspect of the thigh (infants and children aged <2 years) or in the deltoid muscle (older children and adults). Administration in the buttock is not recommended because this route of administration has been associated with decreased protective antibody levels as well as injury to the sciatic nerve. Intradermal administration is not recommended because the immune response is less reliable, particularly in children.

[WER 2004, vol. 79, 28, pp 255-263](#)
page 260

The hepatitis B vaccine does not interfere with the immune response to any other vaccine, and vice versa. Specifically, the birth-dose of hepatitis B can be given safely together with bacillus Calmette-Gurin (BCG) vaccine; BCG does not interfere negatively with the response to hepatitis B vaccine. However, unless formulated as fixed combinations, hepatitis B vaccine and other vaccines administered during the same visit should be given at different injection sites.

Hepatitis B vaccines (WHO position paper)

Testing to determine antibody responses is not necessary after routine vaccination (with hepatitis B vaccine.) However, when feasible, knowledge of response to vaccination is important in the following groups:

(i) persons at risk of occupationally acquired infection; (ii) infants born to HBsAg-positive mothers; (iii) immunocompromised persons; and (iv) sexual partners of HBsAg-positive persons.

Testing for anti-HBs should be performed by a method that allows determination of whether the anti-HBs concentration is protective (>10 mIU per ml). Adults should be tested 1-2 months after completion of the vaccination series. In settings where resources are available, infants born to HBsAg-positive mothers should be tested at 8-15 months of age, after completion of the vaccination series. Persons found to be antibody-negative after the primary series should be referred for appropriate follow-up.

[WER 2004, vol. 79, 28, pp 255-263](#)
page 260

Hepatitis B vaccines (WHO position paper)

Generally, it is easier to deliver hepatitis B vaccine at birth to infants who are born in health facilities. However, availability of monovalent hepatitis B vaccine in pre-filled singledose injection devices facilitates the administration of the vaccine by health care workers and birth attendants to infants born at home.

[WER 2004, vol. 79, 28, pp 255-263](#)
page 263

Influenza vaccines (WHO position paper)

TIVs (trivalent, inactivated influenza vaccines) are injected into the deltoid muscle (vaccinees aged >1 year) or the antero-lateral aspect of the thigh (vaccines aged between 6 and 12 months). Inactivated influenza vaccines will not interfere with concomitantly administered diphtheria/tetanus/pertussis (DTP) or other childhood vaccines.

[WER 2005, vol. 80, 36, pp 279-287](#)
page 284

Measles vaccines (WHO position paper)

The live, attenuated measles vaccines that are now internationally available are safe, effective and relatively inexpensive and may be used interchangeably in immunization programmes.

[WER 2004, vol. 79, 14, pp 130-142](#)
page 131

Measles vaccines (WHO position paper)

Measles vaccine is generally injected subcutaneously but is also effective when administered intramuscularly.

[WER 2004, vol. 79, 14, pp 130-142](#)
page 137

Rubella vaccines (WHO position paper)

As there is no harm in vaccinating already immune individuals, serological testing before (rubella) immunization is not necessary.

[WER 2000, vol. 75, 20, pp 161-169](#)
page 167

Rubella vaccines (WHO position paper)

Each dose of this (RA27/3 rubella) vaccine, which is given by the subcutaneous route, contains a defined number of active virus particles (>1 000 TCID 50).

[WER 2000, vol. 75, 20, pp 161-169](#)
page 166

Rubella antibodies present in blood products may interfere with rubella vaccination. Therefore, 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 postvaccination.

Yellow fever vaccine (WHO position paper)

For convenience and improved coverage, the YF vaccine should be administered simultaneously with the measles vaccine at approximately 9-12 months of age, but in a separate syringe and at a different injection site.

[WER 2003, vol. 78, 40, pp 349-359](#)
page 350

The YF (yellow fever) vaccine is given as a single subcutaneous or intramuscular injection (0.5 ml per dose), although the subcutaneous route is preferred.

Yellow fever vaccine (WHO position paper)

Since there is no interference between YF (yellow fever) vaccine and other vaccines, YF vaccine may be administered simultaneously, but in different syringes and at different sites, with the following vaccines: measles, polio (oral polio vaccine), diphtheria-tetanus-pertussis, hepatitis B, hepatitis A, oral cholera and oral or parenteral typhoid. When not given simultaneously, live vaccines should be administered at least one month before or one month after the YF vaccination. This recommendation is based on the assumption that interferon released in response to the first vaccine may have a temporary inhibitory effect on other live virus vaccines.

[WER 2003, vol. 78, 40, pp 349-359](#)
page 355

Typhoid vaccines (WHO position paper)

The Vi polysaccharide vaccine is administered subcutaneously or intramuscularly as 1 dose of 25 mg to individuals aged > 2 years. The vaccine confers protection 7 days after injection.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 261

Typhoid vaccines (WHO position paper)

The (Ty21a typhoid) vaccine is usually administered orally as entericcoated capsules and is registered for use from 6 years of age.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

A liquid formulation of the Ty21a (Ty21a typhoid) vaccine can be taken by children as young as 2 years and has proved more immunogenic than the capsular formulation.

Typhoid vaccines (WHO position paper)

Ty21a (Ty21a typhoid) is remarkably well tolerated. The vaccine may be given simultaneously with other vaccines, including live vaccines against polio, cholera and yellow fever, or the measles, mumps and rubella (MMR) combination. Proguanil or antibiotics should be avoided during the 3 days before and after vaccination.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

Diphtheria vaccine (WHO position paper)

In most cases, diphtheria toxoid is administered in fixed combination with other vaccines. For childhood vaccination, DTwP or DTaP is generally used, often in combination with other antigens administered at the same time, such as Haemophilus influenzae type b, poliomyelitis, and hepatitis B vaccines, in order to reduce the number of injections. This is a positive development as long as adverse events remain infrequent and the immunogenicity of the individual components is ensured.

[WER 2006, vol. 81, 3, pp 24-32](#)
page 31

Introduction of hepatitis B vaccine into childhood immunization services. Management guidelines, including information for health workers and parents

[WHO/V&B/01.31](#)
page 10

If hepatitis B vaccine is administered on the same day as another injectable vaccine, it is preferable to give the two vaccines in different limbs. If more than one injection has to be given in the same limb, the thigh is the preferred site of injection because of the greater muscle mass, and the injection sites should be 2.5 cm to 5 cm apart so that any local reactions are unlikely to overlap.

Introduction of hepatitis B vaccine into childhood immunization services. Management guidelines, including information for health workers and parents

[WHO/V&B/01.31](#)
page 11

Hepatitis B vaccine SHOULD NOT be given in the buttock as this route of administration has been associated with decreased protective antibody levels, probably because of inadvertent subcutaneous injection or injection into deep fat tissue. In addition there may be a risk of injury to the sciatic nerve.

Hepatitis B vaccine SHOULD NOT be administered intradermally because this route of administration does not produce an adequate antibody response in children.

Hepatitis B vaccine SHOULD NOT be mixed in the same syringe with other vaccines unless specifically recommended by the manufacturer. (Note: pentavalent DTP-HepB+Hib vaccine is supplied in two separate vials, one containing DTP-HepB vaccine (liquid), the other containing Hib vaccine (lyophilized). The manufacturer recommends mixing the contents of the two vials and giving DTP-HepB+Hib vaccine in the same syringe.)

Hepatitis B vaccines (WHO position paper)

[WER 2004, vol. 79, 28, pp 255-263](#)
page 258

Two types of hepatitis B vaccines are available: plasmaderived vaccines and recombinant vaccines. The two vaccines show no differences in terms of reactogenicity, efficacy or duration of protection. The two types of hepatitis B vaccine can be used interchangeably

Typhoid vaccines (WHO position paper)

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

(The Vi polysaccharide typhoid vaccine) can be given simultaneously with other vaccines relevant for international travelers such as the vaccines against yellow fever and hepatitis A.

Diphtheria vaccine (WHO position paper)

[WER 2006, vol. 81, 3, pp 24-32](#)
page 28

(Vaccines containing diphtheria toxoid should be administered) by intramuscular injection only.

Hepatitis A vaccines (WHO position paper)

[WER 2000, vol. 75, 5, pp 38-44](#)
page 42

Hepatitis A vaccine may be administered with all other vaccines included in the Expanded Programme on Immunization and with vaccines commonly given for travel. Concurrent administration of immune serum globulin does not appear to influence significantly the formation of protective antibodies.

Mumps virus vaccines (WHO position paper)

Assumed susceptible persons may be vaccinated (with mumps vaccine) without prior laboratory testing.

[WER 2001, vol. 76, 45, pp 346-356](#)
page 349

Mumps virus vaccines (WHO position paper)

Primary mumps vaccination, especially in the recommended combination with rubella and measles vaccines, is easily adapted to the national vaccination programmes and does not interfere significantly with simultaneously-administered vaccines.

[WER 2001, vol. 76, 45, pp 346-356](#)
page 354

Introducing hepatitis B vaccine into national immunization services

For administering HepB vaccine:

- _ A 25 mm, 22 or 23 gauge needle is recommended.
- _ The standard paediatric dose is 0.5 ml.

[WHO/V&B/01.28](#)
page 3

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

Administration summary: MR/MMR (see Appendix 2_39.)

[WHO/IVB/04.06](#)
page 9

Tetanus vaccine (WHO position paper)

Administration of adsorbed tetanus toxoid is by intramuscular injection.

[WER 2006, vol. 81, 20, pp 198-208](#)
page 202

State of the art of new vaccines: research and development

Of importance for the supply of rabies vaccine is the use of the intradermal route schedule which reduces the number of vaccine vials and thereby the cost of PEP by up to 80% (US\$ 5-10 for vaccine alone).

[WHO/IVB/06.01](#)
page 89

Japanese encephalitis vaccines (WHO position paper)

The cell culture-based, live attenuated (JE) vaccine appears to require fewer doses for longterm protection, is in most cases less expensive, and seems to represent an attractive alternative to the mouse brain-derived vaccine. However, more needs to be known on its safety and efficacy when used in immunodeficient people, as well as on the impact of co-administering this vaccine with other vaccines (page 332.)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 332

The live attenuated vaccine induces protection for several years after 1 or 2 doses, whereas durable protection by the mouse brain-derived vaccine may require 2-3 initial doses followed by boosters at intervals of approximately 3 years. As the price per dose of the mouse brain-derived vaccine in most countries is higher than that of the live attenuated vaccine, the need for repeated doses renders the former vaccine unaffordable in many JE-endemic countries (page 339)

Conclusions and recommendations from the meeting of the immunization Strategic Advisory Group of Experts (SAGE) - November 2006

[WER 2006, vol. 82, 1, pp 1-16](#)
page 9

Consistent with WHO's position on new vaccines, PCV-7 (7-serotype conjugate pneumococcal vaccine) can be easily integrated into routine vaccination schedules, and it may be administered at the same time, though at a different site, as other vaccines in infant immunization programmes, including DTP, hepatitis B, Hib and polio vaccines. Routine immunization with PCV-7 should be initiated before the age of 6 months to maximize the benefits of the vaccine and may start as early as 6 weeks of age.

Pneumococcal conjugate vaccine for childhood immunization (WHO position paper)

[WER 2006, vol. 82, 10, pp 93-104](#)
page 98

PCV-7 should not be mixed in the same syringe with other vaccines.

The vaccine may be administered concomitantly with other vaccines in the Expanded Programme on Immunization provided that separate syringes and sites of injection are used.

(Page 103) - (PCV-7) may be administered concurrently with, though at a different site from, other vaccines in infant immunization programmes, including DTP, hepatitis B, H. influenzae type b and polio vaccines.

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 335

The mouse brain-derived JE vaccine is given subcutaneously in doses of 0.5 or 1 ml (with some vaccines: 0.25 ml or 0.50 ml) the lower dose being for children aged <3 years.

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 336

Current experience, primarily from Taiwan (China) and Thailand, does not suggest reduced seroconversion rates or an increase in adverse events when mouse brain-derived JE vaccine is given simultaneously with vaccines against measles, diphtheria-tetanus-pertussis (DTP) and polio as part of the Expanded Programme Immunization (EPI) programme. However, the possible impact of co-administration of the mouse brain-derived vaccine with other vaccines of the childhood immunization programme has not been systematically studied.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

Following exposure to a suspected rabid animal, prevention of human rabies consists of prompt wound cleansing and administration of a modern CCV and, in cases of severe (category III) exposure, of rabies immunoglobulin (RIG).

Rabies vaccines (WHO position paper)

it is strongly recommended that the production and use of NTVs for humans be discontinued and replaced by modern CCVs as soon as possible.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

Rabies vaccines (WHO position paper)

Pre-exposure immunization is recommended for anyone at increased risk of exposure to rabies virus, either by nature of their residence or occupation, or when travelling.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

Rabies vaccines (WHO position paper)

Countries are encouraged to implement control programmes to ensure coordination between all public sectors involved in rabies control.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 427

Rabies vaccines (WHO position paper)

Pre-exposure vaccination using any of the modern CCVs is recommended for anyone at increased risk of exposure to rabies virus. This recommendation includes laboratory staff, veterinarians, animal handlers, wildlife officers with frequent exposure to potentially infected animals, as well as visitors to areas with high risk of rabies.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

For adults, 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, where the induction of an adequate immune response may be less reliable.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

ID administration of 0.1 ml volumes on days 0, 7, and 28 (day 28 preferable, but administration may be advanced towards day 21 if time is limited) is an acceptable alternative to the standard IM route. However, ID administration is technically more demanding and requires appropriate staff training and qualified supervision.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

Periodic booster injections are recommended only for people whose occupation puts them at continuous or frequent risk of rabies exposure. In such cases, a booster dose should be given at intervals ideally dictated by regular testing for antirabies antibodies. Potential laboratory exposures to high concentrations of rabies virus motivates testing as often as every 6 months; VNA titres of at least 0.5 IU/ml indicate protection. Where serological testing is unavailable, booster vaccination every 5 years may be an acceptable alternative.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

The indication for post-exposure prophylaxis with or without RIG depends on the type of contact with the suspected rabid animal:- Category I touching or feeding animals, licks on the skin (i.e. no exposure);
- Category II nibbling of uncovered skin, minor scratches or abrasions without bleeding, licks on broken skin;
- Category III single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks, exposures to bats.

For category I exposures, no prophylaxis is required; whereas for category II, immediate vaccination, and for category III, immediate vaccination and administration of RIG are recommended. For categories II and III, thorough (for ~15 minutes) washing and flushing with soap/detergent and copious amounts of water of all bite wounds and scratches should be done immediately, or as early as possible.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

Post-exposure prophylaxis can be discontinued if the suspect animal is proved by appropriate laboratory examination to be free of rabies, or, in the case of domestic dogs or cats, the animal remains healthy throughout a 10-day observation period.

Factors that should be taken into consideration when deciding whether or not to initiate post-exposure prophylaxis include the likelihood of the concerned animal being rabid, category of exposure (IIII), clinical features of the animal, as well as its availability for observation and laboratory testing. In most situations in developing countries, the vaccination status of the offending animal should not be taken into consideration to withhold prophylaxis.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
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Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
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Intramuscular administration

The post-exposure vaccination schedule is based on IM doses of 1 ml or 0.5 ml, depending on the manufacturer. The recommended regimen consists of either a 5-dose or a 4-dose schedule.

- (i) The 5-dose regimen prescribes 1 dose injected into the deltoid muscle (or anterolateral thigh in children aged <2years) on each of days 0, 3, 7, 14 and 28.
- (ii) The 4-dose regimen prescribes 2 doses on day 0 (1 in each of the 2 deltoid/thigh sites) followed by 1 dose on each of days 7 and 21.

Intradermal administration

Either the 8-site or the 2-site regimen should be used, as recommended by the respective vaccine manufacturer.

- (i) The 8-site ID regimen prescribes on day 0, injections of 0.1 ml given at 8 sites (1 in each upper arm, 1 in each lateral thigh, 1 on each side of the suprascapular region, and 1 on each side of the lower quadrant region of the abdomen); on day 7, 1 injection in each upper arm and each lateral thigh; and on each of days 30 and 90, 1 injection in one upper arm.⁸ The 1 dose on day 90 may be replaced by 2 ID injections on day 30.
- (ii) The 2-site ID regimen⁹ prescribes 1 injection of 0.1 ml at 2 sites on days 0, 3, 7 and 28.

For rabies-exposed patients who have previously undergone complete pre-exposure vaccination or postexposure prophylaxis with a CCV, 2 IM or ID doses of such a vaccine administered on days 0 and 3 are sufficient. RIG is not necessary in such cases. The same rules apply to people vaccinated against rabies who have demonstrated VNA titres of at least 0.5 IU/ml. Vaccination cards carefully recording previous immunizations are invaluable for correct decision-making.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 434

Rabies immunoglobulin for passive immunization

RIG should be administered in all category III exposures and in category II exposures involving immunodeficient individuals. Given its relatively slow clearance, human rabies immunoglobulin (HRIG) is the preferred product, particularly in cases of multiple severe exposures.

However, HRIG is in short supply and available mainly in industrialized countries. Where HRIG is not available or affordable, purified equine immunoglobulin (ERIG) or F(ab)₂ products of ERIG should be used. Most of the new ERIG preparations are potent, highly purified, safe and considerably less expensive than HRIG. However, they are of heterologous origin and carry a small risk of hypersensitivity reactions.¹⁰ There are no scientific grounds for performing a skin test prior to administration of ERIG because testing does not predict reactions, and ERIG should be given whatever the result of the test. RIG for passive immunization should not be injected later than 7 days after the initiation of post-exposure vaccination. The dose for HRIG is 20 IU/kg body weight, and for ERIG and F(ab)₂ products 40 IU/kg body weight. All of the RIG, or as much as anatomically possible (cave compartment syndrome), should be administered into or around the wound site(s). Any remaining RIG should be injected IM at a site distant from the site of vaccine administration.

Typhoid vaccines: WHO position paper

[WER 2008, vol. 83, 6, pp 49-60](#)
page 50

In view of the continued high burden of typhoid fever and increasing antibiotic resistance, and given the safety, efficacy, feasibility and affordability of 2 licensed vaccines (Vi and Ty21a), countries should consider the programmatic use of typhoid vaccines for controlling endemic disease. In most countries, the control of the disease will require vaccination only of high-risk groups and populations. Given the epidemic potential of typhoid fever, and observations on the effectiveness of vaccination in interrupting outbreaks, typhoid fever vaccination is recommended also for outbreak control.

Typhoid vaccines: WHO position paper

[WER 2008, vol. 83, 6, pp 49-60](#)
page 51

Decisions on whether or not to initiate programmatic use of typhoid vaccines should be based on knowledge of the local epidemiological situation. Important information includes data on subpopulations at particular risk and age-specific incidence rates, as well as on the sensitivity of the prevailing *S. Typhi* strains to relevant antimicrobial drugs. Ideally, cost-effectiveness analyses should be part of the planning process.

Typhoid vaccines: WHO position paper

Immunization of school-age and/or preschool-age children is recommended 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. The selection of delivery strategy (school or community-based vaccination) depends on factors such as the age-specific incidence of disease, subgroups at particular risk and school enrolment rates, and should be decided by the concerned countries.

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page 51

Typhoid vaccines: WHO position paper

Typhoid fever vaccination may be offered to travellers to destinations where the risk of typhoid fever is high, especially to those staying in endemic areas for >1 month and/or in locations where antibiotic resistant strains of *S. Typhi* are prevalent.

[WER 2008, vol. 83, 6, pp 49-60](#)
page 51

Typhoid vaccines: WHO position paper

All typhoid fever vaccination programmes should be implemented in the context of other efforts to control the disease, including health education, water quality and sanitation improvements, and training of health professionals in diagnosis and treatment.

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page 51

Typhoid vaccines: WHO position paper

The Ty21a vaccine:
The capsules are licensed for use in individuals aged >5 years; the liquid vaccine can be administered from the age of 2 years. Both versions of the vaccine are administered every other day; a 3-dose or, in Canada and USA, a 4-dose regimen is recommended for the capsules, whereas the liquid form requires 3 doses. The Ty21a vaccine may be given simultaneously with other vaccines, including live vaccines against polio, cholera, and yellow fever, or the measles, mumps and rubella (MMR) combination.

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23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

In resource-limited settings where there are many competing health priorities, the evidence does not support routine immunization of the elderly and high-risk populations with PPV23. Given the substantial effects of herd immunity in adult age groups following routine infant immunization with PCV7, a higher priority should be given to introducing and maintaining high coverage of infants with PCV7.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
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Given the high burden of pneumococcal disease in children and adults, WHO considers the prevention of pneumococcal disease to be a high priority in both industrialized and developing countries.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

Many industrialized countries recommend PPV23 immunization of their elderly and other high-risk groups.^{26, 27} In resource-limited settings where there are many competing health priorities, the evidence does not support routine immunization of the elderly and high-risk populations with PPV23. Given the substantial effects of herd immunity in adult age groups following routine infant immunization with PCV7, a higher priority should be given to introducing and maintaining high coverage of infants with PCV7. Countries considering introducing PPV23 to elderly or other high-risk populations will need to develop strategies for reaching these target populations.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

Because of the low level of evidence for benefit, routine PPV23 vaccination of HIV-infected adults is not recommended in resource-limited settings.⁴⁶ In low-income countries, WHO recommends the use of other measures that directly or indirectly may help prevent pneumococcal disease, such as trimethoprim-sulfamethoxazole chemoprophylaxis and antiretroviral therapy.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

PPV23 has not been shown to reduce the risk of CAP associated with seasonal or pandemic influenza. However, in countries using PPV23, high levels of vaccine uptake in at-risk populations may help reduce the incidence of pneumococcal bacteraemia during an influenza epidemic or pandemic. Nevertheless, in countries that do not routinely administer PPV23 to high-risk populations, data are insufficient to recommend introducing this vaccine to reduce the morbidity and mortality associated with pandemic influenza.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 384

Insufficient evidence of a beneficial effect precludes recommending routine PPV23 vaccination of pregnant or breastfeeding women in order to prevent pneumococcal disease in infants during the first few months of life.⁴⁷ In view of the strong herd immunity effect of routine infant immunization with PCV7 and the indirect protection of infants too young to receive conjugated pneumococcal vaccine, emphasis should be placed on ensuring high coverage of PCV7 (or an equivalent conjugated pneumococcal vaccine) in national immunization programmes.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 384

deferred during pregnancy, particularly during the first trimester, because their effect on the fetus has not been fully evaluated. However, no adverse consequences have been reported among newborns whose mothers were given PPV23 during pregnancy. In countries that routinely administer PCV23 to individuals with identified risk factors for pneumococcal disease (see above), women considered to be in urgent need of this vaccine may be vaccinated even during pregnancy.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 384

Primary immunization with PPV23 consists of a single intramuscular or subcutaneous dose. The intramuscular route may be preferred because of the lower rate of reactions at the injection site. The optimal timing, frequency and clinical effectiveness of additional doses of PPV23 are poorly defined, and national recommendations regarding revaccination vary. However, on the basis of the data on the duration of vaccine-induced protection, WHO suggests one single revaccination >5 years after a first vaccination.

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23-valent pneumococcal polysaccharide vaccine (WHO position paper)

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Additional data are needed on the possible induction of hyporesponsiveness following repeated doses of pneumococcal polysaccharide vaccine. Further studies are also required to make recommendations on the possible use of PPV23 to extend the serotype coverage in individuals who have previously received PCV7.

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HIV/AIDS and immunosuppression

Hepatitis B vaccines (WHO position paper)

[WER 2004, vol. 79, 28, pp 255-263](#)
page 260

Testing to determine antibody responses is not necessary after routine vaccination (with hepatitis B vaccine.) However, when feasible, knowledge of response to vaccination is important in the following groups: (i) persons at risk of occupationally acquired infection; (ii) infants born to HBsAg-positive mothers; (iii) immunocompromised persons; and (iv) sexual partners of HBsAg-positive persons.

Testing for anti-HBs should be performed by a method that allows determination of whether the anti-HBs concentration is protective (>10 mIU per ml). Adults should be tested 1-2 months after completion of the vaccination series. In settings where resources are available, infants born to HBsAg-positive mothers should be tested at 8-15 months of age, after completion of the vaccination series. Persons found to be antibody-negative after the primary series should be referred for appropriate follow-up.

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 332

The cell culture-based, live attenuated (JE) vaccine appears to require fewer doses for longterm protection, is in most cases less expensive, and seems to represent an attractive alternative to the mouse brain-derived vaccine. However, more needs to be known on its safety and efficacy when used in immunodeficient people, as well as on the impact of co-administering this vaccine with other vaccines (page 332.)

The live attenuated vaccine induces protection for several years after 1 or 2 doses, whereas durable protection by the mouse brain-derived vaccine may require 2-3 initial doses followed by boosters at intervals of approximately 3 years. As the price per dose of the mouse brain-derived vaccine in most countries is higher than that of the live attenuated vaccine, the need for repeated doses renders the former vaccine unaffordable in many JE-endemic countries (page 339)

Hepatitis A

Hepatitis A vaccines (WHO position paper)

[WER 2000, vol. 75, 5, pp 38-44](#)
page 42

Hepatitis A vaccine may be administered with all other vaccines included in the Expanded Programme on Immunization and with vaccines commonly given for travel. Concurrent administration of immune serum globulin does not appear to influence significantly the formation of protective antibodies.

Hepatitis B

Introducing hepatitis B vaccine into national immunization services

[WHO/V&B/01.28](#)
page 2

HepB vaccine is given by intramuscular injection in the anterolateral aspect of the thigh (infants) or deltoid muscle (older children). If HepB vaccine is given on the same day as another injectable vaccine, it is preferable to give the two vaccines in different limbs.

Introducing hepatitis B vaccine into national immunization services

[WHO/V&B/01.28](#)
page 2

HepB vaccine can safely be given at the same time as other vaccines (e.g. DTP, Hib, measles, OPV, BCG, and yellow fever).

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[WHO/IVB/04.06](#)
page 16

Administration summary: HepB vaccine and Administration summary: DTP-HepB combination vaccine (see Appendix 2_12.)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

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See Appendix 6_19 for chart entitled, "Administering vaccines to infants" BCG, DTP, DTP-HepB, HepB, measles, yellow fever, OPV"

Hepatitis B vaccines (WHO position paper)

[WER 2004, vol. 79, 28, pp 255-263](#)
page 260

The recommended dose (of hepatitis B vaccine) varies by product and with the age of the recipient. In most cases, infants and adolescents receive 50% of the adult dose.

The vaccine is administered by intramuscular injection in the anterolateral aspect of the thigh (infants and children aged <2 years) or in the deltoid muscle (older children and adults). Administration in the buttock is not recommended because this route of administration has been associated with decreased protective antibody levels as well as injury to the sciatic nerve. Intradermal administration is not recommended because the immune response is less reliable, particularly in children.

The hepatitis B vaccine does not interfere with the immune response to any other vaccine, and vice versa. Specifically, the birth-dose of hepatitis B can be given safely together with bacillus Calmette-Gurin (BCG) vaccine; BCG does not interfere negatively with the response to hepatitis B vaccine. However, unless formulated as fixed combinations, hepatitis B vaccine and other vaccines administered during the same visit should be given at different injection sites.

Hepatitis B vaccines (WHO position paper)

[WER 2004, vol. 79, 28, pp 255-263](#)
page 260

Testing to determine antibody responses is not necessary after routine vaccination (with hepatitis B vaccine.) However, when feasible, knowledge of response to vaccination is important in the following groups:

(i) persons at risk of occupationally acquired infection; (ii) infants born to HBsAg-positive mothers; (iii) immunocompromised persons; and (iv) sexual partners of HBsAg-positive persons.

Testing for anti-HBs should be performed by a method that allows determination of whether the anti-HBs concentration is protective (>10 mIU per ml). Adults should be tested 1-2 months after completion of the vaccination series. In settings where resources are available, infants born to HBsAg-positive mothers should be tested at 8-15 months of age, after completion of the vaccination series. Persons found to be antibody-negative after the primary series should be referred for appropriate follow-up.

Hepatitis B vaccines (WHO position paper)

[WER 2004, vol. 79, 28, pp 255-263](#)
page 263

Generally, it is easier to deliver hepatitis B vaccine at birth to infants who are born in health facilities. However, availability of monovalent hepatitis B vaccine in pre-filled singledose injection devices facilitates the administration of the vaccine by health care workers and birth attendants to infants born at home.

Introduction of hepatitis B vaccine into childhood immunization services. Management guidelines, including information for health workers and parents

[WHO/V&B/01.31](#)
page 10

If hepatitis B vaccine is administered on the same day as another injectable vaccine, it is preferable to give the two vaccines in different limbs. If more than one injection has to be given in the same limb, the thigh is the preferred site of injection because of the greater muscle mass, and the injection sites should be 2.5 cm to 5 cm apart so that any local reactions are unlikely to overlap.

Introduction of hepatitis B vaccine into childhood immunization services. Management guidelines, including information for health workers and parents

[WHO/V&B/01.31](#)
page 11

Hepatitis B vaccine SHOULD NOT be given in the buttock as this route of administration has been associated with decreased protective antibody levels, probably because of inadvertent subcutaneous injection or injection into deep fat tissue. In addition there may be a risk of injury to the sciatic nerve.

Hepatitis B vaccine SHOULD NOT be administered intradermally because this route of administration does not produce an adequate antibody response in children.

Hepatitis B vaccine SHOULD NOT be mixed in the same syringe with other vaccines unless specifically recommended by the manufacturer. (Note: pentavalent DTP-HepB+Hib vaccine is supplied in two separate vials, one containing DTP-HepB vaccine (liquid), the other containing Hib vaccine (lyophilized). The manufacturer recommends mixing the contents of the two vials and giving DTP-HepB+Hib vaccine in the same syringe.)

Hepatitis B vaccines (WHO position paper)

[WER 2004, vol. 79, 28, pp 255-263](#)
page 258

Two types of hepatitis B vaccines are available: plasmaderived vaccines and recombinant vaccines. The two vaccines show no differences in terms of reactogenicity, efficacy or duration of protection. The two types of hepatitis B vaccine can be used interchangeably

Introducing hepatitis B vaccine into national immunization services

[WHO/V&B/01.28](#)
page 3

For administering HepB vaccine:

- _ A 25 mm, 22 or 23 gauge needle is recommended.
- _ The standard paediatric dose is 0.5 ml.

Hib

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

[WHO/V&B/01.29](#)
page 2

Hib conjugate vaccine is administered by intramuscular or subcutaneous injection in the anterolateral aspect of the thigh (infants) or the deltoid muscle (older children). If given as a combination with DTP in the same syringe, it should be given intramuscularly.

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

[WHO/V&B/01.29](#)
page 2

Hib conjugate vaccine can be given safely at the same time as other vaccines such as DTP, polio, hepatitis B, measles, BCG, and yellow fever vaccines.

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

[WHO/V&B/01.29](#)

page 2

The injection equipment for Hib conjugate vaccine is the same type as that for DTP or hepatitis B:

0.5 ml (auto-disable), 1.0ml or 2.0ml syringe

25mm, 22 or 23 gauge needle

Sterile auto-disable (AD) injection devices are recommended.

The standard paediatric dose is 0.5 ml.

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)

page 6

Hib vaccine is given by intramuscular injection in the anterolateral aspect of the thigh (infants) or deltoid muscle (older children).

- The interval between (Hib vaccine) doses is not less than one month.
- The size of a dose is 0.5 ml.

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)

page 6

The (Hib) vaccine may be given at the same time as DTP, OPV, and (if applicable) HepB vaccines. It can be given at the same time as DTP, OPV, IPV, and HepB vaccines without ill effect. However, if used as a monovalent vaccine, it should not be injected in the same limb at the same time as other vaccines.

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)

page 4

Types and formulations of Hib vaccines can be interchanged, so vaccines from different manufacturers can be used for each dose that a child receives.

Diluents, both in saline form and made from other vaccines, are produced to go with specific Hib vaccines and are not interchangeable.

Immunization in practice: a practical resource guide for Health workers 2004 update _____ Module 2: The vaccines

[WHO/IVB/04.06](#)

page 20

Administration summary: Hib vaccine and DTP-HepB+Hib combination vaccines (see Appendix 2_13.)

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)

page 13

Injection equipment for Hib vaccine and for reconstitution are indicated in Appendix 15_17.

Influenza

Influenza vaccines (WHO position paper)

[WER 2005, vol. 80, 36, pp 279-287](#)
page 284

TIVs (trivalent, inactivated influenza vaccines) are injected into the deltoid muscle (vaccinees aged >1 year) or the antero-lateral aspect of the thigh (vaccinees aged between 6 and 12 months). Inactivated influenza vaccines will not interfere with concomitantly administered diphtheria/tetanus/pertussis (DTP) or other childhood vaccines.

JE

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 332

The cell culture-based, live attenuated (JE) vaccine appears to require fewer doses for longterm protection, is in most cases less expensive, and seems to represent an attractive alternative to the mouse brain-derived vaccine. However, more needs to be known on its safety and efficacy when used in immunodeficient people, as well as on the impact of co-administrating this vaccine with other vaccines (page 332.)

The live attenuated vaccine induces protection for several years after 1 or 2 doses, whereas durable protection by the mouse brain-derived vaccine may require 2-3 initial doses followed by boosters at intervals of approximately 3 years. As the price per dose of the mouse brain-derived vaccine in most countries is higher than that of the live attenuated vaccine, the need for repeated doses renders the former vaccine unaffordable in many JE-endemic countries (page 339)

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 335

The mouse brain-derived JE vaccine is given subcutaneously in doses of 0.5 or 1 ml (with some vaccines: 0.25 ml or 0.50 ml) the lower dose being for children aged <3 years.

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 336

Current experience, primarily from Taiwan (China) and Thailand, does not suggest reduced seroconversion rates or an increase in adverse events when mouse brain-derived JE vaccine is given simultaneously with vaccines against measles, diphtheria-tetanus-pertussis (DPT) and polio as part of the Expanded Programme Immunization (EPI) programme. However, the possible impact of co-administration of the mouse brain-derived vaccine with other vaccines of the childhood immunization programme has not been systematically studied.

MMR

Mumps virus vaccines (WHO position paper)

[WER 2001, vol. 76, 45, pp 346-356](#)
page 354

Primary mumps vaccination, especially in the recommended combination with rubella and measles vaccines, is easily adapted to the national vaccination programmes and does not interfere significantly with simultaneously-administered vaccines.

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[WHO/IVB/04.06](#)
page 9

Administration summary: MR/MMR (see Appendix 2_39.)

Measles

Measles vaccines (WHO position paper)

[WER 2004, vol. 79, 14, pp 130-142](#)
page 140

Administration of immunoglobulins or other antibody-containing blood products may interfere with the immune response to the vaccine. Vaccination should be delayed for 3-11 months after administration of blood or blood products, depending on the dose of measles antibody. Following measles vaccination, administration of such blood products should be avoided for 2 weeks, if possible.

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[WHO/IVB/04.06](#)
page 19

See Appendix 6_19 for chart entitled, "Administering vaccines to infants" BCG, DTP, DTP-HepB, HepB, measles, yellow fever, OPV"

Measles vaccines (WHO position paper)

[WER 2004, vol. 79, 14, pp 130-142](#)
page 131

The live, attenuated measles vaccines that are now internationally available are safe, effective and relatively inexpensive and may be used interchangeably in immunization programmes.

Measles vaccines (WHO position paper)

[WER 2004, vol. 79, 14, pp 130-142](#)
page 137

Measles vaccine is generally injected subcutaneously but is also effective when administered intramuscularly.

Meningococcal

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 22

Administration summary: Meningococcal vaccine (see Appendix 2_16.)

Mumps

Mumps virus vaccines (WHO position paper)

[WER 2001, vol. 76, 45, pp 346-356](#)
page 349

Assumed susceptible persons may be vaccinated (with mumps vaccine) without prior laboratory testing.

Mumps virus vaccines (WHO position paper)

[WER 2001, vol. 76, 45, pp 346-356](#)
page 354

Primary mumps vaccination, especially in the recommended combination with rubella and measles vaccines, is easily adapted to the national vaccination programmes and does not interfere significantly with simultaneously-administered vaccines.

Pentavalent

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 16

Administration summary: HepB vaccine and Administration summary: DTP-HepB combination vaccine (see Appendix 2_12.)

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[WHO/IVB/04.06](#)
page 20

Administration summary: Hib vaccine and DTP-HepB+Hib combination vaccines (see Appendix 2_13.)

Introduction of hepatitis B vaccine into childhood immunization services. Management guidelines, including information for health workers and parents

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page 11

Hepatitis B vaccine SHOULD NOT be given in the buttock as this route of administration has been associated with decreased protective antibody levels, probably because of inadvertent subcutaneous injection or injection into deep fat tissue. In addition there may be a risk of injury to the sciatic nerve.

Hepatitis B vaccine SHOULD NOT be administered intradermally because this route of administration does not produce an adequate antibody response in children.

Hepatitis B vaccine SHOULD NOT be mixed in the same syringe with other vaccines unless specifically recommended by the manufacturer. (Note: pentavalent DTP-HepB+Hib vaccine is supplied in two separate vials, one containing DTP-HepB vaccine (liquid), the other containing Hib vaccine (lyophilized). The manufacturer recommends mixing the contents of the two vials and giving DTP-HepB+Hib vaccine in the same syringe.)

Pneumococcal

Conclusions and recommendations from the meeting of the immunization Strategic Advisory Group of Experts (SAGE) - November 2006

[WER 2006, vol. 82, 1, pp 1-16](#)
page 9

Consistent with WHO's position on new vaccines, PCV-7 (7-serotype conjugate pneumococcal vaccine) can be easily integrated into routine vaccination schedules, and it may be administered at the same time, though at a different site, as other vaccines in infant immunization programmes, including DTP, hepatitis B, Hib and polio vaccines. Routine immunization with PCV-7 should be initiated before the age of 6 months to maximize the benefits of the vaccine and may start as early as 6 weeks of age.

Pneumococcal conjugate vaccine for childhood immunization (WHO position paper)

[WER 2006, vol. 82, 10, pp 93-104](#)
page 98

PCV-7 should not be mixed in the same syringe with other vaccines.

The vaccine may be administered concomitantly with other vaccines in the Expanded Programme on Immunization provided that separate syringes and sites of injection are used.

(Page 103) - (PCV-7) may be administered concurrently with, though at a different site from, other vaccines in infant immunization programmes, including DTP, hepatitis B, H. influenzae type b and polio vaccines.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

In resource-limited settings where there are many competing health priorities, the evidence does not support routine immunization of the elderly and high-risk populations with PPV23. Given the substantial effects of herd immunity in adult age groups following routine infant immunization with PCV7, a higher priority should be given to introducing and maintaining high coverage of infants with PCV7.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 382

Given the high burden of pneumococcal disease in children and adults, WHO considers the prevention of pneumococcal disease to be a high priority in both industrialized and developing countries.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

Many industrialized countries recommend PPV23 immunization of their elderly and other high-risk groups.^{26, 27} In resource-limited settings where there are many competing health priorities, the evidence does not support routine immunization of the elderly and high-risk populations with PPV23. Given the substantial effects of herd immunity in adult age groups following routine infant immunization with PCV7, a higher priority should be given to introducing and maintaining high coverage of infants with PCV7. Countries considering introducing PPV23 to elderly or other high-risk populations will need to develop strategies for reaching these target populations.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

Because of the low level of evidence for benefit, routine PPV23 vaccination of HIV-infected adults is not recommended in resource-limited settings.⁴⁶ In low-income countries, WHO recommends the use of other measures that directly or indirectly may help prevent pneumococcal disease, such as trimethoprim-sulfamethoxazole chemoprophylaxis and antiretroviral therapy.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
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PPV23 has not been shown to reduce the risk of CAP associated with seasonal or pandemic influenza. However, in countries using PPV23, high levels of vaccine uptake in at-risk populations may help reduce the incidence of pneumococcal bacteraemia during an influenza epidemic or pandemic. Nevertheless, in countries that do not routinely administer PPV23 to high-risk populations, data are insufficient to recommend introducing this vaccine to reduce the morbidity and mortality associated with pandemic influenza.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

Insufficient evidence of a beneficial effect precludes recommending routine PPV23 vaccination of pregnant or breastfeeding women in order to prevent pneumococcal disease in infants during the first few months of life.⁴⁷ In view of the strong herd immunity effect of routine infant immunization with PCV7 and the indirect protection of infants too young to receive conjugated pneumococcal vaccine, emphasis should be placed on ensuring high coverage of PCV7 (or an equivalent conjugated pneumococcal vaccine) in national immunization programmes.

[WER 2008, vol. 83, 42, pp 373-384](#)
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23-valent pneumococcal polysaccharide vaccine (WHO position paper)

deferred during pregnancy, particularly during the first trimester, because their effect on the fetus has not been fully evaluated. However, no adverse consequences have been reported among newborns whose mothers were given PPV23 during pregnancy. In countries that routinely administer PCV23 to individuals with identified risk factors for pneumococcal disease (see above), women considered to be in urgent need of this vaccine may be vaccinated even during pregnancy.

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23-valent pneumococcal polysaccharide vaccine (WHO position paper)

Primary immunization with PPV23 consists of a single intramuscular or subcutaneous dose. The intramuscular route may be preferred because of the lower rate of reactions at the injection site. The optimal timing, frequency and clinical effectiveness of additional doses of PPV23 are poorly defined, and national recommendations regarding revaccination vary. However, on the basis of the data on the duration of vaccine-induced protection, WHO suggests one single revaccination >5 years after a first vaccination.⁴⁸

[WER 2008, vol. 83, 42, pp 373-384](#)
page 384

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

Additional data are needed on the possible induction of hyporesponsiveness following repeated doses of pneumococcal polysaccharide vaccine. Further studies are also required to make recommendations on the possible use of PPV23 to extend the serotype coverage in individuals who have previously received PCV7.⁴⁹

[WER 2008, vol. 83, 42, pp 373-384](#)
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Policy

Varicella vaccines (WHO position paper)

[WER 1998, vol. 73, 32, pp 241-248](#)
page 246

Due to the theoretical risk of Reye syndrome, the use of salicylates is discouraged for 6 weeks following varicella vaccination.

Introducing hepatitis B vaccine into national immunization services

[WHO/V&B/01.28](#)
page 2

HepB vaccine is given by intramuscular injection in the anterolateral aspect of the thigh (infants) or deltoid muscle (older children).
If HepB vaccine is given on the same day as another injectable vaccine, it is preferable to give the two vaccines in different limbs.

Introducing hepatitis B vaccine into national immunization services

[WHO/V&B/01.28](#)
page 2

HepB vaccine can safely be given at the same time as other vaccines (e.g. DTP, Hib, measles, OPV, BCG, and yellow fever).

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

[WHO/V&B/01.29](#)
page 2

Hib conjugate vaccine is administered by intramuscular or subcutaneous injection in the anterolateral aspect of the thigh (infants) or the deltoid muscle (older children). If given as a combination with DTP in the same syringe, it should be given intramuscularly.

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

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page 2

Hib conjugate vaccine can be given safely at the same time as other vaccines such as DTP, polio, hepatitis B, measles, BCG, and yellow fever vaccines.

Introducing Haemophilus influenzae type b (Hib) conjugate vaccine into national immunization services

[WHO/V&B/01.29](#)
page 2

The injection equipment for Hib conjugate vaccine is the same type as that for DTP or hepatitis B:

0.5 ml (auto-disable), 1.0ml or 2.0ml syringe
25mm, 22 or 23 gauge needle

Sterile auto-disable (AD) injection devices are recommended.

The standard paediatric dose is 0.5 ml.

Immunization in practice: a practical resource guide for Health workers 2004 update _____ Module 2: The vaccines

[WHO/IVB/04.06](#)
page 4

Administration summary: DTP vaccine (see Appendix 2_1)

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)

page 6

Hib vaccine is given by intramuscular injection in the anterolateral aspect of the thigh (infants) or deltoid muscle (older children).

- The interval between (Hib vaccine) doses is not less than one month.
- The size of a dose is 0.5 ml.

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)

page 6

The (Hib) vaccine may be given at the same time as DTP, OPV, and (if applicable) HepB vaccines. It can be given at the same time as DTP, OPV, IPV, and HepB vaccines without ill effect. However, if used as a monovalent vaccine, it should not be injected in the same limb at the same time as other vaccines.

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)

page 4

Types and formulations of Hib vaccines can be interchanged, so vaccines from different manufacturers can be used for each dose that a child receives.

Diluents, both in saline form and made from other vaccines, are produced to go with specific Hib vaccines and are not interchangeable.

Measles vaccines (WHO position paper)

[WER 2004, vol. 79, 14, pp 130-142](#)

page 140

Administration of immunoglobulins or other antibody-containing blood products may interfere with the immune response to the vaccine. Vaccination should be delayed for 3-11 months after administration of blood or blood products, depending on the dose of measles antibody. Following measles vaccination, administration of such blood products should be avoided for 2 weeks, if possible.

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)

page 10

Administration summary: OPV (see Appendix 2_5)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)

page 12

Administration summary: TT vaccine and tetanus toxoid immunization schedule for routine immunization of pregnant women (see Appendix 2_9)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)

page 16

Administration summary: HepB vaccine and Administration summary: DTP-HepB combination vaccine (see Appendix 2_12.)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 20

Administration summary: Hib vaccine and DTP-HepB+Hib combination vaccines (see Appendix 2_13.)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

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page 22

Administration summary: Meningococcal vaccine (see Appendix 2_16.)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 23

Administration summary: YF vaccine (see Appendix 2_17.)

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[WHO/IVB/04.06](#)
page 25

If you are giving more than one vaccine, do not use the same syringe and do not use the same arm or leg for more than one injection.
Do not give more than one dose of the same vaccine to a woman or child in one session.
Give doses of the same vaccine at the correct intervals.

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

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page 26

Summary of injection sites (see Appendix 2_25.)

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)
page 13

Injection equipment for Hib vaccine and for reconstitution are indicated in Appendix 15_17.

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

[WHO/IVB/04.06](#)
page 10

Infants above 1 year of age and who are not fully vaccinated, should still receive the missing doses (usually countries set 23 months as the upper limit, but this limit can be higher).

If the mother does not know if the infant has been immunized or there is no record in the immunization register, give doses of all eligible vaccines.

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

[WHO/IVB/04.06](#)

page 11

If the infant is eligible for more than one type of vaccine, the vaccines may all be given at the same session, but at different injection sites.

- _ Never give more than one dose of the same vaccine at one time.
- _ If the delay between doses exceeds the minimum delay, do not restart the schedule. Simply provide the next needed dose in the series.
- _ If there is a delay in starting primary vaccination, immunize the infant while maintaining the recommended dosage intervals.
- _ For practical reasons, most countries do not offer the primary series of routine immunization beyond 23 months (refer to national policy).

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

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page 11

If vitamin A was distributed during NIDs in your program area within the past four months:

- _ Assume that all infants and children 6-59 months of age have received a dose (or 12-59 months in countries where infants under 12 months are not given vitamin A with NIDs).
- _ Do not give another dose unless the caretaker says the child did not participate in NIDs.
- _ Do not look for records as vitamin A doses given at NIDs are not meant to be recorded due to the difficulty of recording at mass campaigns.

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

[WHO/IVB/04.06](#)

page 12

To assess a woman's eligibility for TT immunization:

First ask if the woman has a TT vaccination card. If she has, give the dose required according to the national TT schedule. If the woman does not have a record, ask her if she has ever had a dose of TT in the past:

If she says NO: give the first dose of TT and an appointment for the second dose one month later, and give her an immunization card.

If she says YES: ask how many doses she has received in the past and give the next doses in series. Take into account any dose given in SIAs.

If she cannot remember or does not know, you should give her a dose of TT and a follow-up appointment for the next dose.

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page 19

See Appendix 6_19 for chart entitled, "Administering vaccines to infants" BCG, DTP, DTP-HepB, HepB, measles, yellow fever, OPV"

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

Immunization cards should be kept by the parents and not by the health

staff.

BCG vaccine (WHO position paper)

WHO recommends intradermal application of the (BCG) vaccine, preferably on the deltoid region of the arm using syringe and needle, although other application methods such as the multiple puncture technique are practised in some countries. Newborn vaccinees normally receive half the dose given to older children. BCG vaccine can be given simultaneously with other childhood vaccines.

[WER 2004, vol. 79, 4, pp 27-38](#)
page 34

Hepatitis B vaccines (WHO position paper)

The recommended dose (of hepatitis B vaccine) varies by product and with the age of the recipient. In most cases, infants and adolescents receive 50% of the adult dose.

The vaccine is administered by intramuscular injection in the anterolateral aspect of the thigh (infants and children aged <2 years) or in the deltoid muscle (older children and adults). Administration in the buttock is not recommended because this route of administration has been associated with decreased protective antibody levels as well as injury to the sciatic nerve. Intradermal administration is not recommended because the immune response is less reliable, particularly in children.

[WER 2004, vol. 79, 28, pp 255-263](#)
page 260

The hepatitis B vaccine does not interfere with the immune response to any other vaccine, and vice versa. Specifically, the birth-dose of hepatitis B can be given safely together with bacillus Calmette-Gurin (BCG) vaccine; BCG does not interfere negatively with the response to hepatitis B vaccine. However, unless formulated as fixed combinations, hepatitis B vaccine and other vaccines administered during the same visit should be given at different injection sites.

Hepatitis B vaccines (WHO position paper)

Testing to determine antibody responses is not necessary after routine vaccination (with hepatitis B vaccine.) However, when feasible, knowledge of response to vaccination is important in the following groups:

(i) persons at risk of occupationally acquired infection; (ii) infants born to HBsAg-positive mothers; (iii) immunocompromised persons; and (iv) sexual partners of HBsAg-positive persons.

Testing for anti-HBs should be performed by a method that allows determination of whether the anti-HBs concentration is protective (>10 mIU per ml). Adults should be tested 1-2 months after completion of the vaccination series. In settings where resources are available, infants born to HBsAg-positive mothers should be tested at 8-15 months of age, after completion of the vaccination series. Persons found to be antibody-negative after the primary series should be referred for appropriate follow-up.

[WER 2004, vol. 79, 28, pp 255-263](#)
page 260

Hepatitis B vaccines (WHO position paper)

Generally, it is easier to deliver hepatitis B vaccine at birth to infants who are born in health facilities. However, availability of monovalent hepatitis B vaccine in pre-filled singledose injection devices facilitates the administration of the vaccine by health care workers and birth attendants to infants born at home.

[WER 2004, vol. 79, 28, pp 255-263](#)
page 263

Influenza vaccines (WHO position paper)

TIVs (trivalent, inactivated influenza vaccines) are injected into the deltoid muscle (vaccinees aged >1 year) or the antero-lateral aspect of the thigh (vaccinees aged between 6 and 12 months). Inactivated influenza vaccines will not interfere with concomitantly administered diphtheria/tetanus/pertussis (DTP) or other childhood vaccines.

[WER 2005, vol. 80, 36, pp 279-287](#)
page 284

Measles vaccines (WHO position paper)

The live, attenuated measles vaccines that are now internationally available are safe, effective and relatively inexpensive and may be used interchangeably in immunization programmes.

[WER 2004, vol. 79, 14, pp 130-142](#)
page 131

Measles vaccines (WHO position paper)

Measles vaccine is generally injected subcutaneously but is also effective when administered intramuscularly.

[WER 2004, vol. 79, 14, pp 130-142](#)
page 137

Rubella vaccines (WHO position paper)

As there is no harm in vaccinating already immune individuals, serological testing before (rubella) immunization is not necessary.

[WER 2000, vol. 75, 20, pp 161-169](#)
page 167

Rubella vaccines (WHO position paper)

Each dose of this (RA27/3 rubella) vaccine, which is given by the subcutaneous route, contains a defined number of active virus particles (>1 000 TCID 50).

[WER 2000, vol. 75, 20, pp 161-169](#)
page 166

Rubella antibodies present in blood products may interfere with rubella vaccination. Therefore, 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 postvaccination.

Yellow fever vaccine (WHO position paper)

For convenience and improved coverage, the YF vaccine should be administered simultaneously with the measles vaccine at approximately 9-12 months of age, but in a separate syringe and at a different injection site.

[WER 2003, vol. 78, 40, pp 349-359](#)
page 350

The YF (yellow fever) vaccine is given as a single subcutaneous or intramuscular injection (0.5 ml per dose), although the subcutaneous route is preferred.

Yellow fever vaccine (WHO position paper)

Since there is no interference between YF (yellow fever) vaccine and other vaccines, YF vaccine may be administered simultaneously, but in different syringes and at different sites, with the following vaccines: measles, polio (oral polio vaccine), diphtheria-tetanus-pertussis, hepatitis B, hepatitis A, oral cholera and oral or parenteral typhoid. When not given simultaneously, live vaccines should be administered at least one month before or one month after the YF vaccination. This recommendation is based on the assumption that interferon released in response to the first vaccine may have a temporary inhibitory effect on other live virus vaccines.

[WER 2003, vol. 78, 40, pp 349-359](#)
page 355

Typhoid vaccines (WHO position paper)

The Vi polysaccharide vaccine is administered subcutaneously or intramuscularly as 1 dose of 25 mg to individuals aged > 2 years. The vaccine confers protection 7 days after injection.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 261

Typhoid vaccines (WHO position paper)

The (Ty21a typhoid) vaccine is usually administered orally as entericcoated capsules and is registered for use from 6 years of age.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

A liquid formulation of the Ty21a (Ty21a typhoid) vaccine can be taken by children as young as 2 years and has proved more immunogenic than the capsular formulation.

Typhoid vaccines (WHO position paper)

Ty21a (Ty21a typhoid) is remarkably well tolerated. The vaccine may be given simultaneously with other vaccines, including live vaccines against polio, cholera and yellow fever, or the measles, mumps and rubella (MMR) combination. Proguanil or antibiotics should be avoided during the 3 days before and after vaccination.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

Diphtheria vaccine (WHO position paper)

In most cases, diphtheria toxoid is administered in fixed combination with other vaccines. For childhood vaccination, DTwP or DTaP is generally used, often in combination with other antigens administered at the same time, such as Haemophilus influenzae type b, poliomyelitis, and hepatitis B vaccines, in order to reduce the number of injections. This is a positive development as long as adverse events remain infrequent and the immunogenicity of the individual components is ensured.

[WER 2006, vol. 81, 3, pp 24-32](#)
page 31

Introduction of hepatitis B vaccine into childhood immunization services. Management guidelines, including information for health workers and parents

[WHO/V&B/01.31](#)
page 10

If hepatitis B vaccine is administered on the same day as another injectable vaccine, it is preferable to give the two vaccines in different limbs. If more than one injection has to be given in the same limb, the thigh is the preferred site of injection because of the greater muscle mass, and the injection sites should be 2.5 cm to 5 cm apart so that any local reactions are unlikely to overlap.

Introduction of hepatitis B vaccine into childhood immunization services. Management guidelines, including information for health workers and parents

[WHO/V&B/01.31](#)
page 11

Hepatitis B vaccine SHOULD NOT be given in the buttock as this route of administration has been associated with decreased protective antibody levels, probably because of inadvertent subcutaneous injection or injection into deep fat tissue. In addition there may be a risk of injury to the sciatic nerve.

Hepatitis B vaccine SHOULD NOT be administered intradermally because this route of administration does not produce an adequate antibody response in children.

Hepatitis B vaccine SHOULD NOT be mixed in the same syringe with other vaccines unless specifically recommended by the manufacturer. (Note: pentavalent DTP-HepB+Hib vaccine is supplied in two separate vials, one containing DTP-HepB vaccine (liquid), the other containing Hib vaccine (lyophilized). The manufacturer recommends mixing the contents of the two vials and giving DTP-HepB+Hib vaccine in the same syringe.)

Hepatitis B vaccines (WHO position paper)

[WER 2004, vol. 79, 28, pp 255-263](#)
page 258

Two types of hepatitis B vaccines are available: plasmaderived vaccines and recombinant vaccines. The two vaccines show no differences in terms of reactogenicity, efficacy or duration of protection. The two types of hepatitis B vaccine can be used interchangeably

Typhoid vaccines (WHO position paper)

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

(The Vi polysaccharide typhoid vaccine) can be given simultaneously with other vaccines relevant for international travelers such as the vaccines against yellow fever and hepatitis A.

Diphtheria vaccine (WHO position paper)

[WER 2006, vol. 81, 3, pp 24-32](#)
page 28

(Vaccines containing diphtheria toxoid should be administered) by intramuscular injection only.

Hepatitis A vaccines (WHO position paper)

[WER 2000, vol. 75, 5, pp 38-44](#)
page 42

Hepatitis A vaccine may be administered with all other vaccines included in the Expanded Programme on Immunization and with vaccines commonly given for travel. Concurrent administration of immune serum globulin does not appear to influence significantly the formation of protective antibodies.

Mumps virus vaccines (WHO position paper)

Assumed susceptible persons may be vaccinated (with mumps vaccine) without prior laboratory testing.

[WER 2001, vol. 76, 45, pp 346-356](#)
page 349

Mumps virus vaccines (WHO position paper)

Primary mumps vaccination, especially in the recommended combination with rubella and measles vaccines, is easily adapted to the national vaccination programmes and does not interfere significantly with simultaneously-administered vaccines.

[WER 2001, vol. 76, 45, pp 346-356](#)
page 354

Introducing hepatitis B vaccine into national immunization services

For administering HepB vaccine:

- _ A 25 mm, 22 or 23 gauge needle is recommended.
- _ The standard paediatric dose is 0.5 ml.

[WHO/V&B/01.28](#)
page 3

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

Administration summary: MR/MMR (see Appendix 2_39.)

[WHO/IVB/04.06](#)
page 9

Tetanus vaccine (WHO position paper)

Administration of adsorbed tetanus toxoid is by intramuscular injection.

[WER 2006, vol. 81, 20, pp 198-208](#)
page 202

State of the art of new vaccines: research and development

Of importance for the supply of rabies vaccine is the use of the intradermal route schedule which reduces the number of vaccine vials and thereby the cost of PEP by up to 80% (US\$ 5-10 for vaccine alone).

[WHO/IVB/06.01](#)
page 89

Japanese encephalitis vaccines (WHO position paper)

The cell culture-based, live attenuated (JE) vaccine appears to require fewer doses for longterm protection, is in most cases less expensive, and seems to represent an attractive alternative to the mouse brain-derived vaccine. However, more needs to be known on its safety and efficacy when used in immunodeficient people, as well as on the impact of co-administering this vaccine with other vaccines (page 332.)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 332

The live attenuated vaccine induces protection for several years after 1 or 2 doses, whereas durable protection by the mouse brain-derived vaccine may require 2-3 initial doses followed by boosters at intervals of approximately 3 years. As the price per dose of the mouse brain-derived vaccine in most countries is higher than that of the live attenuated vaccine, the need for repeated doses renders the former vaccine unaffordable in many JE-endemic countries (page 339)

Pneumococcal conjugate vaccine for childhood immunization (WHO position paper)

[WER 2006, vol. 82, 10, pp 93-104](#)
page 98

PCV-7 should not be mixed in the same syringe with other vaccines.

The vaccine may be administered concomitantly with other vaccines in the Expanded Programme on Immunization provided that separate syringes and sites of injection are used.

(Page 103) - (PCV-7) may be administered concurrently with, though at a different site from, other vaccines in infant immunization programmes, including DTP, hepatitis B, H. influenzae type b and polio vaccines.

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 335

The mouse brain-derived JE vaccine is given subcutaneously in doses of 0.5 or 1 ml (with some vaccines: 0.25 ml or 0.50 ml) the lower dose being for children aged <3 years.

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 336

Current experience, primarily from Taiwan (China) and Thailand, does not suggest reduced seroconversion rates or an increase in adverse events when mouse brain-derived JE vaccine is given simultaneously with vaccines against measles, diphtheria-tetanus-pertussis (DTP) and polio as part of the Expanded Programme Immunization (EPI) programme. However, the possible impact of co-administration of the mouse brain-derived vaccine with other vaccines of the childhood immunization programme has not been systematically studied.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

Following exposure to a suspected rabid animal, prevention of human rabies consists of prompt wound cleansing and administration of a modern CCV and, in cases of severe (category III) exposure, of rabies immunoglobulin (RIG).

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

it is strongly recommended that the production and use of NTVs for humans be discontinued and replaced by modern CCVs as soon as possible.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

Pre-exposure immunization is recommended for anyone at increased risk of exposure to rabies virus, either by nature of their residence or occupation, or when travelling.

Rabies vaccines (WHO position paper)

Countries are encouraged to implement control programmes to ensure coordination between all public sectors involved in rabies control.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 427

Rabies vaccines (WHO position paper)

Pre-exposure vaccination using any of the modern CCVs is recommended for anyone at increased risk of exposure to rabies virus. This recommendation includes laboratory staff, veterinarians, animal handlers, wildlife officers with frequent exposure to potentially infected animals, as well as visitors to areas with high risk of rabies.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

For adults, 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, where the induction of an adequate immune response may be less reliable.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

ID administration of 0.1 ml volumes on days 0, 7, and 28 (day 28 preferable, but administration may be advanced towards day 21 if time is limited) is an acceptable alternative to the standard IM route. However, ID administration is technically more demanding and requires appropriate staff training and qualified supervision.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

Periodic booster injections are recommended only for people whose occupation puts them at continuous or frequent risk of rabies exposure. In such cases, a booster dose should be given at intervals ideally dictated by regular testing for antirabies antibodies. Potential laboratory exposures to high concentrations of rabies virus motivates testing as often as every 6 months; VNA titres of at least 0.5 IU/ml indicate protection. Where serological testing is unavailable, booster vaccination every 5 years may be an acceptable alternative.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

The indication for post-exposure prophylaxis with or without RIG depends on the type of contact with the suspected rabid animal:- Category I touching or feeding animals, licks on the

skin (i.e. no exposure);

- Category II nibbling of uncovered skin, minor scratches or abrasions without bleeding, licks on broken skin;

- Category III single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks, exposures to bats.

For category I exposures, no prophylaxis is required; whereas for category II, immediate vaccination, and for category III, immediate vaccination and administration of RIG are recommended. For categories II and III, thorough (for ~15 minutes) washing and flushing with soap/detergent and copious amounts of water of all bite wounds and scratches should be done immediately, or as early as possible.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 433

Post-exposure prophylaxis can be discontinued if the suspect animal is proved by appropriate laboratory examination to be free of rabies, or, in the case of domestic dogs or cats, the animal remains healthy throughout a 10-day observation period.

Factors that should be taken into consideration when deciding whether or not to initiate post-exposure prophylaxis include the likelihood of the concerned animal being rabid, category of exposure (III), clinical features of the animal, as well as its availability for observation and laboratory testing. In most situations in developing countries, the vaccination status of the offending animal should not be taken into consideration to withhold prophylaxis.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 433

Intramuscular administration

The post-exposure vaccination schedule is based on IM doses of 1 ml or 0.5 ml, depending on the manufacturer. The recommended regimen consists of either a 5-dose or a 4-dose schedule.

- (i) The 5-dose regimen prescribes 1 dose injected into the deltoid muscle (or anterolateral thigh in children aged <2years) on each of days 0, 3, 7, 14 and 28.
- (ii) The 4-dose regimen prescribes 2 doses on day 0 (1 in each of the 2 deltoid/thigh sites) followed by 1 dose on each of days 7 and 21.

Intradermal administration

Either the 8-site or the 2-site regimen should be used, as recommended by the respective vaccine manufacturer.

- (i) The 8-site ID regimen prescribes on day 0, injections of 0.1 ml given at 8 sites (1 in each upper arm, 1 in each lateral thigh, 1 on each side of the suprascapular region, and 1 on each side of the lower quadrant region of the abdomen); on day 7, 1 injection in each upper arm and each lateral thigh; and on each of days 30 and 90, 1 injection in one upper arm.⁸ The 1 dose on day 90 may be replaced by 2 ID injections on day 30.
- (ii) The 2-site ID regimen⁹ prescribes 1 injection of 0.1 ml at 2 sites on days 0, 3, 7 and 28.

For rabies-exposed patients who have previously undergone complete pre-exposure vaccination or postexposure prophylaxis with a CCV, 2 IM or ID doses of such a vaccine administered on days 0 and 3 are sufficient. RIG is not necessary in such cases. The same rules apply to people vaccinated against rabies who have demonstrated VNA titres of at least 0.5 IU/ml. Vaccination cards carefully recording previous immunizations are invaluable for correct decision-making.

Rabies vaccines (WHO position paper)

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page 434

Rabies immunoglobulin for passive immunization

RIG should be administered in all category III exposures and in category II exposures involving immunodeficient individuals. Given its relatively slow clearance, human rabies immunoglobulin (HRIG) is the preferred product, particularly in cases of multiple severe exposures. However, HRIG is in short supply and available mainly in industrialized countries. Where HRIG is not available or affordable, purified equine immunoglobulin (ERIG) or F(ab)₂ products of ERIG should be used. Most of the new ERIG preparations are potent, highly purified, safe and considerably less expensive than HRIG. However, they are of heterologous origin and carry a small risk of hypersensitivity reactions.¹⁰ There are no scientific grounds for performing a skin test prior to administration of ERIG because testing does not predict reactions, and ERIG should be given whatever the result of the test. RIG for passive immunization should not be injected later than 7 days after the initiation of post-exposure vaccination. The dose for HRIG is 20 IU/kg body weight, and for ERIG and F(ab)₂ products 40 IU/kg body weight. All of the RIG, or as much as anatomically possible (cave compartment syndrome), should be administered into or around the wound site(s). Any remaining RIG should be injected IM at a site distant from the site of vaccine administration.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

In resource-limited settings where there are many competing health priorities, the evidence does not support routine immunization of the elderly and high-risk populations with PPV23. Given the substantial effects of herd immunity in adult age groups following routine infant immunization with PCV7, a higher priority should be given to introducing and maintaining high coverage of infants with PCV7.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 382

Given the high burden of pneumococcal disease in children and adults, WHO considers the prevention of pneumococcal disease to be a high priority in both industrialized and developing countries.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
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Many industrialized countries recommend PPV23 immunization of their elderly and other high-risk groups.^{26, 27} In resource-limited settings where there are many competing health priorities, the evidence does not support routine immunization of the elderly and high-risk populations with PPV23. Given the substantial effects of herd immunity in adult age groups following routine infant immunization with PCV7, a higher priority should be given to introducing and maintaining high coverage of infants with PCV7. Countries considering introducing PPV23 to elderly or other high-risk populations will need to develop strategies for reaching these target populations.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 383

Because of the low level of evidence for benefit, routine PPV23 vaccination of HIV-infected adults is not recommended in resource-limited settings.⁴⁶ In low-income countries, WHO recommends the use of other measures that directly or indirectly may help prevent pneumococcal disease, such as trimethoprim-sulfamethoxazole chemoprophylaxis and antiretroviral therapy.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

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page 383

PPV23 has not been shown to reduce the risk of CAP associated with seasonal or pandemic influenza. However, in countries using PPV23, high levels of vaccine uptake in at-risk populations may help reduce the incidence of pneumococcal bacteraemia during an influenza epidemic or pandemic. Nevertheless, in countries that do not routinely administer PPV23 to high-risk populations, data are insufficient to recommend introducing this vaccine to reduce the morbidity and mortality associated with pandemic influenza.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
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Insufficient evidence of a beneficial effect precludes recommending routine PPV23 vaccination of pregnant or breastfeeding women in order to prevent pneumococcal disease in infants during the first few months of life.⁴⁷ In view of the strong herd immunity effect of routine infant immunization with PCV7 and the indirect protection of infants too young to receive conjugated pneumococcal vaccine, emphasis should be placed on ensuring high coverage of PCV7 (or an equivalent conjugated pneumococcal vaccine) in national immunization programmes.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

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deferred during pregnancy, particularly during the first trimester, because their effect on the fetus has not been fully evaluated. However, no adverse consequences have been reported among newborns whose mothers were given PPV23 during pregnancy. In countries that routinely administer PCV23 to individuals with identified risk factors for pneumococcal disease (see above), women considered to be in urgent need of this vaccine may be vaccinated even during pregnancy.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
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Primary immunization with PPV23 consists of a single intramuscular or subcutaneous dose. The intramuscular route may be preferred because of the lower rate of reactions at the injection site. The optimal timing, frequency and clinical effectiveness of additional doses of PPV23 are poorly defined, and national recommendations regarding revaccination vary. However, on the basis of the data on the duration of vaccine-induced protection, WHO suggests one single revaccination >5 years after a first vaccination.
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23-valent pneumococcal polysaccharide vaccine (WHO position paper)

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Additional data are needed on the possible induction of hyporesponsiveness following repeated doses of pneumococcal polysaccharide vaccine. Further studies are also required to make recommendations on the possible use of PPV23 to extend the serotype coverage in individuals who have previously received PCV7.⁴⁹

Polio

Immunization in practice: a practical resource guide for Health workers 2004 update _____ **Module 2: The vaccines**

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Administration summary: OPV (see Appendix 2_5)

Immunization in practice: a practical resource guide for Health workers 2004 update _____ **Module 6: Holding an immunization session**

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See Appendix 6_19 for chart entitled, "Administering vaccines to infants" BCG, DTP, DTP-HepB, HepB, measles, yellow fever, OPV"

Pregnant Women

Immunization in practice: a practical resource guide for Health workers 2004 update _____ **Module 2: The vaccines**

[WHO/IVB/04.06](#)
page 12

Administration summary: TT vaccine and tetanus toxoid immunization schedule for routine immunization of pregnant women (see Appendix 2_9)

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

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Insufficient evidence of a beneficial effect precludes recommending routine PPV23 vaccination of pregnant or breastfeeding women in order to prevent pneumococcal disease in infants during the first few months of life.⁴⁷ In view of the strong herd immunity effect of routine infant immunization with PCV7 and the indirect protection of infants too young to receive conjugated pneumococcal vaccine, emphasis should be placed on ensuring high coverage of PCV7 (or an equivalent conjugated pneumococcal vaccine) in national immunization programmes.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

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Program Management

State of the art of new vaccines: research and development

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Of importance for the supply of rabies vaccine is the use of the intradermal route schedule which reduces the number of vaccine vials and thereby the cost of PEP by up to 80% (US\$ 5-10 for vaccine alone).

Rabies

State of the art of new vaccines: research and development

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page 89

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Rabies vaccines (WHO position paper)

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page 426

Following exposure to a suspected rabid animal, prevention of human rabies consists of prompt wound cleansing and administration of a modern CCV and, in cases of severe (category III) exposure, of rabies immunoglobulin (RIG).

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

it is strongly recommended that the production and use of NTVs for humans be discontinued and replaced by modern CCVs as soon as possible.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

Pre-exposure immunization is recommended for anyone at increased risk of exposure to rabies virus, either by nature of their residence or occupation, or when travelling.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 427

Countries are encouraged to implement control programmes to ensure coordination between all public sectors involved in rabies control.

Rabies vaccines (WHO position paper)

Pre-exposure vaccination using any of the modern CCVs is recommended for anyone at increased risk of exposure to rabies virus. This recommendation includes laboratory staff, veterinarians, animal handlers, wildlife officers with frequent exposure to potentially infected animals, as well as visitors to areas with high risk of rabies.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

For adults, 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, where the induction of an adequate immune response may be less reliable.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

ID administration of 0.1 ml volumes on days 0, 7, and 28 (day 28 preferable, but administration may be advanced towards day 21 if time is limited) is an acceptable alternative to the standard IM route. However, ID administration is technically more demanding and requires appropriate staff training and qualified supervision.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 432

Rabies vaccines (WHO position paper)

Periodic booster injections are recommended only for people whose occupation puts them at continuous or frequent risk of rabies exposure. In such cases, a booster dose should be given at intervals ideally dictated by regular testing for antirabies antibodies. Potential laboratory exposures to high concentrations of rabies virus motivates testing as often as every 6 months; VNA titres of at least 0.5 IU/ml indicate protection. Where serological testing is unavailable, booster vaccination every 5 years may be an acceptable alternative.

[WER 2007, vol. 82, 49/50, pp 425-436](#)
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Rabies vaccines (WHO position paper)

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page 432

The indication for post-exposure prophylaxis with or without RIG depends on the type of contact with the suspected rabid animal:- Category I touching or feeding animals, licks on the

skin (i.e. no exposure);

- Category II nibbling of uncovered skin, minor scratches or abrasions without bleeding, licks on broken skin;

- Category III single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks, exposures to bats.

For category I exposures, no prophylaxis is required; whereas for category II, immediate vaccination, and for category III, immediate vaccination and administration of RIG are recommended. For categories II and III, thorough (for ~15 minutes) washing and flushing with soap/detergent and copious amounts of water of all bite wounds and scratches should be done immediately, or as early as possible.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 433

Post-exposure prophylaxis can be discontinued if the suspect animal is proved by appropriate laboratory examination to be free of rabies, or, in the case of domestic dogs or cats, the animal remains healthy throughout a 10-day observation period.

Factors that should be taken into consideration when deciding whether or not to initiate post-exposure prophylaxis include the likelihood of the concerned animal being rabid, category of exposure (III), clinical features of the animal, as well as its availability for observation and laboratory testing. In most situations in developing countries, the vaccination status of the offending animal should not be taken into consideration to withhold prophylaxis.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 433

Intramuscular administration

The post-exposure vaccination schedule is based on IM doses of 1 ml or 0.5 ml, depending on the manufacturer. The recommended regimen consists of either a 5-dose or a 4-dose schedule.

- (i) The 5-dose regimen prescribes 1 dose injected into the deltoid muscle (or anterolateral thigh in children aged <2years) on each of days 0, 3, 7, 14 and 28.
- (ii) The 4-dose regimen prescribes 2 doses on day 0 (1 in each of the 2 deltoid/thigh sites) followed by 1 dose on each of days 7 and 21.

Intradermal administration

Either the 8-site or the 2-site regimen should be used, as recommended by the respective vaccine manufacturer.

- (i) The 8-site ID regimen prescribes on day 0, injections of 0.1 ml given at 8 sites (1 in each upper arm, 1 in each lateral thigh, 1 on each side of the suprascapular region, and 1 on each side of the lower quadrant region of the abdomen); on day 7, 1 injection in each upper arm and each lateral thigh; and on each of days 30 and 90, 1 injection in one upper arm.8 The 1 dose on day 90 may be replaced by 2 ID injections on day 30.
- (ii) The 2-site ID regimen9 prescribes 1 injection of 0.1 ml at 2 sites on days 0, 3, 7 and 28.

For rabies-exposed patients who have previously undergone complete pre-exposure vaccination or postexposure prophylaxis with a CCV, 2 IM or ID doses of such a vaccine administered on days 0 and 3 are sufficient. RIG is not necessary in such cases. The same rules apply to people vaccinated against rabies who have demonstrated VNA titres of at least 0.5 IU/ml. Vaccination cards carefully recording previous immunizations are invaluable for correct decision-making.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 434

Rabies immunoglobulin for passive immunization

RIG should be administered in all category III exposures and in category II exposures involving immunodeficient individuals. Given its relatively slow clearance, human rabies immunoglobulin (HRIG) is the preferred product, particularly in cases of multiple severe exposures.

However, HRIG is in short supply and available mainly in industrialized countries. Where HRIG is not available or affordable, purified equine immunoglobulin (ERIG) or F(ab)₂ products of ERIG should be used. Most of the new ERIG preparations are potent, highly purified, safe and considerably less expensive than HRIG. However, they are of heterologous origin and carry a small risk of hypersensitivity reactions.¹⁰ There are no scientific grounds for performing a skin test prior to administration of ERIG because testing does not predict reactions, and ERIG should be given whatever the result of the test. RIG for passive immunization should not be injected later than 7 days after the initiation of post-exposure vaccination. The dose for HRIG is 20 IU/kg body weight, and for ERIG and F(ab)₂ products 40 IU/kg body weight. All of the RIG, or as much as anatomically possible (cave compartment syndrome), should be administered into or around the wound site(s). Any remaining RIG should be injected IM at a site distant from the site of vaccine administration.

Rubella

Rubella vaccines (WHO position paper)

[WER 2000, vol. 75, 20, pp 161-169](#)
page 167

As there is no harm in vaccinating already immune individuals, serological testing before (rubella) immunization is not necessary.

Rubella vaccines (WHO position paper)

[WER 2000, vol. 75, 20, pp 161-169](#)
page 166

Each dose of this (RA27/3 rubella) vaccine, which is given by the subcutaneous route, contains a defined number of active virus particles (>1 000 TCID₅₀).

Rubella antibodies present in blood products may interfere with rubella vaccination. Therefore, 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 postvaccination.

Schedule

Typhoid vaccines (WHO position paper)

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

The (Ty21a typhoid) vaccine is usually administered orally as enteric-coated capsules and is registered for use from 6 years of age.

A liquid formulation of the Ty21a (Ty21a typhoid) vaccine can be taken by children as young as 2 years and has proved more immunogenic than the capsular formulation.

Japanese encephalitis vaccines (WHO position paper)

[WER 2006, vol. 81, 34/35, pp 331-340](#)
page 332

The cell culture-based, live attenuated (JE) vaccine appears to require fewer doses for long-term protection, is in most cases less expensive, and seems to represent an attractive alternative to the mouse brain-derived vaccine. However, more needs to be known on its safety and efficacy when used in immunodeficient people, as well as on the impact of co-administering this vaccine with other vaccines (page 332.)

The live attenuated vaccine induces protection for several years after 1 or 2 doses, whereas durable protection by the mouse brain-derived vaccine may require 2-3 initial doses followed by boosters at intervals of approximately 3 years. As the price per dose of the mouse brain-derived vaccine in most countries is higher than that of the live attenuated vaccine, the need for repeated doses renders the former vaccine unaffordable in many JE-endemic countries (page 339)

Conclusions and recommendations from the meeting of the Immunization Strategic Advisory Group of Experts (SAGE) - November 2006

[WER 2006, vol. 82, 1, pp 1-16](#)
page 9

Consistent with WHO's position on new vaccines, PCV-7 (7-serotype conjugate pneumococcal vaccine) can be easily integrated into routine vaccination schedules, and it may be administered at the same time, though at a different site, as other vaccines in infant immunization programmes, including DTP, hepatitis B, Hib and polio vaccines. Routine immunization with PCV-7 should be initiated before the age of 6 months to maximize the benefits of the vaccine and may start as early as 6 weeks of age.

23-valent pneumococcal polysaccharide vaccine (WHO position paper)

[WER 2008, vol. 83, 42, pp 373-384](#)
page 384

Primary immunization with PPV23 consists of a single intramuscular or subcutaneous dose. The intramuscular route may be preferred because of the lower rate of reactions at the injection site. The optimal timing, frequency and clinical effectiveness of additional doses of PPV23 are poorly defined, and national recommendations regarding revaccination vary. However, on the basis of the data on the duration of vaccine-induced protection, WHO suggests one single revaccination >5 years after a first vaccination.

Tetanus

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page 12

Administration summary: TT vaccine and tetanus toxoid immunization schedule for routine immunization of pregnant women (see Appendix 2_9)

Immunization in practice: a practical resource guide for Health workers 2004 update _____ **Module 6: Holding an immunization session**

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page 12

To assess a woman's eligibility for TT immunization:

First ask if the woman has a TT vaccination card. If she has, give the dose required according to the national TT schedule. If the woman does not have a record, ask her if she has ever had a dose of TT in the past:

If she says NO: give the first dose of TT and an appointment for the second dose one month later, and give her an immunization card.

If she says YES: ask how many doses she has received in the past and give the next doses in series. Take into account any dose given in SIAs.

If she cannot remember or does not know, you should give her a dose of TT and a follow-up appointment for the next dose.

Tetanus vaccine (WHO position paper)

[WER 2006, vol. 81, 20, pp 198-208](#)
page 202

Administration of adsorbed tetanus toxoid is by intramuscular injection.

Travellers

Typhoid vaccines (WHO position paper)

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

(The Vi polysaccharide typhoid vaccine) can be given simultaneously with other vaccines relevant for international travelers such as the vaccines against yellow fever and hepatitis A.

Rabies vaccines (WHO position paper)

[WER 2007, vol. 82, 49/50, pp 425-436](#)
page 426

Pre-exposure immunization is recommended for anyone at increased risk of exposure to rabies virus, either by nature of their residence or occupation, or when travelling.

Typhoid vaccines: WHO position paper

[WER 2008, vol. 83, 6, pp 49-60](#)
page 51

Typhoid fever vaccination may be offered to travellers to destinations where the risk of typhoid fever is high, especially to those staying in endemic areas for >1 month and/or in locations where antibiotic resistant strains of *S. Typhi* are prevalent.

Typhoid

Typhoid vaccines (WHO position paper)

The Vi polysaccharide vaccine is administered subcutaneously or intramuscularly as 1 dose of 25 mg to individuals aged > 2 years. The vaccine confers protection 7 days after injection.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 261

Typhoid vaccines (WHO position paper)

The (Ty21a typhoid) vaccine is usually administered orally as entericcoated capsules and is registered for use from 6 years of age.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

A liquid formulation of the Ty21a (Ty21a typhoid) vaccine can be taken by children as young as 2 years and has proved more immunogenic than the capsular formulation.

Typhoid vaccines (WHO position paper)

Ty21a (Ty21a typhoid) is remarkably well tolerated. The vaccine may be given simultaneously with other vaccines, including live vaccines against polio, cholera and yellow fever, or the measles, mumps and rubella (MMR) combination. Proguanil or antibiotics should be avoided during the 3 days before and after vaccination.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

Typhoid vaccines (WHO position paper)

(The Vi polysaccharide typhoid vaccine) can be given simultaneously with other vaccines relevant for international travelers such as the vaccines against yellow fever and hepatitis A.

[WER 2000, vol. 75, 32, pp 257-264](#)
page 262

Typhoid vaccines: WHO position paper

In view of the continued high burden of typhoid fever and increasing antibiotic resistance, and given the safety, efficacy, feasibility and affordability of 2 licensed vaccines (Vi and Ty21a), countries should consider the programmatic use of typhoid vaccines for controlling endemic disease. In most countries, the control of the disease will require vaccination only of high-risk groups and populations. Given the epidemic potential of typhoid fever, and observations on the effectiveness of vaccination in interrupting outbreaks, typhoid fever vaccination is recommended also for outbreak control.

[WER 2008, vol. 83, 6, pp 49-60](#)
page 50

Typhoid vaccines: WHO position paper

Decisions on whether or not to initiate programmatic use of typhoid vaccines should be based on knowledge of the local epidemiological situation. Important information includes data on subpopulations at particular risk and age-specific incidence rates, as well as on the sensitivity of the prevailing *S. Typhi* strains to relevant antimicrobial drugs. Ideally, cost-effectiveness analyses should be part of the planning process.

[WER 2008, vol. 83, 6, pp 49-60](#)
page 51

Typhoid vaccines: WHO position paper

Immunization of school-age and/or preschool-age children is recommended 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. The selection of delivery strategy (school or community-based vaccination) depends on factors such as the age-specific incidence of disease, subgroups at particular risk and school enrolment rates, and should be decided by the concerned countries.

[WER 2008, vol. 83, 6, pp 49-60](#)
page 51

Typhoid vaccines: WHO position paper

Typhoid fever vaccination may be offered to travellers to destinations where the risk of typhoid fever is high, especially to those staying in endemic areas for >1 month and/or in locations where antibiotic resistant strains of *S. Typhi* are prevalent.

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page 51

Typhoid vaccines: WHO position paper

All typhoid fever vaccination programmes should be implemented in the context of other efforts to control the disease, including health education, water quality and sanitation improvements, and training of health professionals in diagnosis and treatment.

[WER 2008, vol. 83, 6, pp 49-60](#)
page 51

Typhoid vaccines: WHO position paper

The Ty21a vaccine:
The capsules are licensed for use in individuals aged >5 years; the liquid vaccine can be administered from the age of 2 years. Both versions of the vaccine are administered every other day; a 3-dose or, in Canada and USA, a 4-dose regimen is recommended for the capsules, whereas the liquid form requires 3 doses. The Ty21a vaccine may be given simultaneously with other vaccines, including live vaccines against polio, cholera, and yellow fever, or the measles, mumps and rubella (MMR) combination.

[WER 2008, vol. 83, 6, pp 49-60](#)
page 56

Vaccine Handling

Introduction of Haemophilus influenzae type b vaccine into immunization programmes

[WHO/V&B/00.05](#)
page 4

Types and formulations of Hib vaccines can be interchanged, so vaccines from different manufacturers can be used for each dose that a child receives.

Diluents, both in saline form and made from other vaccines, are produced to go with specific Hib vaccines and are not interchangeable.

Varicella

Varicella vaccines (WHO position paper)

[WER 1998, vol. 73, 32, pp 241-248](#)
page 245

When given at separate sites and with separate syringes, simultaneous vaccination of varicella with other vaccines is as safe and immunogenic as when the vaccines are given at intervals of several weeks.

Varicella vaccines (WHO position paper)

[WER 1998, vol. 73, 32, pp 241-248](#)
page 246

Due to the theoretical risk of Reye syndrome, the use of salicylates is discouraged for 6 weeks following varicella vaccination.

Vitamin A

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page 11

If vitamin A was distributed during NIDs in your program area within the past four months:

- _ Assume that all infants and children 6-59 months of age have received a dose (or 12-59 months in countries where infants under 12 months are not given vitamin A with NIDs).
- _ Do not give another dose unless the caretaker says the child did not participate in NIDs.
- _ Do not look for records as vitamin A doses given at NIDs are not meant to be recorded due to the difficulty of recording at mass campaigns.

Yellow Fever

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 2: The vaccines

[WHO/IVB/04.06](#)
page 23

Administration summary: YF vaccine (see Appendix 2_17.)

Immunization in practice: a practical resource guide for Health workers 2004 update_____Module 6: Holding an immunization session

[WHO/IVB/04.06](#)

page 19

See Appendix 6_19 for chart entitled, "Administering vaccines to infants" BCG, DTP, DTP-HepB, HepB, measles, yellow fever, OPV"

Yellow fever vaccine (WHO position paper)

[WER 2003, vol. 78, 40, pp 349-359](#)

page 350

For convenience and improved coverage, the YF vaccine should be administered simultaneously with the measles vaccine at approximately 9-12 months of age, but in a separate syringe and at a different injection site.

The YF (yellow fever) vaccine is given as a single subcutaneous or intramuscular injection (0.5 ml per dose), although the subcutaneous route is preferred.

Yellow fever vaccine (WHO position paper)

[WER 2003, vol. 78, 40, pp 349-359](#)

page 355

Since there is no interference between YF (yellow fever) vaccine and other vaccines, YF vaccine may be administered simultaneously, but in different syringes and at different sites, with the following vaccines: measles, polio (oral polio vaccine), diphtheria-tetanus-pertussis, hepatitis B, hepatitis A, oral cholera and oral or parenteral typhoid. When not given simultaneously, live vaccines should be administered at least one month before or one month after the YF vaccination. This recommendation is based on the assumption that interferon released in response to the first vaccine may have a temporary inhibitory effect on other live virus vaccines.