TRAVEL WITH CHILDREN AND BABIES

1 General

Children in good health – although more sensitive than adults to all sorts of infections – in themselves present no additional problems, on condition that a maximum effort is made beforehand to estimate the risks of a stay in the (sub)tropics and suitable precautionary measures are taken.

After your arrival, a few basic principles should be observed. The most important points to which attention must be given are:

- Basic immunizations: These should preferably be brought up to date before departure. Special attention must be given to polio and measles, as these still occur in developing countries. The immunization schedules must be modified for babies and children under 1 year old if you are travelling to a developing country.
- Malaria: It is advisable to enquire first whether a trip with young children to highly endemic areas is really necessary, as malaria is more serious in young children. In addition to a suitable chemoprophylaxis, an impregnated mosquito net is required, as children are more easily exposed to mosquito bites. You will find more information on this in the section "Malaria".
- Diarrhoea: Children are particularly susceptible to diarrhoea, hence the great importance of good hygiene and a clear understanding of how to recognise symptoms and to react to them. Dehydration resulting from diarrhoea is a particular problem with children under 2 years old. They get diarrhoea more frequently and for longer periods than older children. Oral salt-sugar solution is a remedy against dehydration. Your general practitioner should provide written instructions, with the correct directions for use and a description of the first signs of dehydration. It is best that the mother continues to breast-feed the baby for as long as possible while travelling, as this offers the best protection against diarrhoea. In a hot climate extra water can be given with a spoon.
- General preventive measures based on a good knowledge of the local health problems are essential. Safe behaviour should be adopted in connection with drinking-water, food, swimming (is schistosomiasis present in rivers, lakes, pools), animals (stray cats and dogs), etc. Pay special attention to sunburn, prickly heat, walking barefoot. Overexposure to the sun during childhood is best avoided, as its cumulative effect increases the risk of occurrence of skin cancer (especially melanoma). Acute altitude sickness occurs with approximately the same frequency in children as in adults. It is advisable not to stay overnight above 2000 m with children under 2 years old and not above 3000 m with

children under 10 years old. Too little is known about the use of acetazolamide in children. In case of illness a good handbook on self-help and a travel medical kit prove very useful, as they show you how to treat diarrhoea, fever / high temperature, minor wounds, etc. It is not always easy to find a doctor.

- Air travel: Babies are usually not permitted to travel by air until they are 7 days old (air travel is discouraged for premature babies; emergency transport in an incubator, with medical supervision, can be arranged from 48 hours after birth). Approximately 15% of children get earache when travelling by air (especially during the descent). It is advisable if in doubt to have their ears examined before departure. During ascent and descent you can try to prevent problems of earache by giving them a feeding bottle. Some paediatricians on the other hand warn that this causes even more air to be swallowed, with the result that the crying can be further increased by expansion of air in the abdomen.

2 Basic vaccinations scheme (Belgium):

At 2 months	DI-TE-PER POLIO /IPV(**) H. INFLUENZAE type b	1st dose 1st dose 1st dose	DTPw or DTPa (*) Polio vaccine is obligatory.
At 3 months	DI-TE-PER POLIO /IPV(**) H. INFLUENZAE type b HEPATITIS B	2nd dose (2nd dose) 2nd dose 1st dose	DTPw or DTPa (*)
At 4 months	DI-TE-PER POLIO /IPV(**) H. INFLUENZAE type b HEPATITIS B	3rd dose 3rd dose 3rd dose 2nd dose	DTPw or DTPa (*) Polio vaccine is obligatory.
13-14 months	DI-TE-PER POLIO /IPV(**) H. INFLUENZAE type b HEPATITIS B	4th dose 4th dose 4th dose 3rd dose	DTPw or DTPa (*) Polio vaccine is obligatory.

15 months	MEASLES-MUMPS-RUBELLA	The anti-measles vaccine may be administered to children over 9 months of age, who are at higher risk e.g. children in orphanages or similar communities (where multiple children lose protection from maternal antibodies at the same time), followed by a new vaccination 6 months later in combination with rubella and mumps. If there is a threat of an epidemic all susceptible children over 9 months may be vaccinated: the vaccination can be effective if given within 72 hours after contact.	
5-6 years	DI-TE or DTPa(*) POLIO /IPV(**)	5th dose 5th dose	
11-12 years	MEASLES-MUMPS-RUBELLA HEPATITIS B	Repeat vaccination. Also given to children who have already had one of these diseases. Basic vaccination for as yet unvaccinated individuals.	
15 years	DI-TE (Tedivax® pro adulto) Repeat vaccination	Repeat (booster) every 10 years	

(*) At present especially the tetravalent diphtheria-, tetanus-, polio and acellular whooping cough (pertussis) vaccine is used. The Flemish Government has provided the acellular vaccine for the repeat (booster) DTP at 13 months .

(**) IPV = inactivated injectable polio vaccine.

In risk groups: hepatitis B and BCG from birth, influenza from 6 months.

In children whose vaccination status is unknown (e.g. in adopted children), a start is made from the beginning. No whooping cough (pertussis) vaccine based on whole cells should be used for children older than 2 years. The acellular whooping cough vaccine can be used up to and including the age of 6 years. No full dose of diphtheria should be used for children older than 7 years. For these older children Tedivax® pro Adulto and Revaxis ® can be used as it contains a lower dose of diphtheria-toxoid).

If the vaccination scheme is interrupted, it suffices to proceed with the remaining doses, without repeating the complete schedule. The effect of one or more previous doses is maintained (no repeat of whooping cough vaccination after the age of 2 years).

3 Basic vaccinations

3.1 Tetanus-diphtheria-pertussis (whooping cough)-polio

Oral POLIO vaccine (Sabin®) is no longer given in Belgium, but is still used in some other countries. When travelling to a risk country the child should if possible have had 4 doses. In Belgium and in most other European countries the injectable polio vaccine in the form of **combined paediatric** vaccines is exclusively used.

In children who travel to the tropics at a very young age basic vaccination can be started earlier, i.e. from 6 weeks. The next 2 doses may be given after that with a minimum interval of 4 weeks. 3 doses are best administered before departure to a risky country.

3.2 Haemophilus influenzae type b

3.2.1 General

Haemophilus influenzae type b carries a high risk of inducing bacterial meningitis in children under the age of 5 years. Three vaccines are available at present.

3.2.2 Vaccination scheme

- **Less than 6 months of age:** 3 injections at 2, 3, 4 months of age, and a repeat booster vaccination at around 13-14 months (together with DI-TE-PER-IPV, but at another

injection site). 2 doses are best administered before departure; in emergency, administration may be started from the age of 6 weeks.

- **From 6 to 12 months:** 2 injections with an interval of 1 to 2 months between injections, and a repeat booster vaccination at 13-18 months.
- **From 1 to 5 years:** 1 single injection suffices.

*

3.3 Hepatitis B

3.3.1 General

- Since September 1999 hepatitis B vaccination has been included in the free basic vaccinations for babies and for children from 11-12 years old.

3.3.2 Vaccination schedule

- 3 intramuscular injections (in the anterolateral thigh muscle) are advised for babies: together with the other basic vaccinations at 2, 4, 13 months. The protection is very long lasting. Experts at present even foresee no need for a repeat (booster) vaccination.
- 3 intramuscular injections (in the anterolateral thigh muscle) are recommended for children over 1 year old: at months 0-1-6. The protection lasts for a minimum of 5 years, but in fact may be lifelong.
- If departure to the tropics cannot be postponed, and there is a real risk of infection, the accelerated scheme can also be used: 3 injections with an interval of 1 or even 2 months or if necessary of only 1 week between injections, followed by a repeat (booster) vaccination after one year.

Vaccination is very strongly advised for children who are going to live in developing countries under rather primitive conditions, with continuous close contact with local children (who easily get open wounds). Vaccination should generally be considered for children who are going to stay for longer than 6 months in an area where hepatitis B is highly endemic. Children of parents who are themselves carriers of the hepatitis B virus must of course also be vaccinated. As hepatitis B vaccination is part of the basic vaccinations for children in general (of babies and adolescents in particular) it can be stated that any long-distance trip with children is an opportunity to bring the vaccination up to date. Twinrix®Paediatric, a combined vaccine against hepatitis A and B, is available for this age category. However, no reimbursement is provided for this vaccine.

*

3.4 Measles

3.4.1 General

The risk of measles is very high in less developed countries. The morbidity, mortality and subsequent complications are considerable. If a child travels to the tropics before the age of 13 months, measles vaccination can be administered early.

3.4.2 Vaccination schedule

- **Between 6 and 11 months of age**: 1st dose single vaccine.
    - If the child is to remain in a highly endemic area and a single vaccine is given at between 6 and 9 months of age: a 2nd dose of combination vaccine (measles-mumps-rubella) is given at 12 months.
    - In places where the risk of measles infection is lower, the 2nd dose of combination vaccine (measles-mumps-rubella) is given at 15 months.
- **Between 12 and 14 months:** 1st dose combination vaccine (measles-mumps-rubella). Repeat (booster) of the single vaccine at 18 months.
- **From 15 months:** administration of the combination vaccine (measles-mumps-rubella).

Remarks:

- After vaccination the child is best kept under observation for 20 minutes.
- Measles vaccine may be given together with any other vaccine.
- Gamma-globulins should be avoided in the period from 6 weeks (preferably 3 months) before and 2 weeks after the measles vaccine.
- Parents should be made aware of the fact that the child may show attenuated measles symptoms 1 week after administration of the vaccine.
- Contraindications are hypersensitivity to neomycin or other components of the vaccine. Vaccination may be considered for individuals who have a non-anaphylactic allergy to eggs. For other contraindications we refer you to the scientific information sheet.

3.5 Measles-mumps-rubella

Since 1985 the trivalent measles-mumps-rubella vaccine has been available free for children up to the age of 2 years. A first vaccination is normally given at the age of approximately 15

months, and a repeat booster vaccination is given at the age of 11-12 years, as seroconversion after a first vaccination does not occur in 5 to 10% of cases (primary failure) and in a further 5% the antibodies have disappeared after ten years (secondary failure).

- Individuals born before 1980 almost certainly have antibodies to measles and mumps as a result of natural exposure to the virus.
- In individuals born after 1980 the following options are available to anyone going to stay in or on a long trip to less developed countries:
    - Either vaccinate with trivalent measles-mumps-rubella vaccine; strongly advised if there has been no vaccination nor natural infection, as the chance of acquiring immunity via natural exposure has become smaller,
    - Or advise a repeat booster if there has been a previous vaccination i.e. from the age of 5-6 years.

Administration of the vaccine harbours no risk in itself when the individual already has antibodies to one or more of these diseases e.g. as a result of an infection that has proceeded subclinically or as a result of a previous vaccination. A booster vaccination can therefore be administered safely even to individuals over 18 years old whose immune status is dubious. It is not economically feasible to determine the antibodies to any of these infectious diseases beforehand.

*

4 Other vaccinations

4.1 Yellow fever

The vaccine is not normally administered to children under 12 months old. In emergency cases it may however be administered to children over 6 months (very exceptionally it can be given to even younger children, but never to those younger than 4 months!). A few cases of encephalitis after vaccination have been reported especially in children under 9 months old. The only genuine contraindications are allergy to chicken and egg proteins, and a state of immunosuppression.

4.2 Hepatitis A

Opinions are divided over prevention of hepatitis A in children. Hepatitis A usually proceeds much more mildly and much more frequently asymptomatically in children- certainly in those

under 5 years old - than in adults. However, fulminant hepatitis can occur extremely rarely. A clinically manifest hepatitis A can spoil the trip. Children with hepatitis A, even if this is subclinical, can moreover form a major source of infection for their acquaintances, both while travelling and after returning home (family, relatives, kindergarten, school). Parents must of course be consulted when considering the vaccination.

It is sensible to vaccinate children of immigrants who return to their country of origin for their annual holidays.

The vaccine is administered from the age of 1 year (administration to younger children is not contraindicated, though up to the present there are insufficient clinical studies available). A suitable low dose vaccine for the 1 to 15 year age range is available. The vaccination scheme comprises 1 intramuscular injection of 0.5 ml followed by a second injection 6 months, but preferably 1 year, later.

Twinrix®Paediatric, a combined low dose vaccine against hepatitis A and B, is available for the age category 1 to 15 years.

4.3 Typhoid (infection with S*almonella typhi*)

- The efficacy and safety of the oral vaccine Vivotif® have not yet been proved in children under 5 years old. This does not mean that it must not be administered to younger children when there is a real risk of typhoid while travelling. If a child is unable to swallow the capsule (which is usually the case for children under 4 years old), its contents can be dissolved in 250cc cold skimmed milk to which 0.8g (1/4 teaspoonful) of sodium bicarbonate has been added. This mixture should be drunk completely and without delay immediately after preparation.
- Parenteral vaccines (Typherix® and Typhim Vi®) are not administered to children under the age of 2 years, as the immune response under this age (as with polysaccharide vaccines in general) is too low. Typhoid is in any case exceptional under the age of 2 years.

4.4 Bacterial meningitis (infection with N*eisseria meningitidis*)

Anti-meningococcal meningitis vaccine has been shown to be effective when administered from the age of 2 years. Children from 3 to 12 months old are the principal victims of meningococcal sepsis and/or -meningitis. The immune response to vaccination is, however, very low in these children.

Meningococcus A vaccine is 85 to 95% effective for approximately 3 years in individuals of

at least 4 years of age and older. The vaccine is not immunogenic in children under the age of 3 months. Immunogenicity gradually increases between the age of 3 months to 4 years. According to a recent informal recommendation by the W.H.O. the vaccine can however be administered to young children (from the age of 3 months) when there is a meningitis epidemic due to meningococcus A: after the first injection from the age of 3 months a repeat booster vaccination is given after a further 3 months, after 18 months, and after 3 years.

Meningococcus C vaccine

A conjugated monovalent meningococcus C vaccine that is active in children under 2 years old is now available on the Belgian market. The new conjugated meningococcal vaccine gives protection only against the C-serogroup, and is therefore of limited use in travel medicine. If a child has already been vaccinated with this vaccine, there should be no problem when subsequently giving a further vaccination with the quadrivalent vaccine.

If necessary the **tetravalent mixed vaccine** (Mencevax® ACWY) may be administered to children from 3 months of age (as for the meningococcus A vaccine). A repeat booster should be given after 3 months, after 18 months, after 3 years and then every 5 years (if continuous immunity is desired). Children from 3 months to 2 years of age who travel to Mecca are best given 2 injections with 3 months' interval between injections.

Upon vaccination of children from 2 to 5 years old a second dose is given 1 year after the first dose; and a repeat booster should be given after 3 years, and then every 5 years if desired.

4.5 Bacterial infection of lungs, in particular with S*treptococcus pneumoniae*

Pneumococcus vaccine is administered only after the age of two years. The indication remains strictly limited to certain risk groups (including asplenia). In the near future a conjugated pneumococcal vaccine effective in children under two years old will be available on the Belgian market. Sickle cell anaemia is a formal indication for vaccination.

4.6 Rabies

Children in third world countries run a real risk of rabies. They are moreover more likely to get bitten on the face or neck, which can greatly shorten the incubation period for rabies. The advice not to stroke any unfamiliar animals in the street or "tame" animals living in the wild is especially applicable to children. Vaccination should in any case be considered for a prolonged stay in a remote rural area. The vaccine may be administered to infants under the age of 6 months, though in practice vaccination is usually given only from the age of 1 year, the age at

which the child begins to walk.

4.7 Tuberculosis

Tuberculosis has become a rarity in Belgium, although since 1993 a slight increase has been noted in immigrants, fringe groups and HIV-seropositive individuals. In many developing countries TB is however one of the major health problems, due especially to the combination of TB with HIV and to multiresistant bacteria.

The most clinically serious problems are on the one hand miliary TB and tubercular meningitis, which occur mostly in young children (the incidence diminishes significantly after the age of 14 years) and on the other hand the TB-HIV combination.

4.7.1 Vaccination

BCG vaccine is a live attenuated bovine tuberculosis bacillus-based vaccine. It is a controversial vaccine. It is administered intradermally, thus producing a local infection. This induces cellular immunity (antibodies are not involved in protection), by which a virulent infection is attenuated (it does not prevent the actual infection itself). A certain resistance to tuberculous-induced pathology, but especially to severe post-primary complications, is produced.

Results of BCG vaccination studies vary enormously: from 0 to 80%. A mean protective effect of 50% is assumed at present. Protection against tubercular meningitis and miliairy TB is probably around 80%. A disadvantage is that the Mantoux test will be more difficult to interpret in case of suspected infection.

The vaccine may be administered from birth, but preferably 2 months before departure for a trip. In this manner the immunity is maximally built up and any inflammation of the armpit and/or lymph nodes resulting from vaccination can still be treated in Belgium. BCG may be given together with other live vaccines. If there are no other problems, the customary paediatric basic vaccination scheme can remain unchanged.

Contraindications include extensive dermatoses, immunosuppression, immunosuppressant medication.

The vaccine can be ordered abroad by the pharmacist (it is no longer on the market in Belgium). You can also contact the Flemish Respiratory Healthcare and Anti-Tuberculosis Association (Vlaamse Vereniging voor Respiratoire Gezondheidszorg en Tuberculosebestrijding (VRGT) on telephone number 02/512.54.55 for advice and information on the indication for vaccination. The VRGT and certain University Hospitals (Paediatric Department and/or

Occupational Health Department) keep the vaccine in stock and can if desired administer it.

4.7.2 Indications for vaccination

- There is no indication for ordinary tourists.
- The W.H.O. advises vaccination for children and young adults originating from countries where TB is quite rare and who are going to live in an endemic area for a long time. Administration of BCG is justified (or at any rate not to be discouraged) in children in the age group up to 5 years, if there is a substantial risk of exposure (prolonged stay in a third world country, close contact with indigenous population, in an area with high TB prevalence), and the local medical infrastructure is of a very low standard.
- It is also sensible to vaccinate children of immigrants who take their annual holidays in their country of origin.
- For other people the following alternatives should be considered:
- Tuberculin test negative before departure + stay of a minimum of 6 months in a third-world country: tuberculin test 2-3 months after returning home.
- Tuberculin test negative before departure + high risk stay in a third-world country (e.g. medical personnel, social workers, in certain cases also children under 5 years old, etc.): BCG.

Regular performance of an intradermal tuberculin test (before departure, annually or once every two years; two months after finally returning home) is still an excellent alternative.

4.8 Japanese encephalitis

The vaccine is not administered to children under one year old. A half dose is given to children from 1 to 3 years old.

4.9 Fruhsommer meningoencephalitis

This vaccine is preferably not administered to children under 1 year old. This avoids giving too many vaccinations and also the risk to this age group is thought to be very low.

Children over 1 and under 12 years old: a half dose for the first injection (children run an increased risk of fever and / or allergic reactions after vaccination).

5 Malaria

5.1 External protective measures against mosquito bites

External protective measures against mosquito bites are the principal preventive measures.

Use of D.E.E.T.-based repellents is useful, but as some absorption through the skin is possible and side effects have been reported, albeit extremely rarely, this product should be applied to children with the necessary caution. Its concentration should be between 20-30% (the higher the concentration, the longer the action time; when the concentration is too low the action time is too short). An alternative - or a supplementary measure – consists of applying the product to the clothing, though the activity from this is perhaps somewhat lower. Avoid contact with eyes and mouth. The product acts for at most a few hours, so that the exclusive use of a repellent does not guarantee sufficient protection for the whole night! Avoid prolonged use! To limit contact with the product as much as possible it is advisable to wash off residues from the skin when further protection is no longer needed.

The principal preventive measure for children, and in particular for babies, is the correct use of a mosquito net that has been checked for holes and has been impregnated. For further details we refer to the heading "Impregnation of mosquito nets".

5.2 Chemoprophylaxis

The weekly dose of **Lariam®** (5mg/kg) is modified for children as follows:	
Lariam®	
Bodyweight (kg)	**Weekly dose in 250 mg tablets**
<5	Not advised
5-12	0.25
13-16	0.33
17-24	0.5
25-35	0.75
>36	1.00

Source: International Travel and Health-Vaccination requirements and health advice, W.H.O.

You can ask the pharmacist to make up capsules containing the correct quantity of Lariam®. Children suffer less on average from side effects, though a tolerance test before departure is indicated, as it is for adults. If a tablet is vomited within 30 minutes after being taken, it simply suffices to give a fresh dose.

(2) The doses of **Nivaquine®-Paludrine®** amount to:

Paludrine®		**Nivaquine®**	
Bodyweight (kg)	**Daily dose in 100mg tablets**	**Bodyweight (kg)**	**Weekly dose in 100mg tablets**
		5-6	0.25
		7-10	0.5
5-8	0.25	11-14	0.75
9-16	0.5	15-18	1.00
17-24	0.75	19-24	1.25
25-35	1.00	25-35	2.00
36-50	1.5	36-50	2.5
>50	2.00	>50	3.00
(3mg/kg per day)		(5 mg/kg per week)	

Source: International Travel and Health – Vaccination requirements and health advice, W.H.O.

Although everyone is aware that all medicines are best kept out of reach of children, this is particularly true for Nivaquine® as an overdose can prove fatal. Because of the taste (Nivaquine® is very bitter), or because a syrup form is often not obtainable, you can ask the pharmacist to make up gelatine capsules containing the correct quantity of Nivaquine® or Paludrine® per kg bodyweight. As alternative you can crush the tablets and mix them with a tablespoonful of jam or grenadine syrup.

- When there is a high risk of malaria (in rural areas in Africa) you can give quinine drops, but only during the first THREE months of life, at any rate so long as the baby is not being given / not capable of taking chloroquine-proguanil. Administration of quinine will only be absolutely essential under **exceptional** circumstances!

- It is prescribed as follows:

R/	Quinine dihydrochloride	6	12	18 g
	Sodium metabisulphite	15	30	45 mg
	Aqua (water) add	30	60	90 ml
	In brown bottle			
	With a drop-counter for 20 drops per ml.			
S/	1 drop per kg bodyweight per day			

Each drop of concentrated quinine solution contains 10 mg quinine. 1 drop per kg bodyweight is administered per day in a single dose.

After opening, a bottle can be kept for a further 3 months; an unopened bottle keeps for a maximum of 1 year.

These drops can also be used in the treatment of a malaria attack (see further).

- Malarone® can be used for children of over 11 kg bodyweight, for journeys of up to 28 days
- According to the W.H.O. guidelines doxycycline can be used as prophylaxis from the age of 12 years.

5.3 Treatment

Fever in a child in an endemic area (and up to 3 months after leaving that area) must always be considered as malaria in the first instance. You are advised to seek rapid, adequate medical help in order to be able to make a reliable differential diagnosis, as the condition often is not malaria.

Fever itself may be absent in babies, but malaria must be considered in case of atypical symptoms.

In principle the same medications as are used in adults can be used in children, although most clinicians avoid using doxycycline.

- Malarone® is the first choice and can be used when bodyweight is above 11 kg.
- Quinine combined with clindamycin (16 mg/kg per day divided into 3-4 doses for 7 days), as doxycycline is contraindicated in children under 8 years old.
- (Lariam® in a dose of 15 mg/kg, followed by 10 mg/kg after 8-12 hours)

- Quinine drops can be given to **babies** (see above) in a dose of 10 mg (= 1 drop) per kilogram bodyweight every 8 hours (= 3x per day) for 7 days (the stated dose must not be exceeded).
- Fansidar® must not be given to babies younger than 2 months. Lariam® must not be administered to children younger than 3 months and/or weighing less than 5 kg.
- Products derived from artemisinine are new and effective antimalaria agents that are expected to appear on the market in the next few years. Artemisinine derivatives can be given to children.