Travelling with Children: an Update

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Abstract

A 'healthy' journey starts with a good preparation, especially when travelling with children. It is important that travelling parents inform themselves timely in order to have sufficient time to arrange everything before departure. In general, it is recommended to schedule a travel consultation at least six to eight weeks before departure, but for some vaccinations more time may be necessary. Travel medicine is an increasingly complex medical specialization. Therefore it might be recommended to consult a travel clinic, general practitioner with specific knowledge in travel medicine or paediatrician specialized in infectious diseases / travel medicine prior to travel, especially when going to the tropics or for more adventurous prolonged journeys. This article offers an updated overview of the current pre-travel recommendations for children, aiming to facilitate safe and healthy travel.

The role of the GP or general paediatrician

Many parents first turn to their pharmacist, general practitioner (GP) or general paediatrician for travel advice. Or they might casually mention that they are going to visit their friends or family in Africa, Asia or Latin America, often only when actively asked. Being able to provide correct information about this is essential. Not all travellers recognize the importance of medical preparation for their journeys, positioning GPs, pharmacists and paediatricians as vital in raising awareness among travelling parents. For example, during a consultation you can proactively ask about future travel plans, especially when people have their roots in the Global South. Most routine vaccinations are available at the pharmacy and can be given by any doctor. Only yellow fever vaccination must be given in an accredited yellow fever travel clinic. However, especially for tropical journeys, prolonged trips, adventurous travel or rural areas it might be advised to obtain specialized advice and refer to a travel clinic or a paediatrician with a background in travel medicine.

Belgian Travel Medicine Guidelines

The Belgian travel medicine guidelines are based on information from the World Health Organization (WHO), advice from the Superior Health Council (SHC), and guidelines written by the Belgian Study Group for Travel Medicine. To make these guidelines free of charge available for travellers and physicians, the Institute for Tropical Medicine in Antwerp has created 'Wanda', with financial aid of the Flemish Department of Health (1). This is a reference tool for travel medicine and consists of a website (www.wanda.be) and a mobile application, available for Android and iOS (Figure 1). It contains information about mandatory and recommended vaccinations per country, health risks, travel advice for specific target groups (e.g., children and pregnant women) and general topics such as the 'travel pharmacy'. There is also a separate section on the website for doctors who provide travel advice, with extensive disease sheets and detailed information in English (1).

Figure 1.
Scan the QR code to go directly to wanda.be

The travel consultation

To make a correct assessment of the traveller's risk profile, a number of factors must be taken into account: first of all, of course, the destination(s) and stopovers, then also the duration of stay and the activities that are planned (for example contact with animals, staying with locals or in remote areas), season, underlying health problems, vaccinations already received and future travel plans.

Specific advice when travelling with children

In general, children are exposed to the same health risks as adults, but the consequences can be more serious. Traveller's diarrhoea, dengue and tuberculosis are often more severe. If not treated in time malaria can rapidly be fatal in young children. In addition, some vaccines work less well or should not be administered below a certain age. Children are more sensitive to the sun, to motion sickness and to pressure changes during take-off and descent in an airplane, resulting in earaches (1).

Term infants are allowed to fly from seven days of age (1). If a child has frequent episodes of otitis or a recent ear infection, it can be considered to administer oxymetazoline nasal drops right before take-off or descent. Pressure in the middle ear can be equalized by swallowing or chewing, so allow the child to drink, suck or chew during ascent and descent (bottle, breast or pacifier).

A few points of interest:

- **Frequent breastfeeding and/or drinking** is even more important for children than for adults. This is related to the fact that the child's body consists of a larger percentage of water than adults and is more prone to dehydration.
- **Keep the threshold for medical advice low**. In case of fever or general malaise, the threshold should be lower to contact a physician, because of the possible rapid progression of diseases like malaria or dehydration in young children. This is particularly important considering the challenges of accessing timely medical assistance in unfamiliar settings.
- **Sun protection**: advise parents that babies should be kept in the shade and dressed in clothing that covers the entire body. Regularly

Table 1. Use of mosquito repellents in children.

	Minimal age	Concentration	Total duration of treatment (months)
DEET *N,N-diethyl-m-toluamide*	>6 months	20%: children and pregnant women 30-50% adults	Duration of protection varies with concentration: higher concentrations protect longer. Neurotoxicity reported in supratherapeutic dosages.
IR3535 *Ethyl butyl acetyl aminopropionate*	>6 months	20%: children and pregnant women 30%: adults	
(P)Icaridine	>2 years	20-25%	
Citrodiol *p-menthane 3.8 diol or PMD*	>6months	20-25%	

Table 2. Atovaquone-proguanil prophylactic dosage.

Weight of child in kg	Number of tablets per day
<5	Not recommended
5 - 7	½ junior tablet
8 - 10	¾ junior tablet
11 - 20	1 junior tablet or ¼ adult tablet
21 - 30	2 junior tablets or ½ adult tablet
31 - 40	3 junior tablets or ¾ adult tablet
From 40	1 adult tablet

apply a sunscreen with a high sun protection factor (SPF 50+). DEET-containing insect repellents reduce the effectiveness of sunscreen, so apply sunscreen more frequently when you use DEET (2). For babies the carriage can be covered to create shade, but it should not be completely enclosed in order to prevent overheating.

- **Keep the child far away from animals**: do not let them stroke, feed or touch them even if the animal looks cute and healthy or if the animal is dead. Children can be scratched while playing and therefore become infected (e.g. with rabies) without somebody knowing this. Discuss rabies pre-exposure vaccination when staying in a country where rabies occurs. Do not let a child play barefoot outside, not even on the beach or in the sea (1).
- **Altitude disease**. Children are not more susceptible to altitude sickness, but it is more difficult to recognize. Irritability, restlessness, muscle tension, loss of appetite, less playing, sleep disorders or vomiting can indicate altitude sickness. Therefore, descend immediately with young children who are unwell above an altitude of 2500 meters. It is better not to spend the night above 2000 meters with children under the age of two and above 3000 meters with children under the age of ten. If a rapid climb is unavoidable, acetazolamide (2.5 mg/kg every 12 hours, maximum 125 mg per dose) can be used although experience is limited in children.
- **Diarrhoea while travelling: prevention and treatment**. Foodborne infections occur worldwide, but the risk is higher in countries in Asia, the Middle East, Africa and Latin America with lower hygiene standards. Although travellers are often advised to 'boil it, cook it, peel it, or forget it' this has never been proven to be effective. Poor hygiene practices in local restaurants and deficiencies in hygiene and sanitation infrastructure are likely the largest contributors. In tropical countries it is generally recommended to avoid (semi-)raw food like salads, uncooked/unbaked food, fruits that you have not peeled yourself or washed thoroughly in clean water, uncooked or unpasteurized milk products, dishes based on raw eggs, raw or undercooked fish and seafood, dishes that have been left at room temperature for hours, ice cream from street vendors, tap water and ice cubes, street stalls (unless the food has been thoroughly cooked and is eaten immediately on the spot). Traveller's diarrhoea is the most common travel-related infectious disease and is usually caused by eating or drinking food or water contaminated with bacteria (e.g. *Escherichia coli* (ETEC), *Campylobacter jejuni*, *Shigella* spp., *Salmonella* spp.) Children who take acid suppression or recently received antibiotics are even more prone to it.

Sometimes traveller's diarrhoea is caused by a virus or parasites such as giardia or amoebae. Oral Rehydration Solution is the most important treatment, especially in children who are prone to dehydration, and should be in the traveller's pharmacy. In case of severe diarrhoea (blood or mucus in the stools, high fever, severe abdominal cramps, liquid stools more than six times per 24 hours), medical attention is required. *Preventive antibiotics (such as azithromycin) should not be prescribed routinely to travellers, but can be considered for patients* who are immunocompromised or have an underlying condition making them more prone to complications (e.g. Crohn's disease, insulin dependent diabetes mellitus, severe heart failure, small therapeutic window of medication,…) (1).

Malaria prophylaxis

Children with malaria can rapidly develop high levels of parasitaemia and are at increased risk for severe complications. When travelling to malaria endemic areas mosquito preventive measurements are important and in certain high risk areas additional malaria chemoprophylaxis is advised. The recommendation for malaria preventive measures per country can be found on 'wanda.be'. Malaria chemoprophylaxis is available for children from 5 kg onwards.

Always protect a child against mosquito bites and let them sleep under an impregnated mosquito net. Long sleeves are recommended (esp. in the evening for the malaria-vector *Anopheles*, but also during the day against *Aedes* mosquitos in dengue, chikungunya and yellow fever areas).

Data on the use and safety of mosquito repellents in travelling children are sparse and there are often contradictory international

recommendations. Therefore, it's advised for young children and pregnant women to use repellents *only if the other mosquito repellent measures cannot be applied* sufficiently and to *wash it off when it is no longer needed*. Never apply it on the hands, near eyes or the mouth of young children. The label instructions for product application and re-application should be followed but bear in mind that the duration of protection is often shorter than the manufacturer suggests on the bottle. The mosquito repellents that can be used on children are listed in table 1.

Prophylactic Malaria medication:

Atovaquone-proguanil, doxycycline and mefloquine are used as malaria chemoprophylaxis. In practice atovaquone-proguanil is most often prescribed for children. For optimal absorption atovaquone-proguanil should be taken with a fatty meal. Unfortunately no syrup is available, but the tablets can be cut using a pill cutter. It is advisable to bring a pill cutter when travelling and cut the tablets as needed, rather than pre-cutting all doses at home. Preferably the tablets should be swallowed but if this is not possible, they can be crushed, however this will result in a bitter taste which makes adherences more challenging. Junior tablets are almost as expensive as adult tablets, so adult tablets are preferably used. A full junior pill tastes less bitter compared to a partial adult dose so this might still be considered in case of difficult adherence if there are no financial constraints. Alternatives are doxycycline, but this can only be used from the age of 8 years onwards (and can cause significant phototoxicity): it should be taken from one day before entering a malaria risk area until 28days after leaving. Mefloquine can be used from 5 kg, it is only taken once a week and needs to be started 2-3 weeks before entering a malaria risk zone until 28 days after leaving. Mefloquine can potentially have serious side effects (e.g. anxiety, insomnia, depression, suicidal mood,…): if this occurs, the use should be discontinued immediately and it should be switched to another malaria prophylaxis. If mefloquine has never been taken, it's advised to start at least 3 weeks before travel to monitor side-effects. Since 2014, it is mandatory to inform patients about potential side effects of mefloquine and a patient warning leaflet needs to be signed and kept by the traveller during use (1).

Vaccinations

In addition to discussing measures against mosquitos and preventive malaria medication, vaccinations are an important part of the travel advice. A trip is always a good time to check whether the basic vaccination schedule for the patient is still up to date and to supplement the schedule with the available travel vaccinations. We hereby give an update on important vaccines. Which vaccines are currently advised for a specific country can be found on wanda.be (1). For the Flemish regions registering all vaccines in Vaccinnet is essential in order to avoid misunderstandings or double vaccinations (3).

Tetanus-diphtheria-pertussis, hepatitis B, influenza, COVID19 and pneumococcal vaccination must always be checked in the basic vaccination schedule and updated if necessary. The status of measles-mumps-rubella and poliomyelitis vaccination should also be verified.

Measles, Mumps, Rubella (MMR)

Travellers are considered fully vaccinated for measles if they have received two vaccinations with a minimum interval of four weeks after the age of twelve months or have already had measles. Travellers born after 1970 who have not had measles and have not been vaccinated twice are eligible for free vaccination. Based on seroprevalence data, it is known that travellers born before 1970 usually have had measles.

Measles is on the rise worldwide and can be dangerous for young children. Measles is one of the most contagious infections in the world and the virus remains active and contagious in the air or on infected surfaces for up to two hours after contact (4). When travelling to a country with a measles outbreak (see Wanda: measles- countries with an outbreak) an earlier measles vaccination can be recommended (1). It is possible to administer the MMR vaccine *from 6 months onwards. If the child is between 6 and <12 months of age and travelling to a country with a measles outbreak a MMR vaccine should be administered*. This will only provide temporary protection and should therefore not be counted: one should administer it again after the age of 12 months (routine schedule) with a minimal interval of 28 days between the two MMR vaccines. For children who already received the first dose at the age of 12 months the second dose should be brought forward and given prior to travelling to a country with an outbreak: this second dose may be counted in the schedule as long as they were given after the age of 12 months and with at least one month interval. Ideally an interval of 28 days should be taken into account between the MMR and yellow fever vaccine, but if this is not feasible it's preferably to give the MMR vaccination and the yellow fever vaccination simultaneously (1).

Poliomyelitis

Global vaccination programs have almost eradicated poliomyelitis. The disease only occurs in a few countries in Asia and Africa. Polio vaccination is recommended for all travellers who have not had a full basic vaccination schedule. In addition, a one-time booster after the age of 16 is also recommended for all travellers to Asia or Africa. For countries where there is circulation of wild polio virus 1 (WPV1), circulating vaccine derived polio virus 1 or 3 (cVDPV1 or cVDPV3), with a risk of international spread, evidence of recent (<12 months) polio vaccination is required when leaving the country after a stay of four weeks or more. A list of these countries can be found on wanda.be.

Travel related vaccinations

Yellow fever

Yellow fever is a life-threatening arboviral infection transmitted by *Aedes* mosquitoes.

It occurs in Sub-Saharan Africa and Latin America. The yellow fever vaccine (Stamaril®) is a live attenuated vaccine. Vaccination is recommended in countries where there is a risk of yellow fever transmission. In accordance with the International Health Regulations (2005) some countries demand a proof of vaccination on entry. The vaccine is recommended *from the age of 9 months onwards* and can exceptionally be administered from 6-8 months (relative contra-indication). It is never given before the age of 6 months because of the risk of 'yellow fever vaccine-associated neurologic disease (YEL-AND)' occurring in babies under 6 months. It should be given at least ten days before arrival and a one-time booster is recommended for a subsequent trip to a yellow fever area. Twenty percent of patients have a slight flu-like syndrome after a few days. A very rare side effect is yellow fever vaccine-associated neurologic disease (YEL-AND) or yellow fever vaccine-associated viscerotropic disease (YEL-AVD). In Belgium the *yellow fever vaccine is the only vaccine that has to be administered in accredited travel medicine clinics*.

Hepatitis A

Hepatitis A is transmitted faeco-orally by ingestion of contaminated food or water and causes acute viral hepatitis. In recent decades there has been a decline in the incidence due to better food hygiene and improved sanitary facilities. There is still a high prevalence of hepatitis A in sub-Saharan Africa and some parts of South Asia, but outbreaks also occur in other countries in Latin America, North Africa, the Middle East, and other parts of Asia. Vaccination is recommended for all travellers to areas where hepatitis A occurs. The schedule consists of two vaccines, given with an interval of 6 to 12 months, after which lifelong protection occurs. In case the interval would be longer than 12 months, the schedule does not need to be restarted, but the second dose can just be administered and will still count as a second dose. In young children hepatitis A is mostly mild, but transmission to adolescents or adults is one of the reasons why vaccination is still recommended. The vaccine can be given from the age of 1 year. In case of an outbreak it is sometimes given at an earlier age (from 6 months onwards), but a dose administered prior to 12 months of age might result in suboptimal immune response and is therefore not considered a valid dose: the whole schedule should be repeated after the age of 12 months. The junior dosage is used until the age of 16 years; afterwards the adult dosage can be used.

Typhoid fever

Typhoid fever is caused by *Salmonella typhi* and is transmitted through contaminated food or water. As it only lives in humans, they are the sole vector. Symptoms include high fever, headache, nausea, abdominal pain, constipation or diarrhoea. Severe cases may lead to serious complications (e.g. intestinal perforation) or even death. But improved living conditions and antibiotic therapy have reduced mortality and morbidity in industrialized countries. The best protection consists of meticulous application of the 'safe food and drink advice' (see above). Typhoid fever currently primarily occurs in the Indian subcontinent. The risk in countries in Asia, Central / South America and Africa is lower. There is a typhoid vaccine available (Typhim Vi®) that provides 60-70% protection from 14 days after administration. This can be given *from the age of two years* and the duration of protection is a maximum of three years. The vaccine is recommended for travellers who will be in India, Nepal, Pakistan, or Bangladesh for more than three weeks, those visiting friends and relatives (VFR) for extended periods (>3weeks), or travellers staying in poor hygienic conditions in any country with a risk of typhoid fever.

Rabies

Rabies is a viral infection that can be contracted by inoculation of saliva from an infected mammal (including dogs, cats, monkeys, bats) through a bite or scratch or by a lick on mucous membranes or a wound. It can have a very long incubation period and is always fatal. A pre-exposure (PrEP) vaccination schedule consists of *two vaccines (Rabipur®) with at least a week's* interval. In principle PrEP vaccination is advised starting from the age of 1 year (since most children don't walk before and have therefore less risk on bites). There is however no real age limit for rabies vaccination. Until 2 years of age Rabipur 1ml is always given intramuscularly. In older individuals some centres give Rabipur 2 x 0,1 ml intradermally, in practice as soon as intradermal vaccination is practically possible, often from 8 years of age ore older. For each risk contact, the schedule must always be supplemented by washing the wound thoroughly with soap and then the post-exposure policy (PEP) with two booster vaccines (with an interval of 3 days). In people without rabies PrEP, this consists of a series of four or five vaccinations and sometimes additional administration of anti-rabies immunoglobulins (RIG or MARIG), which should be started as soon as possible after a bite or scratch after (remote) advice from a (paediatric) infectiologist. Other schedules are available for immunocompromised patients.

Meningococci ACWY

Meningococci can cause sepsis and meningitis. Clusters and outbreaks can occur anywhere in the world, but the highest frequency of disease is seen in the meningitis belt in Sub-Saharan Africa during the dry season from December to June. Travellers who have close contact with the local population ('visiting friends and relatives', medical staff, etc.) or who are traveling for more than 4 weeks or who have a spleen disorder, or certain immune disorders are advised to be vaccinated before departure with a conjugated meningococcal ACWY vaccine (Nimenrix® or Menveo®). Outbreaks have also been linked to pilgrimages to Mecca such as Hajj or Umrah. Vaccination with a meningococcal ACWY vaccine is mandatory for everyone from the age of two who goes on pilgrimage to Mecca; the certificate for this specific indication remains valid for five years after vaccination with a conjugate vaccine. It should be noted that since the second half of 2023, all children in Belgium are offered Nimenrix® at the age of *15 months* in the child welfare centres. For younger at risk travellers, a vaccine can be administered starting from 6 weeks old, following an adapted schedule. If given between 6 weeks and 6 months: it is recommended to administer two doses with a two-month interval, followed by a booster dose after the age of 12 months. If the vaccine is given between 6 months and 1 year, one dose is required, with a booster dose after the age of 12 months (with a minimum interval of 2 months). A booster is recommended by the Superior Health Council at 15 years of age (even when not travelling) as part of the routine vaccination schedule although not yet reimbursed and might be advised before travelling depending on the age of the child and the timing of the previous vaccination.

Tick-borne encephalitis

Tick-borne encephalitis (TBE) is a viral infection transmitted by ticks and exceptionally by the ingestion of unpasteurized dairy products. The disease is usually mild, but sometimes neurological symptoms occur that can lead to permanent residual damage or even death. TBE mainly occurs in certain forested areas in Europe (central Europe but also Scandinavia) and Eastern Europe. A vaccine is available (FSME-IMMUN®). A *lower junior dose is used for children aged one to sixteen years*. It consists of three doses with the second vaccine given 1 to 3 months after the first, and the third 5 to 12 months after the second dose. A first booster is necessary after 3 years and a second revaccination after 5 to 10 years (or for people >60 years old: after 3 years).

Japanese encephalitis

Japanese encephalitis is a viral infection spread by Culex mosquitoes. In most people the disease is mild and the symptoms resolve within a few days. In a minority, neurological symptoms will develop (meningitis/ encephalitis), with a high risk of permanent residual damage or even death. The disease only occurs in South / Southeast Asia and Eastern Australia. The risk is generally low for travellers, but it increases with long-term or frequent stays or a stay in the countryside. The Japanese encephalitis vaccine (Ixiaro®) consists of *2 doses given with an interval of 4 weeks*. A booster should be given after 12 to 24 months, after which the duration of protection is at least 10 years. No junior vaccine is available but children from *2 months to 3 years should receive half a dose of the vaccine*. In case of stock disruptions in Belgium or insufficient time to complete the schedule before departure, the patients can obtain the vaccines sometimes at their travel destination. A list of locations where it can be acquired is provided by the International Society of Travel Medicine (https://www.istm.org/clinic-directory/).

Dengue

Dengue is an arboviral infection transmitted by *Aedes* mosquitoes. This can cause fever, vomiting, headache, muscle and joint pain. In exceptional cases (but more often in infants), severe dengue can occur with bleeding, shock and multi-organ failure; this risk is greatest with a second dengue infection. A dengue vaccine (Qdenga®) has been available on the Belgian market since 2023. The vaccine reduces the risk of a serious dengue infection. It is *only recommended for travellers if they have already had a first dengue episode* and travel to a high-risk area for a prolonged period of time (>4 weeks or frequent stays) and can receive two doses before departure. The duration of protection has not yet been determined. It is a live attenuated vaccine and should not be used in certain immune disorders, during pregnancy or while breastfeeding. It can be administered from the age of 6 years onwards and consists of 2 vaccines with an interval of 3 months.

Immunosuppression

When children have to begin immunosuppressive therapy for any reason, it is crucial to vaccinate them beforehand, particularly against yellow fever. This important step is often overlooked because there may not be immediate travel plans. However, since the therapy could extend over several years, failing to vaccinate before starting treatment could restrict the child's travel opportunities in the future. Additionally an immunosuppressed child who is planning to travel to the tropics should seek expert travel medicine advise prior to travelling.

'Visiting Friends and Relatives' and risk of tuberculosis

'Visiting friends and relatives' (VFR) are a specific group of people with their roots in the 'Global South' who frequently travel to their countries of origin to visit friends, (grand)parents and other family members. They sometimes stay in (often crowded and less ideal) family residences in more rural areas and are therefore more exposed to vector-borne and diarrheal pathogens. Focusing on the importance of malaria preventive measures including the necessity of malaria chemoprophylaxis is

especially important in this subgroup. Adequate vaccination and discussing prevention and treatment of diarrhoea is essential.

A recent study also suggested that VFR trips to high-tuberculosis-incidence countries play a significant role in the epidemiological dynamics of tuberculosis (TB) in regions with low TB incidence. In Spanish VFR children with a negative tuberculin skin test (TST) at baseline, 2.6% turned out to have latent TB when retested (with TST or interferon gamma release assay (IGRA)) 8 to 12 weeks after return. It has therefore been suggested to target paediatric VFR travellers – as a high risk group – for prevention (by performing TST or IGRA) 8-12 weeks after returning (5). BCG (bacillus Calmette-Guérin) vaccination is not routinely available on the Belgium market but can be imported from abroad in certain Belgian clinics (https://www.wanda.be/en/a-z-index/travel-clinics-in-belgium). For children younger than five years who are repeatedly visiting or spending more than six months in a high-risk country BCG vaccination is recommended. If it's not possible to obtain it in Belgium beforehand they should be advised to get it locally upon arrival (1).

Conclusion

Whether a trip nearby or far away is planned, it is important to get appropriate medical travel advice. The website and application www.wanda.be can be used as a guidance but should always be supplemented with a travel consultation: either in a travel clinic, or with a general practitioner or paediatrician with expertise in travel medicine. When checking vaccinations, it is important to first check the basic vaccinations (with special attention for measles when travelling to regions where measles outbreaks occur) and then consider which additional travel vaccinations are useful based on the travel destination and the risk factors.

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REFERENCES

1. Travel advice for travellers and physicians (https://www.wanda.be & https://artsen.wanda.be).
2. Sidbury R. Should Pediatricians Be More Proactive in Counseling Children About Skin Cancer Risk?: Implications of the USPSTF Recommendation Statement. JAMA Pediatr. 2018;172(5):418-20.
3. https://www.vaccinnet.be/.
4. WHO, Fact sheet measles, 2023 (https://www.who.int/news-room/fact-sheets/detail/measles).
5. Perez-Porcuna TM, Noguera-Julian A, Riera-Bosch MT, Macià-Rieradevall E, Santos-Santiago J, Rifà Pujol M, et al. Tuberculosis among children visiting friends & relatives. J Travel Med. 2024.