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  - Tuberculosis
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Chapter 5 Immunisations and Health Information for Travel

**Introduction**

Over the last 60 years international tourist arrivals increased from 25.3 million in 1950 to 1,035 million in 2012.

Changes in travel patterns include a continuing trend for visiting remote destinations and for longer stays.

Many people are unaware that exotic destinations include potential exposure to infections that are rare in their home environment and other infections such as malaria that they have never encountered previously. The resurgence of malaria in many parts of the world, with an increasing pattern of drug resistance, has led to an increase in the number of cases presenting in non-endemic areas. The emergence of new infections such as SARS, pandemic influenza H1N1 and the spread of dengue fever, chikungunya and West Nile Virus place an increasing responsibility on doctors to remain up-to-date with current practice.

Responsibilities that travellers need to accept before travel include:
- Seeking advice in good time
- Complying with recommended vaccines and other medications
- Carrying a medical kit
- Obtaining adequate health insurance cover.

Regulations regarding entry requirements such as the need for yellow fever certificates can be obtained from organisations such as WHO whose website address is given at the end of the chapter.

All travellers (domestic and international) should be up to date with routine vaccinations.

A pre-travel consultation should address what vaccines are recommended, their potential side-effects and their suitability for each traveller. Knowledge of relative risks in particular destinations is essential, as is an assessment of the patient’s overall medical health and current medications. Advice for those with pre-existing chronic illness should be included. Patients who are very young, those who are pregnant and the elderly warrant special consideration.

Factors influencing the risk of illness, and the need for specific vaccines include:
- Duration of visit
- Destination
- Purpose of visit
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- Standards of accommodations and food hygiene
- Behavioural or lifestyle patterns of the traveller
- Risk of exposure to the disease
- Age, health status, vaccination history
- Special risk factors
- Adverse reactions to previous vaccines
- Risk of infecting others

Many major urban centres and well-developed tourist destinations pose little risk to the short-term tourist or business traveller. Travel to remote areas where sanitation and standards of hygiene are poor and medical services are difficult to access can pose serious risks to travellers. Any special occupation or activity should also be taken into account, e.g. contact with fresh water in areas where schistosomiasis is endemic.

While immunisations represent an important part of the travel consultation, advice on risk avoidance, chemoprophylaxis and methods of self-treatment are also part of the consultation. Ideally short-term travellers should present for advice at least 6 weeks before travel. Those who are travelling for long periods or going to remote regions may require 6-12 weeks for the full series of immunisations.

Travellers should be made aware that many conditions can present after they have returned from abroad. In general, patients who develop an illness within 1 year of returning should inform a doctor that they have been abroad.

In general, travel vaccinations are both safe and effective. However, not all vaccines offer complete protection and additional recommendations for preventing disease should be followed. Following administration most vaccines require a few weeks for a protective immune response to develop and therefore they should be administered at least two weeks before travel, although the late-presenting traveller may still benefit from having vaccinations even at the last minute.

Multiple vaccines can be administered at different sites on the same day.

Live vaccines such as MMR, varicella, and yellow fever should be administered on the same day or else 4 weeks apart.

Live vaccines can interfere with the response to the tuberculin skin test (TST). The TST, if indicated, can be done before or on the day that live virus vaccines are administered or at least 4 weeks later.
Chapter 5  Immunisations and Health Information for Travel

Vaccines for global travellers
Each traveller should be up to date with the routine vaccine schedule including vaccines against influenza and pneumococcal vaccines for those in at-risk groups. Other vaccines (Table 5.1) maybe advised depending on the area to be visited, the type of travel, any special identified risks and the age, health and vaccination history of each traveller.

Table 5.1  Vaccines for travellers

<table>
<thead>
<tr>
<th>Category</th>
<th>Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Routine vaccination</td>
<td>DTaP/IPV or Tdap/IPV</td>
</tr>
<tr>
<td>See relevant chapters for details</td>
<td>Hepatitis B (if born before 1/7/2008)</td>
</tr>
<tr>
<td></td>
<td>Hib</td>
</tr>
<tr>
<td></td>
<td>Men C</td>
</tr>
<tr>
<td></td>
<td>MMR</td>
</tr>
<tr>
<td></td>
<td>Influenza</td>
</tr>
<tr>
<td></td>
<td>Pneumococcal</td>
</tr>
<tr>
<td>2. Recommended vaccines depending on itinerary, type and duration of travel etc</td>
<td>BCG</td>
</tr>
<tr>
<td></td>
<td>Cholera</td>
</tr>
<tr>
<td></td>
<td>Hepatitis A</td>
</tr>
<tr>
<td></td>
<td>Hepatitis B</td>
</tr>
<tr>
<td></td>
<td>Japanese encephalitis</td>
</tr>
<tr>
<td></td>
<td>Meningococcal ACWY</td>
</tr>
<tr>
<td></td>
<td>Rabies</td>
</tr>
<tr>
<td></td>
<td>Tick-borne encephalitis</td>
</tr>
<tr>
<td></td>
<td>Typhoid fever</td>
</tr>
<tr>
<td></td>
<td>Yellow fever</td>
</tr>
<tr>
<td>3. Mandatory vaccination</td>
<td>Men ACWY (for Hajj, Umra)</td>
</tr>
<tr>
<td></td>
<td>Yellow fever</td>
</tr>
</tbody>
</table>
**Cholera (notifiable)**

Cholera is an acute diarrhoeal disease caused by an enterotoxin of Vibrio cholerae which has infected the small bowel. Two main serogroups occur (O1 and O139).

The disease occurs mainly in countries where there is inadequate sanitation and where clean drinking water is difficult to obtain. The risk for most travellers is very low, even during epidemics. Activities that may predispose to infection include drinking untreated water or eating poorly cooked seafood in endemic areas. Travellers living in unsanitary conditions, for example relief workers in disaster or refugee areas, are at particular risk.

The illness is characterised by the sudden onset of profuse watery diarrhoea and occasionally vomiting. Dehydration, metabolic acidosis and circulatory collapse may follow rapidly if adequate oral hydration is not provided. Most patients recover with prompt administration of oral rehydration solutions. In severe cases, intravenous fluids may be required.

All travellers should be given advice on maintaining good food, water and hand hygiene, safe eating and drinking and water purification. Simple precautions are usually sufficient to prevent cholera. Vaccination is only advised for those at significantly increased risk of the disease, such as aid workers assisting in disaster relief or refugee camps, and travellers with remote itineraries in areas with cholera O1 outbreaks and with limited access to medical care.

**Vaccine**

Cholera vaccine (inactivated, oral) (Dukoral) contains inactivated antigens of serogroup O1 but is not effective against O139 strains. Protection is achieved in 85-90% of recipients, with antibodies persisting up to 3 years after the primary course.

The vaccine consists of a suspension of inactivated bacteriae and effervescent granules for dissolution in 150 mls water. For details of preparation, see the SmPC.

An up to date list of licensed vaccines can be accessed on the HPRA website [www.hpra.ie](http://www.hpra.ie)

Cholera vaccine should be stored between +2°C to +8°C.
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Dose and route of administration
Adults and children from 6 years of age: 2 doses orally at least 1 week apart.

Children 2 to 6 years of age: 3 doses orally at least 1 week apart.

Cholera vaccine is not recommended for children under 2 years of age, due to lack of efficacy data.

Immunisation should be completed at least 1 week prior to potential exposure to V. cholerae 01.

Note: If more than 6 weeks have elapsed between doses, the primary immunisation course should be re-started.

Booster
For continuous protection against cholera a single booster dose is recommended within 2 years for adults and children from 6 years of age, and after 6 months for children aged 2 to 6 years. If more than 2 years have elapsed since the last vaccination the primary course should be repeated.

Contraindications
Anaphylaxis to any of the vaccine constituents.

Precautions
Acute severe febrile illness - defer until recovery.
Acute gastrointestinal illness - defer until recovery.

Diphtheria (notifiable) (see Chapter 6)
Diphtheria continues to pose a threat to public health and travellers to any part of the world should be fully vaccinated.

Those aged 10 years and over should not be given the higher strength childhood vaccine due to the possibility of a significant local reaction.

Hepatitis A (notifiable) (see Chapter 8)
Vaccination with 1 dose gives >98% seroconversion by day 19; a booster dose 6-12 months later results in long-term (>20 years) protection.
Travellers presenting less than 20 days prior to travel should be advised that they may not have adequate antibody protection for 20 days post vaccination and they need to exercise extra precautions until then.

**Hepatitis B (notifiable) (see Chapter 9)**
Hepatitis B vaccine can be given as an accelerated course if the time to departure is short. The dose is 1.0 ml of vaccine given intramuscularly on days 0, 7 and 21 or 28 and 12 months. Accelerated doses of the combined Hepatitis A and B vaccines have been shown to be effective but are not routinely recommended.

**Influenza (notifiable) (see Chapter 11)**
All travellers are at some risk of acquiring seasonal influenza during an outbreak. Tourists are at increased risk because they often travel in crowded conditions and visit very crowded locations.

**Vaccine**
There may be, in any given year, a significant difference between strains during the influenza seasons of the northern and southern hemisphere which occur at different times of the year (November to April in the North and April to September in the South). Therefore influenza vaccine administered in one hemisphere may only offer partial protection to travellers to a different hemisphere. At-risk travellers who are going to another hemisphere during the influenza season should arrange to have influenza vaccine as soon as possible after arriving at their destination.

**Japanese B encephalitis (notifiable)**
Japanese encephalitis (JE) virus is a mosquito-borne flavivirus, closely related to West Nile and St. Louis encephalitis viruses, and endemic in South East Asia. It is predominantly a rural disease causing a potentially fatal encephalitis. It is spread by bites from mosquitoes (culex genus) that bite mainly from dusk to dawn. Rice paddies are important breeding sites. Mosquitoes become infected by feeding on infected domestic pigs and wild birds.

Epidemics predominantly occur in the monsoon season in Cambodia, India and Thailand. In other countries, such as Indonesia, Malaysia and the Philippines, there is a risk of infection all year round.
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Short-term (<1 month) travellers whose visits are restricted to major urban areas are at minimal risk for JE, unless they have extensive exposure in rural areas during periods of active transmission. The risk of JE among people from non-endemic countries travelling to Asia is estimated to be less than 1 case per 1 million travellers. Those who stay for prolonged periods in rural areas with active JE transmission (i.e. in close proximity to rice paddies, or infected pigs and birds) are likely to be at similar risk as the resident population (5–50 cases per 100,000 per year).

The majority of people who contract JE virus remain asymptomatic or suffer from a short acute viral illness. In 1 in 200 people the disease causes encephalitis that has a mortality rate of about 30-50%; many survivors have long-lasting severe neurological sequelae. The chance of permanent neurological disease increases with increasing age.

The vaccine is recommended for
• Those with prolonged (>1 month) stay in a JE endemic area.

The vaccine should be offered to the following:
• Those with a travel itinerary covering rural areas, in particular spending a period of time in rice fields or close to pig farms
• Those who are repeat travellers to JE endemic areas
• Travelers to an area with an ongoing JE outbreak.
• Any traveller requesting maximum protection.

Further detailed information should be sought from specialised centres or the WHO website.

Vaccine
There are two JE vaccines available (see Table 5.2 below).
• Japanese encephalitis vaccine (inactivated, adsorbed) IXIARO
• Green Cross JE Vaccine

JE vaccines should be stored between +2°C to +8°C.
### Table 5.2 Summary of Japanese Encephalitis Vaccines

<table>
<thead>
<tr>
<th>Japanese Encephalitis Vaccines Summary</th>
<th>IXIARO</th>
<th>Green Cross JE Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Inactivated cell-culture derived virus</td>
<td>Inactivated mouse brain derived virus</td>
</tr>
<tr>
<td><strong>Efficacy</strong></td>
<td>&gt; 90%</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>From 2 months</td>
<td>From 1 year</td>
</tr>
<tr>
<td><strong>Dosage</strong></td>
<td>0.25 mls from 2 months to &lt;3 years</td>
<td>0.5ml for &lt; 3 years</td>
</tr>
<tr>
<td></td>
<td>0.5ml from age 3 years</td>
<td>1ml ≥ 3 years</td>
</tr>
<tr>
<td><strong>Route</strong></td>
<td>I.M.</td>
<td>Subcutaneous</td>
</tr>
<tr>
<td><strong>Dosing Schedule</strong></td>
<td>2 doses at 0, 28 days.</td>
<td>3 doses at 0, 7 and 28 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rapid schedules (May result in lower antibody titres and a shorter duration of protection)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 doses 7-14 days apart or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 doses at 0, 7 and 14 days</td>
</tr>
<tr>
<td><strong>Booster</strong></td>
<td>Continuous risk (laboratory personnel or persons residing in endemic areas).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 booster 1 year after primary course</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continued potential risk of exposure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 booster 12 -24 months after primary course</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data on the need for further booster doses are not available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 booster 1 year after primary course</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Further boosters 3 yearly if at continued risk of exposure</td>
<td></td>
</tr>
<tr>
<td><strong>Special Instructions</strong></td>
<td>Vaccination courses should be completed with the same vaccine</td>
<td>Whenever possible vaccine should not be given less than 10 days before departure in case hypersensitivity problems should arise</td>
</tr>
<tr>
<td><strong>Side Effects</strong></td>
<td>Common: Injection site pain and tenderness, headache, myalgia, fatigue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rare: Arthralgia, fever</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Common: Injection site pain and tenderness, rash</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rare (up to 3 weeks later): Arthralgia, myalgia, fever. allergy/hypersensitivity (3:1000 doses)</td>
<td></td>
</tr>
</tbody>
</table>
Meningococcal infection (notifiable) (see Chapter 13)
Different Meningococcal serogroups predominate in different regions of the world. Serogroup A predominates in Africa (see Figure 5.1).

**Figure 5.1** Map showing countries in Meningitis Belt (WHO)

Epidemic disease is characterised by an increased case-attack rate and altered age distribution, with increased numbers of cases seen in adolescents and adults. Examples include large epidemics involving serogroup A or serogroup W strains in association with the annual pilgrimage (Hajj) to Mecca, with importation into other countries by returning pilgrims.
**Vaccine**

Table 5.3 outlines the meningococcal vaccines required for travel.

<table>
<thead>
<tr>
<th>Vaccine type</th>
<th>Conjugate MenACWY vaccines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indications</td>
<td>Travel related*</td>
</tr>
<tr>
<td><strong>Trade name</strong></td>
<td></td>
</tr>
<tr>
<td>Menevo</td>
<td>Nimenrix</td>
</tr>
<tr>
<td>2- &lt;12 months</td>
<td>Menevo may replace MenC * (see below)</td>
</tr>
<tr>
<td>1 to 10 years</td>
<td>1 dose, at least 4 weeks (preferably 2 months) after last MenC dose</td>
</tr>
<tr>
<td>11 years and older</td>
<td>1 dose</td>
</tr>
<tr>
<td>Booster doses</td>
<td>For those with medical risk condition** a booster is recommended if vaccinated during infancy AND travel to area of increased risk.</td>
</tr>
</tbody>
</table>

* Give a dose of conjugate MenACWY (Menevo) vaccine instead of MenC if the timing coincides with the normal Men C vaccination. If two MenC vaccine doses have already been administered, give one dose of conjugate MenACWY vaccine (at least 4 weeks after MenC) and a booster dose at least 4 weeks and preferably 2 months later.

** See Chapters 3 and 13

Either vaccine may be given if previously vaccinated with polysaccharide meningococcal vaccine.

Meningococcal vaccines should be stored between +2°C to +8°C.

**Dose and route of administration**

The dose is 0.5 ml, given by IM injection in the anterolateral thigh or the deltoid region.

**Indications for Travellers**

1. Travel to high-risk areas, including the meningitis belt of Africa and Saudi Arabia during the Hajj. Vaccination with MenACWY is mandatory for pilgrims entering Mecca for pilgrimages.
2. Travel to areas where epidemics of meningococcal disease are occurring (see WHO website for up-to date information).
Chapter 5  Immunisations and Health Information for Travel

A risk-based approach in deciding whether it is worthwhile vaccinating a patient should take the following factors into account:

• Destination (i.e. the countries highlighted in Figure 5.1 above).
• Duration at destination; a stay of months represents a higher risk than a 2-week trip.

Travellers at high-risk include:

• those who live or work with local people
• those who live or travel rough such as hitchhikers or trekkers
• aid workers in refugee camps

From time to time, meningococcal disease outbreaks occur in various parts of the world. Where such outbreaks are due to vaccine-preventable strains, vaccination may be recommended for some groups of travellers to the affected areas. The advice of an appropriate Specialist should be sought.

Note: Visa entry requirements should be checked in good time prior to travel to individual countries.

Contraindications
Anaphylaxis to any of the vaccine constituents.

Precautions
Acute severe febrile illness, defer until recovery.

Adverse reactions
Local: Pain erythema, induration, pruritus, and swelling.

General: Headache, nausea, rash and malaise. Infants and younger children may develop irritability, reduced feeding and sleep disturbance.

Poliomyelitis (notifiable) (see Chapter 17)
Transmission of poliomyelitis has been significantly lessened during the past 20 years. However up to November 2013, cases of wild polio have been reported from Afghanistan, Cameroon, Ethiopia, Kenya, Nigeria, Pakistan, Somalia and Syria. Polio continues to pose a public health threat and travellers to any part of the world (including Europe) should be fully vaccinated. For an up-to-date list of countries for which polio boosters are recommended for travellers, see the WHO website.
Rabies (notifiable) (see Chapter 18)
Rabies, a viral disease transmitted by bites, licks or scratches from infected mammals, is a very important cause of viral encephalomyelitis in many parts of the world. Travellers can be bitten in countries where access to treatment is difficult and sometimes unavailable. For further details of rabies pre and post exposure management see Chapter 18.

Tick-borne encephalitis (TBE) (notifiable)
The disease occurs sporadically through parts of Eastern and Central Europe and the Asian part of the former USSR. The annual incidence is estimated at 10,000 cases in Russia (where it is known as Russian spring-summer fever) and 3,000 cases in Europe. The true incidence is probably much higher, and has risen dramatically in last 4 decades. It has spread to new areas particularly Scandinavia and Switzerland.

The disease is caused by a flavivirus belonging to the same family as Japanese encephalitis, dengue and yellow fever viruses.

The virus is usually transmitted in spring and summer by ticks that feed on wild and domestic animals. The ticks attach themselves to passing animals or humans. After attachment the tick may not feed for up to 12 hours; thus, early removal of ticks can prevent disease. The tick should be removed with tweezers, care being taken not to leave the head or mouth parts attached to the skin. The disease is also transmitted by unpasteurised goat’s milk or goat’s milk products.

After infection there is an initial viraemic phase, with 20-30% of those affected developing encephalitis. Post-encephalitic sequelae are common and the disease has a mortality rate of 1%. There are higher mortality rates with Siberian and Far Eastern subtypes (2-3% and 20-40%) compared to European virus (1-2%) and increased morbidity with increasing age.

Travellers planning to camp or trek through forests or along nature trails should consider vaccination before travelling. If indicated, further detailed information should be sought from specialised centres or the WHO website.
Chapter 5 Immunisations and Health Information for Travel

Vaccine
TBE vaccine (whole Virus inactivated) (TicoVac) 0.5 ml suspension for injection in a prefilled syringe. The vaccine is available in adult and junior forms.

TBE vaccine should be stored between +2°C to +8°C.

Dose and route of administration
1. Adults and children aged >16 years: 0.5 ml IM at 0, 1 and 12 months.
2. Children aged 16 years and less: 0.25 ml at 0, 1 and 12 months.

A shorter course at day 0, day 14, and 5-12 months can be used for rapid protection.

A booster is given every 3 years for those who are exposed to the disease regularly.

Contraindications
Anaphylaxis to any of the vaccine constituents, including egg or chicken protein.

Precautions:
Acute severe febrile illness—defer until recovery.
Persons with pre-existing non-stable cerebral disorders.

Adverse reactions
Local: Pain, erythema and induration.

General: Fever, headache, restlessness.

Tuberculosis (notifiable) (see Chapter 22)
Tuberculosis occurs worldwide and the risk of infection varies from country to country (see map on WHO website). BCG vaccination should be considered in the following groups of travellers.

1. Unvaccinated TST negative persons under 16 years of age intending to live with local people in high-incidence countries for more than 3 months. BCG vaccine may also be considered for shorter-stay travellers who are likely to be at increased risk.
2. Unvaccinated TST or IGRA negative persons who are more likely than the general population to come into contact with patients or with clinically contaminated items (e.g. HCWs).
(Note: TST testing should have been performed within the previous 3 months if BCG is to be administered to those aged 6 years and older).

Individuals who are already vaccinated do not need repeat vaccination.

The vaccine should be given at least 6 weeks before departure. Further vaccination in the arm in which BCG is given is not recommended for at least 3 months.

Travellers should avoid unpasteurised dairy products. If in doubt boil milk before drinking it.

For information on contraindications and precautions to BCG vaccine see Chapter 22.

**Typhoid (notifiable)**
Typhoid fever is a systemic infection caused by Salmonella typhi or paratyphi. Humans are the only hosts.

Typhoid is predominantly a disease of countries with poor sanitation and poor standards of personal and food hygiene. It is particularly prevalent in the Indian sub-continent. All travellers to endemic areas are at risk of infection. The risk is lowest in tourist and business centres and rises as travellers enter more rural areas where standards of accommodation and food hygiene are poor.

Most serotypes cause only local infection of the gastro-intestinal tract (gastro-enteritis or ‘food poisoning’).

Following ingestion of contaminated food or water *S. typhi* penetrates the intestinal mucosa, replicates and enters the bloodstream. Symptoms range from mild fever, diarrhoea, myalgia and headache to severe disseminated disease with multi-organ involvement in 10-15% of cases. The case–fatality rate (CFR) is less than 1% with prompt antibiotic therapy, but may be as high as 20% in untreated cases. The likelihood of becoming a chronic carrier increases with age.

As typhoid vaccine is only partially effective, travellers should be advised to take precautions against eating or drinking potentially contaminated food and drink.
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Vaccine

Three typhoid vaccines are available.

1. Oral typhoid vaccine (Ty21a) contains a live, attenuated strain of S. typhi (Ty21a) in an enteric-coated capsule. A three dose course gives a cumulative three year efficacy of 50 to 60%. The vaccine is indicated for persons from six years of age.

2. Vi polysaccharide vaccine contains purified Vi capsular polysaccharide from S. typhi. Maximum antibody response is achieved one month following vaccination and persists for about three years. Children under 2 years may show a suboptimal response. Use of the vaccine in this age group should therefore be governed by the likely risk of exposure to infection.

3. Hepatitis A and Typhoid polysaccharide vaccine suspension and solution for suspension for injection in pre-filled syringe contains Vi polysaccharide vaccine and Hepatitis A vaccine.

Typhoid-containing vaccines should be stored at +2°C to +8°C.

An up to date list of licensed vaccines can be accessed on the HPRA website www.hpра.ie

Note: Vaccination should occur at least 2 weeks prior to potential exposure to infection.

Dose and route of administration

1. Oral typhoid vaccine (Ty21a)
   
   Adults and children from 6 years of age: three doses orally at 0, 2 and 4 days.

2. Vi polysaccharide vaccine
   
   Adults and children from 2 years of age: one dose of 0.5ml. IM
   
   Children 1-2 years of age: These should be immunised if there is a high risk of typhoid though there may be a sub-optimal response. Immunisation is not recommended for children under one year of age.

   NOTE; As the response to the vaccine may be sub-optimal in those aged <2 years, more scrupulous attention than normal should be given to personal, food and water hygiene measures.

   Re-immunisation every 3 years is recommended for those who remain at risk of infection.

3. Hepatitis A and Typhoid polysaccharide vaccine
   
   Adults and children aged 15 years and over. One dose of 1ml IM. For information regarding subsequent doses see the SmPC.
Chapter 5  Immunisations and Health Information for Travel

Indications
Typhoid immunisation is required for:
• Laboratory workers handling specimens which may contain typhoid organisms
• Travellers to countries in Africa, Asia, Central and South America and South East Europe, and to other areas where hygiene is likely to be poor. Vaccination is generally less important in areas where typhoid is not highly endemic and where visits are confined to urban centres with good accommodation.

Contraindications
Anaphylaxis to any of the vaccine constituents.

Precautions
Acute severe febrile illness, defer until recovery.
Pregnancy, avoid unless at high risk.

Adverse reactions
Oral typhoid vaccine (Ty21a): Adverse events are uncommon or rare, and include malaise, headache, GIT upset and fever.

Vi polysaccharide vaccine: Local reactions (pain, swelling, and erythema) are very common, but generally resolve within 2 days. Fever is common.

Hepatitis A and Typhoid polysaccharide vaccine: Local reactions (pain, swelling, and erythema) are very common, but generally resolve within 2 days. Nausea, vomiting and fever are common.

Yellow fever (notifiable)
Yellow fever is an acute haemorrhagic fever spread by mosquitoes that occurs in tropical South America and in many countries in sub-Saharan Africa. It generally presents as an acute fever with jaundice and haemorrhage, with a mortality rate of up to 50% in outbreaks. The risk of acquiring disease increases in patients who travel to jungle areas but also in urban centres reporting outbreaks. Areas where yellow fever occurs far exceed those officially reported.

The risk of infection can be reduced by taking precautions against mosquito bites. The species that transmits yellow fever also bites during day time. Vaccination is recommended for all travellers (exceptions see below) who visit any area where there is a risk of yellow fever transmission. For in-country travel, vaccination is recommended outside urban areas of the endemic
zone (see current WHO maps http://apps.who.int/ithmap/ ) even if these countries have not officially reported the disease.

**Vaccine**

Yellow fever vaccine is a live viral vaccine. Duration of protection: At least 35 years, with some exceptions.

The vaccine should be stored between +2°C to +8°C.

An up to date list of licensed vaccines can be accessed on the HPRA website www.hpra.ie

**Dose and route of administration**

The dose is 0.5 ml subcutaneously, at least 10 days before entering an endemic area.

**Indications**

Active immunisation against yellow fever in persons:
- travelling to, passing through or living in an endemic area,
- travelling to any country that requires an International Certificate of Vaccination or Prophylaxis for entry,
- handling potentially infectious materials (e.g. laboratory personnel).

Re-vaccination (see Figure 5.2) should be offered to those:
- who need a valid International Certificate of Vaccination or Prophylaxis (ICVP)
- who received their initial yellow fever vaccination:
  - when aged less than two years old
  - during pregnancy
  - whilst infected with HIV
  - when immunosuppressed
  - before undergoing a bone marrow transplant

The WHO are seeking to implement this change in 2016. However some countries may continue to require 10 yearly revaccination despite WHO guidance. Practitioners may choose to give exemption certificate to avoid unnecessary boosting. Presently (July 2015) the International Health Regulations (2005) require re-vaccination at 10 year intervals if indicated, in order to retain a valid International Certificate of Vaccination Prophylaxis.
Figure 5.2: Yellow Fever Revaccination

1. Last YF vaccine ≥10 years ago?
   - Yes: Requirement for ICVP?
     - Yes: Revaccinate if no contraindications if precautions, seek expert advice
     - No: No need to revaccinate
   - No: Going to YF risk area or working with YF virus?
     - Yes: Was last YF vaccine given when
       - < 2 years of age
       - pregnant
       - infected with HIV
       - immunosuppressed before a bone marrow transplant?
         - Yes: Any contraindications or precautions to YF vaccine?
           - Yes: Consider revaccination/seek expert advice
           - No: Revaccinate
         - No: Concern about risk of YF exposure (e.g. working/living in high risk setting for extended period)?
           - Yes: Do not revaccinate
           - No: Revaccinate
     - No: Concern about risk of YF exposure (e.g. working/living in high risk setting for extended period)?
       - Yes: Do not revaccinate
       - No: Revaccinate

2. Concern about risk of YF exposure (e.g. working/living in high risk setting for extended period)?
   - Yes: Consider revaccination/seek expert advice
   - No: Revaccinate

3. Any contraindications or precautions to YF vaccine?
   - Yes: Consider revaccination/seek expert advice
   - No: Revaccinate
Vaccination may be an entry requirement for travellers arriving from countries where there is a risk of yellow fever transmission. It does not generally apply to passengers from European countries unless the host country has certified yellow fever vaccination as an entry requirement.

If yellow fever is contraindicated for medical reasons a certificate of exemption may be provided.

A yellow fever certificate is valid from 10 days after vaccination for 10 years.

**Contraindications:**
The risk of death from yellow fever is far greater than the risks related to the vaccine.
Anaphylaxis to the vaccine constituents, including egg.
Significant immunosuppression (see Chapter 3).
Infants aged <6 months.

**Precautions:**
1. Acute severe febrile illness-defer until recovery.
2. Pregnancy or if breast-feeding, unless at high risk (e.g. during a yellow fever outbreak), and after expert consultation to consider the potential risks and benefits.
3. Children aged from 6 to 9 months unless at high risk as the vaccine may cause encephalitis; seek expert opinion.
4. Age >60 years of age unless there is a considerable and unavoidable risk of acquiring yellow fever infection, as the risk for yellow fever vaccine associated neurotropic disease (YEL-AND) and yellow fever vaccine associated viscerotropic disease (YEL-AVD) increases with age.
5. When possible, yellow fever vaccine and MMR should be given 28 days apart, at separate sites and in a different limb. This is because of sub-optimal antibody responses to yellow fever, mumps and rubella antigens when the vaccines are co-administered.

**Adverse reactions**
*Local:* Pain, swelling.

*General:* Headaches, GIT upset, myalgia, and low-grade fever are common.
Very rare: anaphylaxis meningitis, encephalitis (particularly in those aged <9 months of age), Yellow fever vaccine associated neurotropic disease
(YEL-AND) includes neurological symptoms, coma, and/or Guillain-Barré syndrome. Yellow fever vaccine associated viscerotropic disease (YEL-AVD) mortality rate >60%. The risks of YEL-AND and YEL-AVD appear to be higher in those aged over 60 years.

All travellers should ensure that their routine vaccinations are up to date

Travel health: general information
It is important to remember that the commonest illnesses acquired abroad are preventable by measures other than vaccines.

Diarrhoea
Traveller’s diarrhoea is one of the commonest problems in people travelling abroad. Between 20-50% of travellers may be affected by this self-limiting condition. The average duration of an attack is 2-5 days. Diarrhoea that continues for longer than 2 weeks is deemed to be persistent travellers’ diarrhoea and is more likely to have an underlying parasitic cause. The main cause of acute traveller’s diarrhoea is bacterial, although viruses may also be implicated. Organisms causing dysentery can present in well-fed travellers without blood appearing in the stool. The main causative bacterium tends to differ between the areas visited, and variation in the organisms most likely to cause diarrhoea can be seasonal.

Travellers should be advised to:
• Wash hands with soap and water frequently, especially after using the toilet and before handling food. Alcohol hand wash or wipes may also be used.
• Drink only bottled, boiled, filtered or disinfected water.
• Avoid ice cubes in drinks.
• Eat food that is completely cooked and piping hot and avoid street vendor food, if possible.
• Avoid cooked food that has been allowed to stand at room temperature in warm environments, or that has been exposed to flies.
• Avoid sushi, and raw or improperly cooked seafood of any kind.
• Eat fruits and vegetables that can be peeled.
• Be wary of unpasteurised dairy foods, including ice cream.
Anti-motility agents and an appropriate anti-microbial for travellers as emergency self-treatment may be prescribed. The use of antibiotics as prophylaxis for diarrhoea is reserved for cases where chronic disease may make the risk of diarrhoea considerably more serious.

**Malaria (notifiable)**
Malaria is a common and life-threatening disease in many tropical and sub-tropical areas. In 2010 there were an estimated 219 million cases and 660,000 deaths. Approximately 90% of deaths occurred in Africa. Malaria mortality rates have fallen by more than 25% globally since 2000 and by 33% in the WHO African Region. It is likely that the malaria mortality burden is larger than estimated, especially in adults.

There is concern that the incidence of malaria is increasing due to increasing drug and insecticide resistance and the breakdown of public health measures against malaria due to social and civil disruption in some areas.

Malaria is caused by a protozoan *Plasmodium*. Four varieties are recognised of which *P. falciparum* is the most serious form.

Malaria can be rapidly fatal particularly in pregnant women and children under the age of 5 years. Young children and pregnant women are advised not to travel to areas where falciparum malaria occurs unless travel is essential.

Strict adherence to preventive measures (insecticide-treated bed nets, repellent sprays, chemoprophylaxis, etc) considerably reduces the risk of acquiring malaria. All travellers to regions where malaria occurs should be informed of the level of risk and the types of malaria that occur. Appropriate chemoprophylaxis should be prescribed. Patients should be educated on how to take their medication and advised of potential side-effects. Anti-mosquito-bite protection regimes have been shown to provide a significantly cumulative protective effect with chemoprophylaxis.

No anti-malarial regime is 100% effective and travellers should be informed of the need to investigate any unexplained ‘flu-like illness occurring within a year after return from a malaria-endemic area. Long-term travellers to endemic areas where medical care may be inaccessible should be provided
with stand-by medication.

Many arthropod viruses are also mosquito-borne and appropriate advice about mosquito avoidance is very pertinent in these diseases, some of which have no vaccine, e.g. dengue fever.

**Prolonged travel**
Those planning to live overseas for prolonged periods of time should attend for medical advice regarding immunisations and general healthcare in sufficient time (up to 3 months) before departure.

A dental check before travelling is recommended and it may be wise to carry sterile syringes/needles in case an injection is necessary.

**Visiting friends and relations**
Many infections associated with travel predominantly affect people who travel to visit friends and relatives (VFR) in their country of origin. VFR travellers have a different risk profile to other types of travellers; they tend to travel for longer and live as part of the local community while abroad. This increases their likelihood of exposure to infectious diseases.

VFR travellers may not seek health advice prior to travel because the destination is familiar to them or their family; they may underestimate risks to their health. Targeting VFR travellers for travel health advice includes opportunistically asking migrant patients about travel plans when they consult for other reasons (e.g. new patient checks, childhood vaccination clinics and other consultations) and encouraging them to attend for further advice.

If visiting highly endemic countries, there is evidence that VFR travellers may be resistant to accepting malaria prophylaxis and vaccination.

**Returning to Ireland**
Natural immunity against a number of diseases drops rapidly once an individual is not continuously exposed. Following a stay in Ireland of over 6 months it should be assumed that an individual has lost natural protection against malaria and diarrhoeal diseases. Malaria prophylaxis and vaccination cover for this group should be the same as that suggested for
any other traveller.

There is evidence that VFRs are much less likely to seek advice and are many times more likely to present with malaria post travel. They are more likely to suffer from other preventable diseases such as typhoid.

In addition to preventing travel associated illness, primary care teams have an important role in identifying travel associated illness in unwell patients. A travel history should form part of the assessment of any unwell patient, particularly those who are febrile.

Malaria can present up to a year after leaving a malaria risk area. Anyone presenting in this time frame with influenza like illness and a relevant travel history should have this diagnosis confirmed or excluded as a matter of urgency as malaria can be rapidly fatal.
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