

Travel Medicine: A Perspective on the Emerging Problem of Travel-related Infections

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Abstract

Travel Medicine has come a long way since it was started in the 1980s. Today, with the advances in electronic communications and efficient international travel, the demand for up-to-date information on international health situation is more urgent than before. Disease outbreaks can be updated and be available immediately across to the whole world in a matter of hours via the Internet. Travel medicine specialists no longer can give the excuse that they are unaware of such a situation because it is posted all over the net. Advances in vaccine development and the work of international agencies like the World Health Organization and the Centres for Disease Control have helped further the strategies and the knowledge we have in travel health risks. For the traveller, this means that they should no longer be travelling to a destination without knowing the health hazards and without taking the appropriate prophylaxis and precautions.

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Introduction

In the last 20 years, we have seen at least 30 new micro-organisms linked to emerging communicable diseases, ranging from human immunodeficiency virus (HIV) and the highly infectious Ebola virus to rotavirus and hepatitis C. At the same time, old diseases like yellow fever, diphtheria, cholera, plague, dengue and meningococcal meningitis are re-emerging as public health threats. The resurgence of diseases can be explained in part by changes in demographic, ecologic and social factors including migration of populations and international travel.¹

Variously known as "Geographic Medicine", "International Health", "Tourist Medicine", etc, travel medicine has come a long way since it was started in the 1980s. However, it should be pointed out that "Travel Medicine" (Emporiatics) and "Geographic Medicine" are quite distinct entities in that the former deals with the concerns of travellers and the latter with the health of "natives". In the United States, travel medicine developed in response to an increasing demand by affluent and sanitised Americans for prophylaxis against tropical diseases during their travel to the less developed world.

In this age of rapid information transfer and dissemination, advancements in medicine and technology has

made travel medicine into a form of preventive medicine that is a necessity rather than a luxury. Prophylaxis and travel advice is now readily available to more and more people in the better informed societies. In Singapore, we see an increasing demand for travel advisory service and an ever-growing thirst for such knowledge not only from the public but the general practitioners as well. This is in part contributed by the publicity given to travel-related illness by the press as well as the increasing travelling population of Singaporeans. According to the Singapore Tourist Promotion Board, Singaporeans made a total of almost 3.3 million outbound trips last year,² making us a nation of well-travelled citizens.

With the advent of air travel, the world has become a smaller place and the people are now more closely linked. The world today is one big global village and any geographical or physical barrier/border to disease cannot realistically stop the spread of an infectious disease because of the movement of masses of people. While travel has brought about many developments, like fostering economic, political and technological ties, promoting exchange of cultures and customs, multi-racial and multi-national understanding, there exists a downside to it. Increased travel has resulted in increasing populations being exposed to epidemiological forces and environment that is conducive to the transmission

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of infectious diseases. This has caused an increase in the importation of parasitic and infectious tropical diseases into the more developed countries in the West and an increase in sexually-transmitted diseases and HIV in the less developed countries in Asia. Travel has also facilitated the spread of infectious diseases in many parts of the world as seen in the example of HIV infection and influenza.

Contrary to popular belief, the commonest cause of mortality in travellers is not due to infections but to injuries. Although almost 50% of short-term travellers suffer from some form of temporary impaired health, only 5% of travellers seek medical attention for these problems.³ Prevention of health risks related to travel is based on the relative risk in relation to the type of travel and the destination.

Training for the Travel Medicine Practitioner

The travel medicine practitioner should ideally be trained in tropical medicine. Infectious disease training would be advantageous though not absolutely necessary. At the current time, there is no specific qualifying examination in travel medicine and no specialist board examinations for certification as travel medicine specialists. There are, however, various diploma and certificate courses in tropical medicine, travel medicine as well as adventure/ wilderness medicine conducted by various academic bodies. We should not forget the role of the family physician in providing general advice on disease prevention and immunisations especially for the traveller with a recognised health problem. More complicated travel-related health needs can be addressed by the travel health specialist.

Category of Travellers

In general, travellers can be categorised into either high-risk or low-risk travellers based on their destination, itinerary and the activities. Low-risk travellers are those who travel to cities or major tourist resorts for short durations (<1 month), stay in hotels or proper accommodation and has little or no intimate contact with the native residents. This includes business and professional travellers. On the contrary, high-risk travellers are those who travel to rural or remote off the beaten track places, staying for a month or more and have frequent contacts with the locals. This group includes Peace Corps volunteers, missionaries, adventure travellers, backpackers, relief workers, military and medical personnel.

Hazards of Travel

There are particular health hazards involved in travelling to an unfamiliar place, with its own unique epidemiological exposures and environmental conditions. There are hazards related to the use of transportation

either on air, sea, overland or otherwise. Minor and temporary impairment of health includes jet lag, insomnia, motion sickness, stress and fatigue. Major and life-threatening hazards include accidents, trauma, air/sea/road disasters, life-threatening medical conditions (including frostbite, mountain sickness and heat disorders) and death. There are particular health hazards that affect special groups of travellers; anecdotal reports of previously unknown travel hazards in the morbidly obese include acute ventilatory failure inflight due to Pickwickian syndrome, deep vein thrombosis, acute pulmonary embolism⁴ and a report of a traveller who sustained a vaginal haematoma and a labial laceration from using an airplane vacuum toilet!⁵

A large group of diseases that can be prevented or treated are infectious diseases. With proper prophylaxis or precautions, the majority of travel-related infections can be avoided. Immunisation is available for the prevention of typhoid, poliomyelitis, influenza, yellow fever, chickenpox, measles, mumps, rubella, meningococcal meningitis, Japanese B encephalitis, hepatitis A, B, diphtheria, tetanus and rabies. Chemoprophylaxis is available to prevent against malaria and less commonly in traveller's diarrhoea. Taking appropriate precautions can help guard against diseases where immunisation is unavailable e.g. traveller's diarrhoea, parasitic diseases, sexually-transmitted diseases and HIV infection.

Prevention is Better Than Cure

In this age of multidrug-resistant microorganisms and resurgence of infections that have become more virulent than before, the key to managing infections might lie in its prevention. For instance, the development of penicillin-resistant pneumococci in many places to significant proportions may suggest that a preventive strategy by vaccination may be the approach to take. Multidrug-resistant typhoid fever in many parts of the world might be better tackled by vaccination of the high-risk group. For travellers to less developed countries, falling ill with an infectious disease may not only mean a damper to their holiday but may render them to be victims to the danger and complications of being exposed to a system of sub-optimal medical care and sub-standard medical facilities. This would include the risk of nosocomial infections and blood-borne infections in addition to medical accidents and adverse effects of inappropriate therapy.

It is beyond the scope of this article to address the issues of preventing other physical hazards associated with travel. Readers are referred to a recent article by Zell on environmental hazards associated with adventure travel.⁶

Vaccination of Travellers

The vaccine armamentarium we have today to pre-

vent travel-related illness is impressive. Many of these diseases are now preventable with vaccination or chemoprophylaxis, while the rest can be avoided by taking the appropriate precautions. However, even with the best of intentions, there are certain circumstances we cannot avoid.

In general, vaccinations can be broadly categorised into 3 main categories-required (i.e. required for entry e.g. yellow fever vaccination), recommended (e.g. in endemic areas for protection against highly endemic diseases) and routine (for the normal maintenance of health).

Routine vaccinations would include tetanus, diphtheria, polio, mumps, measles and rubella vaccination. If the traveller had already completed the primary series, a booster will suffice. Recommended vaccinations are mainly for high-risk travellers and these include Japanese B encephalitis vaccine, meningococcal vaccine, rabies, hepatitis B and typhoid vaccine. A list of vaccines available in Singapore is shown in Table I.

The decision to give a vaccine is dependent on several factors: the risk of disease, cost, efficacy, safety, duration of protection, availability of alternative strategies for prevention and the effect of vaccine in altering risk-taking behaviour.⁷ Vaccination has been considered the most cost-effective form of public health intervention and is highly effective in controlling and preventing many infections. Many of the vaccines used in preventing childhood diseases are highly cost effective e.g. polio vaccine, MMR and DPT. In contrast, many of the vaccines

used in travellers are expensive and not very cost effective in terms of preventing mortality. Travel-related diseases are not very common; this means that a lot of vaccines are given in order to prevent a small number of infections and an even smaller number of deaths. It has been estimated that the routine use of cholera vaccine in travellers to areas with cholera would cost more than US\$28m per case of cholera prevented⁸ and more per death prevented. Similarly, routine use of rabies vaccine in the US for travellers to Thailand would cost US\$50m per rabies death averted.⁹ Compare this with US\$520,286 spent per life saved by installing smoke detectors in airplane toilets. The bottom line is that many of the vaccines used in travellers are extremely expensive per case prevented or death averted¹⁰ and there is an expensive price to pay for prevention.

In addition, it has been known that vaccination can sometimes have a permissive effect on travellers who paradoxically engage in risk behaviours after receiving the vaccine. This not only exposes them to other infections not covered by the vaccine but also defeats the purpose of vaccination as a tool to complement responsible behaviour in preventing diseases. Although most vaccines have a high efficacy rate in protecting against infection, we must caution that this is by no means absolute since many factors including patient response, immune factors, vaccine quality and drug/vaccine interactions can play a role in determining the final efficacy.

Preventing Food-borne Infections and Traveller's Diarrhoea

Food-borne illnesses are common among travellers to all parts of the world but especially so to developing countries. Traveller's diarrhoea affect 20% to 40% of all travellers to some destinations.**

Traveller's diarrhoea (TD) usually refers to the passage of 3 or more loose stools a day acquired when a person travels from an industrialised country to a less developed country. Younger people are more prone to getting TD; this may be due to lower gastrointestinal immunity as a result of young age or to the propensity of younger travellers to be more adventurous with food and a tendency towards a lower standard of hygiene. A number of factors predispose a person to diarrhoea and these are:

- 1) Epidemiologic factors: Travelling from a developed country to a less developed country. Recent travel to a developing country confers some protection to TD during subsequent trips.
- 2) Host factors: Reduced gastric acidity is a well known risk factor, others are blood group O (predisposed to cholera and shigella) and inflammatory bowel disease. Immunocompromised individuals are also more prone to getting TD.

TABLE I: COMMONLY AVAILABLE TRAVEL VACCINES

Vaccines available at travel clinics
Cholera (parenteral)
Oral cholera (Orochol)
Typhoid (whole-cell, parenteral)
Typhoid (oral)
Typhim Vi
Hepatitis A (adult and paediatric)
Hepatitis B
Yellow fever
Meningococcal
Japanese B encephalitis
Tetanus
Tetanus-diphtheria
OPV (oral polio vaccine)
EIPV (inactivated polio vaccine)
MMR (mumps, measles, rubella)
Rabies
Rabies immunoglobulin
Immunoglobulin
Influenza
Chickenpox/Pneumococcal
Plague*
Tick-borne encephalitis*
Typhus*

* Vaccine not available/registered in Singapore

Two basic actions can protect you from food-borne diseases:

- 1) Avoid unsafe food.
- 2) Get your immunisations (typhoid: 70% efficacy, hepatitis A: >95% efficacy).

The usual food and water hygiene advice include:

- 1) Drink only boiled or bottled water.
- 2) Avoid ice cubes unless made from boiled or bottled water. Avoid popsicles or flavoured ice.
- 3) Eat food that is thoroughly cooked and served hot.
- 4) Avoid salads and fruits that cannot be peeled. If fruit can be peeled, peel them yourself after washing hands, do not eat the peelings.
- 5) Avoid street hawkers and unhygienic restaurants.

Aetiological agents causing TD are epidemiologically different in different parts of the world. This is summarised in Table II. The cornerstone of the therapy of acute diarrhoea worldwide remains as rehydration with fluids and electrolytes, particularly important to the very

old and the very young. Antimicrobials are used in moderate to severe diarrhoea and in those with fever and bloody stools. Current antimicrobial therapeutic recommendations are summarised in Table III. The use of loperamide in conjunction with antimicrobials may offer some additional benefits.^{12,13}

Chemoprophylaxis is not routinely used but some situations (*vide infra*) warrant its consideration such as:

- 1) Patients with history of achlorhydria, or previous gastrectomy or taking omeprazole/H₂-blockers/antacids for ulcer therapy.
- 2) Patients with inflammatory bowel disease.
- 3) Insulin dependent diabetics.
- 4) Patients with acquired immunodeficiency syndrome (AIDS).
- 5) Patients on diuretics or cardiac drugs.
- 6) Travellers who cannot afford to have diarrhoea (important mission or competitors/performers).

More importantly, prescribing chemoprophylaxis to travellers must not detract them from the fact that they need to observe food and water hygiene as usual.

Preventing Insect-borne Infections and Malaria

When we mention insect-borne diseases, we invariably think of malaria. Malaria has received more attention because it is relatively more common and more ubiquitous than the other insect-borne infections, being endemic in most parts of the developing world. Some important insect-borne travel-related infections are shown in Table IV.

Immunisation is available for some of these infections but for the majority of them, taking precautions against insect bites is the mainstay of prevention. Even with the protection conferred by vaccination, mosquito protection remains an important component of prevention for these travellers. In fact, no traveller should be given

TABLE II: AETIOLOGIC CAUSES OF TRAVELLER'S DIARRHOEA BY REGIONS OF THE WORLD

Region	Aetiological agents causing traveller's diarrhoea
Tropical/Subtropical areas	ETEC, <i>Shigella</i> sp., <i>Aeromonas</i> / <i>Plesiomonas</i> sp., <i>Salmonella</i> sp., <i>C. jejuni</i>
Coastal areas	Tropical agents, non-cholera <i>Vibrio</i> sp
Thailand	Tropical agents, <i>Cyclospora</i> , <i>Aeromonas</i> sp.
South America/Nepal	<i>Cyclospora</i>
Mountainous areas	<i>Giardia</i> spp.
Russia	<i>Cryptosporidium</i> , <i>Giardia</i> sp.
Mexico	Tropical agents, Rotavirus

ETEC: enterotoxigenic *E. coli*; *C. jejuni*: *Campylobacter jejuni*

TABLE III: SOME COMMONLY USED REGIMENS FOR EMPIRIC TREATMENT OF TRAVELLER'S DIARRHOEA

Drugs	Dose	Duration	Remarks
Trimethoprim /Sulfamethoxazole	160/800 mg bid	3 to 5 days	
Ciprofloxacin	500 mg bid	3 days	Contraindicated in those <17 years
Norfloxacin	400 mg bid	3 days	
Ofloxacin	300 mg bid	3 days	
Pefloxacin	400 mg bid	3 days	
Fleroxacin	400 mg qd	3 days	
		with/without Loperamide	
For children:			
TMP/SMX (Co-trimoxazole)	10 mg TMP/ 50 mg SMX/kg/day divided 2 doses	3 to 5 days	
Erythromycin	40 mg/kg/day in 4 divided doses		

TMP: trimethoprim; SMX: sulfamethoxazole

TABLE IV: IMPORTANT TRAVEL-RELATED INFECTIONS CAUSED BY INSECTS

Malaria (chemoprophylaxis available)
Yellow fever (vaccine available)
Japanese B encephalitis (vaccine available)
Dengue infection (vaccine may be available in the near future)
Tick-borne encephalitis (vaccine available)
Filariasis
Onchocerciasis
Leishmaniasis
Trypanosomiasis
Plague and tungiasis
Lyme disease
Typhus
Borreliosis
Rocky mountain spotted fever
Erhlichiosis
Insect bite reaction

vaccination or malaria chemoprophylaxis without coupling it with mosquito protection advice.

Prevention of mosquito bites include:

- 1) Avoid the outdoors in the evening and night (for malaria).
- 2) Wear clothes that cover most of the body.
- 3) Apply insect repellents containing DEET to any exposed skin.
- 4) Remain in well-screened areas and sleep under a mosquito net or in air-conditioned room.
- 5) Burn mosquito coils in heavily infested areas.
- 6) For greater protection, clothing and bed-nets can be impregnated with permethrin.

Malaria chemoprophylaxis should only be given if there is a real risk of contracting malaria since some of these drugs are associated with adverse side-effects. Table V summarises some of the commonly used antimalarial drugs and their main contraindications. The choice of drugs is dependent on the destination and patient factors. The existence of drug-resistant malaria in different parts of the world would mean a different recommendation of antimalarial drugs for different

TABLE V: SOME COMMONLY USED ANTIMALARIA CHEMOPROPHYLACTIC AGENTS

Antimalarial drug	Dose	Precaution/Contraindication
Mefloquine	250 mg once/week	psychiatric disorder, epilepsy, cardiac drugs
Doxycycline	100 mg once/day	pregnancy, children <8 years
Chloroquine	500 mg once/week	
Proguanil (with weekly Chloroquine)	200 mg once/day	
Primaquine (as terminal prophylaxis for relapsing malaria)	1.5mg/day for 14 days	G6PD deficiency, pregnancy

regions of the world. A country list of malaria drug-resistance pattern and chemoprophylaxis recommendations can be found in the WHO publication *"International Travel and Health-Vaccination requirements and health advice 1997"*.¹⁴

Preventing Blood-borne Infections and Sexually-transmitted Diseases (STDs)

AIDS/STD prevention should be part and parcel of routine travel advice because much as we would like to deny this, sex tourism is still rampant in many parts of the world including Asia. Although it would be difficult to identify the "high-risk" sex tourist, we must not deny this information to other "low-risk" travellers. Families, couples and missionaries going to Asia and Africa may take offence if the subject is broached, but if it is done professionally, the advice is usually well appreciated. In Singapore, the majority of local residents who acquired HIV infection had an associated history of travel and exposure to commercial sex workers while overseas (I Snodgrass, personal communications). Most of these individuals were aware of the risk of infection by having unprotected casual sex but were complacent to take precautions by using a condom. Safe sex should be stressed and avoidance of casual sex must be re-emphasised. Adding a condom into the travel first aid kit in the travel pack has been proposed. Many countries include HIV/STD prevention efforts for travellers at the airport and ports of arrival.

The blood supply and the medical facilities in some developing countries may not meet standards practised by developed countries. Long-staying tourists and expatriates must be warned of the consequences of receiving treatment in such sub-optimal conditions since they are likely to use the facilities if they remain for an extended period of time. Vaccination can prevent against hepatitis B infection as a result of using contaminated needles, syringes and contaminated or poorly-sterilised surgical instruments but no vaccine is available against other life-threatening blood-borne infections like HIV or hepatitis C and G. If it is felt that there is no safe guard, then it may be advisable for such individuals to carry their own supply of sterile disposable needles and syringes. If they are to receive any blood or blood products, they need to ensure that these are screened and free from HIV, hepatitis B, C, syphilis and malaria especially in countries where there is a high seroprevalence of such infections and particularly if they also practise commercial blood banking or "blood selling". Autologous blood transfusion or donated blood from a reliable person may help to prevent such risks; hence, the advice to "travel with a friend or companion with a similar blood group" is sometimes given. It must be stated however that, it is very rare that a traveller would require an emergency blood transfusion. If possible, plasma expanders should

be used first before considering transfusion of whole blood.¹⁴

General Principles of Approach to Travel-related Infections

The key to making an accurate diagnosis in travel-related infections is a thorough clinical and travel history. A history of recent travel in any patient being evaluated for a possible infection may often indicate a potential link to epidemiological exposures not usually experienced in Singapore. Some of these infections are life-threatening and have widespread public health implications, e.g. malaria. Over 90%¹⁵ of malaria seen in Singapore are imported or related to travel to an endemic country. It is important to do a blood film for malaria parasites in anyone who presents with fever and had travelled to an endemic area recently.

However, we must remember that some of these diseases may also be acquired locally. The incubation period is therefore important in considering if an infection was acquired before or during travel, e.g. if someone was diagnosed to have typhoid fever 3 days after returning from a 3-day trip from a neighbouring country; it was possibly acquired in Singapore rather than during the trip. Diseases presenting much later than its maximum incubation period would exclude it from being travel-related. We must remember that certain diseases can have a very long incubation period—an American war veteran presented with melioidosis 26 years after returning from Vietnam during the war!¹⁶ Likewise, rabies can have a long incubation period of up to 19 years.

Knowledge of the traveller's itinerary, destination and the exact nature of activities during the trip, including the standard of hygiene, types of food consumed, sexual history, medical treatment or intervention, insect exposures and contact with wild-life are very helpful in establishing the specific epidemiological risk giving rise to disease. Some examples of important epidemiological associations include a link between schistosomiasis and swimming in freshwater in Africa, malaria and jungle trekking in endemic areas, brucellosis and eating unpasteurised goat cheese/milk, tick-bite fever and deer hunting, traveller's diarrhoea and consumption of unhygienic food.

A detailed immunisation history as well as any chemoprophylaxis should be obtained because highly efficacious vaccines like yellow fever, hepatitis A, B, rabies and tetanus would make these diagnoses much less likely. On the contrary, less effective vaccines like typhoid, cholera and malaria chemoprophylaxis even if taken appropriately may not offer complete protection. Prophylactic antibiotics and drugs taken to prevent infections by travellers can sometimes cause problems e.g. antibiotics taken to prevent traveller's diarrhoea can

cause antibiotic-associated diarrhoea or *Clostridium difficile* colitis which can present like traveller's diarrhoea and sulphur drugs taken for malaria can cause drug fever and agranulocytosis.

Lastly, we have to remember that common epidemiological exposures can lead to occurrence of multiple infections simultaneously. A person may get cholera, typhoid, hepatitis A and viral gastro-enteritis by eating contaminated seafood from a common source. Constant and prolonged exposure to mosquito bites can give dengue fever, malaria and Japanese B encephalitis simultaneously although these are transmitted by different mosquito vectors.

Managing the HIV Infected/Immunocompromised Traveller

There is little information about the travel patterns of immunocompromised travellers and those with HIV infection. In a study by Kemper et al,¹⁷ a questionnaire survey of 89 American HIV patients (half of whom have AIDS) revealed that about half of them had travelled in the preceding 2 years and 30% of the trips were motivated by their HIV positivity because they thought that it was their last chance to travel.

Some of the problems this group of patients can anticipate include:

- 1) Increased risk to infectious diseases especially for travel to less developed countries. They should consult their physicians or travel medicine specialists before they embark on their tour.
- 2) Problems with safety and efficacy of vaccines used in preventing travel-related infections. This will be discussed in more detail below.
- 3) Problem of discrimination in HIV-infected individuals. Some countries restrict entry for HIV-positive travellers while others require a HIV test for entry or if the traveller intends to stay for a period of time.
- 4) Many health insurance policies are only valid in the country of origin. Such individuals may need to purchase a supplemental policy for their trip.
- 5) Travel to a less developed country may pose problems of availability of specialised drugs and medical expertise in the case of exacerbation of illness or an opportunistic infection in these patients.

The immunocompromised state pose special problems for the risk of acquiring infections during travel and the risk-benefit analysis tends to tip the scale in favour of vaccination of these individuals against vaccine-preventable diseases. In general, live vaccines should be avoided, with the exception of measles vaccine which has been studied in HIV and AIDS patients and not shown to have an increased incidence of adverse effects.¹⁸

Inactivated (killed) polio vaccine should be used instead of oral (live) polio vaccine, and inactivated

parenteral typhoid vaccine instead of the live, attenuated oral typhoid vaccine. The WHO recommends immunisation of HIV-infected travellers going to yellow fever endemic countries. This recommendation covers primarily HIV-seropositive individuals who are asymptomatic. However, there is “insufficient evidence to permit a definitive statement on whether administration of yellow fever vaccine poses a risk for symptomatic HIV-infected persons, and the issue is currently under investigation”.¹⁴ If immunisation is not performed, a vaccination waiver letter should be issued. Depending on the state of immunodeficiency, the likelihood of a successful immune response to vaccination is reduced and the patients must be warned of this and counselled to take supplementary precautions e.g. mosquito precautions must be adhered to after yellow fever vaccination.

There is evidence that antimicrobial prophylaxis can reduce the risk of diarrhoea in travellers, although none of these studies involve HIV-positive individuals. These agents can have adverse effects and can promote the emergence of drug-resistant organisms. In practice, prophylactic antibiotics are not routinely prescribed for all HIV-infected persons against TD; they should nevertheless, carry a supply of antibiotics with them (e.g. Ciprofloxacin 500 mg bid for 3 to 5 days) for empirical treatment of diarrhoea. They should consult a doctor if the symptoms do not respond within 48 hours or if they have chills, fever or dehydration.

Managing the Asymptomatic Returned Traveller

For travellers who have worked or lived abroad for a long time (>3 months), it may be worthwhile on returning to present to a travel clinic for a routine check-up. This is particularly relevant if the traveller had been ill while he was overseas, or had high-risk epidemiological exposures e.g. to water, soil, insects, wild-life or the indigenous population, especially in rural Asia or Africa.

Depending on the history and the specific epidemiological risk factors, screening should include:

- 1) Full blood count: this is very useful in detecting anaemia (seen in many chronic infections and parasitic infections), eosinophilia (seen in many parasitic/helminthic infections).
- 2) Blood-film for malaria parasites (blood-film is less sensitive for diagnosis of trypanosomiasis and filariasis).
- 3) Liver function tests (for evidence of hepatitis) and hepatitis A, B, E serologies if indicated.
- 4) Serology for schistosomiasis, filariasis, Lyme disease, syphilis and HIV if indicated.
- 5) Stool tests for cysts, ova and parasites and stool culture for enteropathogens.

- 6) Terminal urine for schistosoma eggs.
- 7) Optional chest X-ray. This would be helpful if there are respiratory symptoms or there is intimate and prolonged contact with sick people, especially health-care or relief workers.
- 8) Miscellaneous e.g. biopsy of any suspicious skin lesions/ulcers, urethral swabs and sexually-transmitted diseases work-up.

It must be emphasised that the value of good laboratory support in specialised fields as diagnostic parasitology and parasitic serology in addition to physician expertise in tropical diseases is invaluable in the management of the asymptomatic returned traveller.

Where to Obtain Travel Health Information

Information on diseases relevant to international health is published and updated on a regular basis by international agencies like the World Health Organization (WHO) and the Centres for Disease Control and Prevention (CDC), Atlanta, USA. The WHO Weekly Epidemiological Bulletin contains all the information that the Organisation is required to provide under the International Health Regulations (1969). The WHO also publishes an annual guidebook entitled *International Travel and Health* for all those involved in travel health and the travel industry. Vaccination requirements for individual countries, malaria prophylaxis recommendations and other aspects of travel health and prevention are covered in the issue which is updated yearly. The CDC publishes a bi-annual *Health Information for International Travel* which is a complete guide on vaccination information, requirements, and recommendations as well as many other health hints for travel. There are also various other commercial publications in travel health as well as software packages and reference catalogues designed to meet different needs and costs. The Internet and the electronic media also offer an impressive range of travel information to the public as well as the medical providers. Web sites, including the Tan Tock Seng Hospital's "Traveller's Health and Vaccination Clinic" at <http://www.ttsh.gov.sg/>, the WHO's at <http://www.who.ch/> and the CDC's at <http://www.cdc.gov/>, cater to a spectrum of net surfers from the lay public to the travel medicine specialists.

Conclusion

With all the science and information available to protect the international traveller, no one should knowingly leave for a trip without the appropriate vaccination and prophylaxis. However, we must guard against being overly zealous in our effort to provide pre-travel protection otherwise the high cost and inconvenience of vaccinating travellers unnecessarily would negate any benefits we get from attempting to prevent these infections.

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