

Preparing patients to travel abroad safely

Part 1: Taking a travel history and identifying special risks

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abstract

OBJECTIVE To present for family physicians without access to a travel clinic and the Internet the questions to ask about the medical history and itinerary of their patients traveling abroad. To suggest ways to identify and advise high-risk patients.

QUALITY OF EVIDENCE MEDLINE searches from 1990 to November 1998 located 51 articles on travel and diabetes, 37 on travel and chronic obstructive pulmonary disease (COPD), 63 on travel and heart disease, 192 on travel and pregnancy, and 298 on travel with infants or children. Additional searches were undertaken in September 1999. The quality of evidence in most articles is level III (expert opinion). There are no randomized controlled trials of the best advice for family physicians to give travelers.

MAIN MESSAGE A history should include countries to be visited, planned activities, previous tropical travel, medical history, vaccination status, whether children are traveling, pregnancy status, and patients' opinions of the risks and precautions needed. Detailed advice should be given to reduce risks. The main causes of mortality abroad are existing cardiovascular conditions and accidents. High-risk conditions to be identified in travelers are cardiovascular illness, COPD, diabetes, immunodeficiency, pregnancy, and traveling with children.

CONCLUSIONS Patients with cardiovascular illness or COPD should be advised to avoid too much exertion while traveling. Detailed instruction should be given to diabetic patients on how to maintain stable glucose levels, to pregnant women on avoiding malarial infection, and to parents on protecting their children from infections and accidents.

résumé

OBJECTIF Présenter aux médecins de famille qui n'ont pas accès à une clinique de médecine des voyages ni à Internet les questions à poser durant l'anamnèse et sur l'itinéraire de leurs patients qui voyagent à l'étranger. Suggérer des façons d'identifier et de conseiller les patients à risque élevé.

QUALITÉ DES DONNÉES Une recension dans MEDLINE, de 1990 à novembre 1998, a permis de trouver 51 articles sur le voyage et le diabète, 37 sur le voyage et les maladies respiratoires obstructives chroniques (MROC), 63 sur le voyage et la coronaropathie, 192 sur le voyage et la grossesse, et 298 sur le voyage avec des nourrissons ou des enfants. Des recherches additionnelles ont été effectuées en septembre 1999. La qualité des données probantes dans la plupart des articles est de niveau III (opinion d'experts). Il n'existait pas d'essais aléatoires contrôlés sur les meilleurs conseils à prodiguer par les médecins de famille aux voyageurs.

PRINCIPAL MESSAGE Durant l'anamnèse, il faudrait demander quels pays seront visités, les activités prévues, les voyages antérieurs dans des pays tropicaux, les antécédents médicaux, l'état vaccinal, si des enfants sont du voyage, si la personne est enceinte, l'opinion des patients quant aux risques et aux précautions à prendre. Des conseils détaillés devraient être prodigués pour réduire les risques. Les principales causes de décès à l'étranger sont les accidents et les conditions cardiovasculaires existantes. Les états de santé ou situations à risque élevé à identifier chez les voyageurs sont les maladies cardiovasculaires, les MROC, le diabète, l'immunodéficience, la grossesse, et à savoir si des enfants sont du voyage.

CONCLUSIONS Il faudrait conseiller aux patients souffrant de maladies cardiovasculaires ou de MROC d'éviter l'excès d'activité physique pendant leur voyage. Des instructions détaillées doivent être données aux patients diabétiques sur la façon de maintenir stable leur taux de glycémie, aux femmes enceintes sur les mesures à prendre pour éviter l'infection paludéenne et aux parents sur la façon de protéger leurs enfants contre les infections et les accidents.

This article has been peer reviewed.

Cet article a fait l'objet d'une évaluation externe.

Can Fam Physician 2000;46:132-138.

Increasing numbers of Canadians are traveling abroad to tropical locations. Most do not have access to a travel medicine clinic and rely on their family physicians for up-to-date information on preventing and treating illnesses contracted abroad.

Travelers die abroad mainly from cardiovascular conditions and accidents, and more rarely from malaria. Morbidity arises from diarrhea, malaria, sexually transmitted diseases (STDs), skin infections, and upper respiratory infections.

Travel medicine experts (level III evidence) suggest focusing on certain areas while taking a history, giving advice, and suggesting preventive measures: travelers with health conditions, such as diabetes, heart disease, immunodeficiency, or pregnancy, that will need careful management abroad; travelers with children; intended travel and activities; vaccinations needed; and risk assessment for, prevention of, and treatment of malaria, accidents, diarrhea, and STDs.

This first of a series of four articles on preparing patients to travel abroad safely, therefore, focuses on taking a travel history and identifying high-risk situations. The three articles to follow cover vaccinations; malaria; and accidents, diarrhea, and STDs.

No randomized controlled trials (RCTs) have investigated giving comprehensive optimal advice and preventive measures to patients of family medicine practices and measuring whether there are significant differences in mortality or morbidity on return. The advice in this article is mostly based on level III evidence.

Quality of evidence

MEDLINE searches from 1990 to November 1998 found 51 articles on travel and diabetes, 37 on travel and chronic obstructive lung disease (COPD), 63 on travel and heart disease, 192 on travel and pregnancy, and 298 on travel with infants or children (**Table 1**). Additional searches were undertaken in September 1999. For this series of four travel articles, 13 separate MEDLINE searches found 3063 articles. Titles were read, as were abstracts of relevant articles. Most articles were epidemiologic studies and articles by experts (level III evidence, **Table 2**¹), such as travel medicine physicians and subspecialists (eg, gastroenterologists). I looked for RCTs, systematic reviews, and meta-analyses; the few I found focused on malaria, vaccinations, and diarrhea.

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Travel Internet sites were searched, and those of Health Canada's Laboratory Centre for Disease Control (LCDC), the United States Centres for Disease Control (CDC), and the World Health Organization were selected as being evidence based. These sites concur in their advice about travel preparations; some give more detail in certain areas. Other sites useful for giving timely warnings of epidemics are noted (**Table 3**).

Because of the infectious disease component, travel and tropical medicine change rapidly. I did not search MEDLINE further back than 1990.

Main message

An example of morbidity levels and risks encountered during tropical holidays is shown in a study of 500 Swedes: 36% incurred diarrhea and 21% respiratory tract infection. Illness lasted an average of 4.5 days, 30% were confined to bed for 2 days, and 75% used medications.² The odds of people 10 to 24 years old becoming ill were 3.8:1 compared with people 25 to 64 years old. The odds ratio of contracting respiratory illness was 4.2 for trips longer than 5 weeks compared with trips of 1 week. Travelers on adventure holidays were 4.1 times more likely to become ill than those on recreational trips. Family physicians can endeavour to reduce such risks by history-taking and advice.

History. History-taking should include countries to be visited; planned activities, including rural visits, excursions, camping, and contact with animals; previous tropical travel, precautions, and health experiences; medical history (particularly diabetes, cardiovascular disease, COPD, and immunodeficiency); vaccinations received and due; whether children are traveling; pregnancy status; and patients' opinions of the risks they will face with the activities planned in the countries they will visit and the precautions they plan. Detailed advice can then be given about avoiding risks.

Travel medicine information sources. Travel medicine resources that will keep you current include *International Travel Health Information: Guidelines for Health Professionals*; collated evidence-based statements and guidelines developed by the the Committee to Advise on Tropical Medicine and Travel (CATMAT); the *Canadian Immunization Guide*, 5th edition; and the CDC's *Health Information for International Travel* (Yellow Book). Useful internet sites are listed in **Table 3**.

Table 1. Articles retrieved from MEDLINE search from 1990 to November 1998

TOPIC	NO. OF ARTICLES
Travel and dengue fever	73
Travel and malaria	671
Travel and diarrhea	504
Travel and sexually transmitted diseases	42
Travel and diabetes	51
Travel and human immunodeficiency virus or acquired immune deficiency syndrome	24
Travel and chronic obstructive pulmonary disease	37
Travel and heart disease	63
Travel and pregnancy	192
Travel and infants or children	298
Travel and immunization	372
Travel and accidents	163
Travel medicine	573

Distribution of tropical diseases by country is given in Wilson.³ Travel medicine practitioners DuPont and Steffen⁴ and Jong and McMullen⁵ have written authoritative textbooks on travel medicine. An excellent discussion of the complications of pre-travel vaccination and posttravel illness presenting in emergency departments appears in Jong and McMullen.⁶

Diabetes. There is no evidence that those who follow the advice in travel medicine textbooks on managing diabetes have lower morbidity, although the advice makes intuitive sense. Travel involves unaccustomed exertions and interruptions to routines and meals, and patients with insulin-dependent diabetes should plan their travel, meals, and insulin to minimize disruptions. They also need to plan where they will store their insulin. Diabetics should be reminded to take their capillary glucose monitor and enough test strips along on holiday. Patients taking oral medications should take them at the usual prescribed times, using local time.

Those taking insulin should take their usual doses on the morning of departure.⁷ Those traveling east across six or more time zones will wake up at their

destination only 18 hours after their previous insulin dose. To avoid hypoglycemia on the first morning, they should take two thirds of their usual insulin dose. Those who take two injections of insulin a day and who find their glucose level at dinnertime is substantially elevated (eg, >14 mmol/L) could take their regular evening dose of insulin plus the remaining third of their morning dose.⁷ Those traveling west across six or more time zones will experience a lengthened day and could simply take a full dose of insulin the next morning and check their sugar levels at dinnertime.

Travel often involves missed meals and both hurried and prolonged preparations; diabetic travelers should take along extra snacks. Traveling companions unused to diabetes should be informed about the symptoms of hypoglycemia (glassy eyes, confusion, fatigue, and inappropriate sweating) and instructed to give a sugary drink and a complex carbohydrate snack, such as cheese and crackers, should the problem arise.

Cardiovascular disease. Studies have identified, not surprisingly, that cardiovascular disease remains a risk factor for people on holiday. About 50% of US travelers who die abroad are men older than 60 who have heart attacks.⁸

Experts advise against travel for people who have had heart attacks within the preceeding 4 weeks, unstable angina, uncontrollable congestive heart failure, or serious cardiac arrhythmias. During flights, travelers should move about regularly to avoid deep venous thrombosis (DVT). Travel increases the risk of pulmonary embolism or DVT: one study identified risk factors for these as previous DVT (34%); malignancy or chronic disease (25%); hormone therapy (16%); recent lower limb injury (11%); and recent surgery or femoral catheterization (9%).⁹

Patients taking warfarin might have lowered INRs (international normalized ratios) if they eat unaccustomed amounts of fruit and vegetables containing vitamin K in tropical environments. There might be no way of verifying the INRs.

Chronic obstructive pulmonary disease. The Canadian Thoracic Society recommends that patients who already use supplemental oxygen and those with suspected hypoxemia, suspected hypercapnia, known COPD, or restrictive lung disease, a history of respiratory difficulty during air travel, recent exacerbation of COPD, or other chronic conditions that could be

exacerbated by hypoxemia be evaluated before flying for possible hypoxemia.¹⁰

Airlines fly at altitudes between 6700m and 13 400m and usually aim to pressurize their cabins to provide an effective cabin altitude of 1724m. This altitude results in an inspired PaO₂ of 118 mm Hg compared with 149 mm Hg at sea level.¹⁰ A study of COPD patients found their PaO₂ at sea level was 72 ± 9 mmHg, and at a simulated altitude of 2400m was 47 ± 6 mmHg. Normal subjects' values were 95 ± 8 mmHg at sea level and 60 ± 4 mmHg at 2400m.¹⁰

Patients with PaO₂ levels of < 70 mm Hg at sea level are at increased risk of hypoxemia. Those with PaO₂ levels of 60 to 70 mm Hg are in a gray zone; risk depends on their ability to hyperventilate to compensate during flight.¹⁰

The Canadian Thoracic Society recommends maintaining a minimum PaO₂ of 50 to 55 mmHg during flight; giving oxygen at 2L/min to those who are likely to develop hypoxemia during flight; increasing the oxygen flow rate by 1 to 3L/min for those already using supplemental oxygen at ground level; and computing the supplemental oxygen needed for those for whom it is difficult to predict their reaction to altitude (a hypoxic gas study with an F_{IO₂} of 15% in a pulmonary laboratory will demonstrate the outcome at a cabin altitude of 1724m).¹⁰ Contraindications to flying are dyspnea at rest, cyanosis, active bronchospasm, pneumonia, or pulmonary hypertension.⁷

Immunocompromised travelers. Travelers with human immunodeficiency virus infection are at higher risk in environments with high levels of infectious disease, and they respond poorly to vaccines.¹⁰ They are also more susceptible to bacterial pathogens of the gut due to achlorhydria, decreased cell-mediated mucosal and systemic immunity, and humoral immunity, and this can lead to bacteremia; *Shigella*; *Campylobacter*; protozoal infections; and chronic, relapsing *Salmonella* or disseminated salmonellosis.¹¹ Expert advice from the LCDC recommends antibiotic prophylaxis for traveler's diarrhea for HIV-positive people traveling for less than 3 weeks.¹²

Travelers with HIV are also more susceptible to *Streptococcus pneumoniae*, *Haemophilus influenzae*, other influenza, fungal infections (histoplasmosis and coccidioidomycosis in the southwestern United States and Central and Latin America), and sinusitis.¹⁰ Because of their marked susceptibility to tuberculosis (TB), a high index of suspicion should be maintained when symptoms of fever, weight loss, malaise, and night sweats present. Regular Mantoux testing

Table 2. Strength and quality of evidence as rated in *Canada Communicable Disease Reports*¹

STRENGTH	
CATEGORY	DEFINITION
A	Good evidence to support recommendation for use
B	Moderate evidence to support recommendation for use
C	Poor evidence to support recommendation for use
D	Moderate evidence to support recommendation against use
E	Good evidence to support recommendation against use
QUALITY	
GRADE	DEFINITION
I	Evidence from at least one properly randomized controlled trial
II	Evidence from at least one well-designed clinical trial without randomization, from cohort or case-controlled analytic studies (preferably from more than one centre, from multiple time series studies, or from dramatic results in uncontrolled experiments)
III	Evidence from opinions of respected authorities on the basis of clinical experience, from descriptive studies, or from reports of expert committees

with an anergy panel should be undertaken before traveling and 2 to 4 months after returning from high-risk areas, even though these patients' ability to respond to tuberculin testing might be impaired.

An article in the *Medical Journal of Australia* identifies a CD₄ count below 200/mm³ as indicating increased risk of acquiring sinusitis, *Pneumocystis carinii*, central nervous system toxoplasmosis, and cytomegalovirus retinitis. These diseases require sophisticated hospital resources for treatment; such resources might not be readily available in poorer countries.¹³

Patients who have had their spleens removed are at higher risk of infection with encapsulated organisms (*S pneumoniae*, *H influenzae* type b, meningococcus), malaria, *E coli*, and babesiosis. Experts advise getting vaccinations to reduce the risk of pneumococcus and *H influenzae*, and meningococcus if patients are traveling to areas where it is endemic.¹¹

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Table 3. Internet travel medicine sites

CANADIAN SOURCES

Travel Medicine Program, Laboratory Centres for Disease Control (LCDC), Health Canada http://www.hc-sc.gc.ca/hpb/lcdc/tmp_e.html

Canada Communicable Disease Reports (CCDR), LCDC, Health Canada <http://www.hc-sc.gc.ca/hpb/lcdc/publicat/ccdr/99vol25/index.html>

UNITED STATES SOURCES

Travelers' Health, Centres for Disease Control (CDC), US Department of Health and Human Services <http://www.cdc.gov/travel/>

Morbidity and Mortality Weekly Reports (MMWR), US Public Health Service <http://www2.cdc.gov/mmwr/>

WORLD HEALTH ORGANIZATION SOURCES

International Travel and Health Vaccination Requirements and Health Advice <http://www.who.int/dsa/justpub/justpub.htm#>

International Travel and Health Diseases Outbreaks Report <http://www.who.int/emc/outbreak-news/index.html>

Pregnancy. In the tropics, rates of fetal loss are higher in the first trimester, risk of early labour increases after 35 weeks, and remoteness from medical help should be avoided. Clotting factor levels are higher during pregnancy, and air travel increases the risks of venous stasis and blood clots in the deep veins of the legs. Experts advise stretching and walking the aisles periodically to reduce pressure on the veins from the uterus.¹⁴

Pregnant women and their unborn babies are at increased risk of poor outcomes from malaria, amebiasis, and hepatitis B. Boiling or using a 2µ-pore filter are the preferred methods of purifying water. Meat should be well cooked; microwaving, stir-frying, smoking, and steaming might not kill parasites.¹⁵ Most diarrhea is self-limiting, and early oral rehydration is the important therapy.

Caeiro and DuPont¹⁶ recommend that pregnant women exercise "extreme prudence" in food and beverage preparation and that sulfonamides, quinolones, and trimethoprim not be used. Two articles advise against using bismuth subsalicylate (Pepto-Bismol) because of the potential adverse effects of salicylate on a fetus.^{16,17} A third article argues that there is no evidence that either the bismuth or the subsalicylate causes human teratogenicity but advises that the theoretical risk of using salicylates during pregnancy be considered.¹⁵

Second- and third-generation cephalosporins are effective against many strains of *Shigella* and *Salmonella*, and erythromycin is the drug of choice for *Campylobacter* during pregnancy.¹⁵

Traveling with infants and children. A study of children of missionaries to sub-Saharan Africa shows how poorly prepared they were to face health risks. Only 6% had received immunoglobulin; 9% complete typhoid and rabies vaccinations; 17% a complete hepatitis B series; 26% oral polio vaccine; 71% diphtheria, tetanus, and polio vaccine; and 19% appropriate malaria prevention. About 65% took appropriate measures to clean vegetables, and 84% treated the family's water appropriately.¹⁸ Family physicians could help families prepare better through history-taking and advice.

Experts advise that infants should not travel by air in the first 2 weeks of life because they are sensitive to changes in air pressure: ventilation-perfusion mismatches could be exacerbated, and they might still have unexpanded alveoli.¹⁹ If children suck bottles or hold their noses and blow, they might be able to equalize ear pressures as the plane descends.²⁰

If children must travel before their primary immunizations are complete, accelerated schedules can be used. Measles is endemic in developing countries and has high mortality; polio is also endemic, and vaccinations should be completed before travel. Tuberculosis is endemic in developing countries, and children are highly susceptible. Health Canada rates the recommendation for TB vaccination for children, especially those younger than 1 year intending to stay in areas where there is a high incidence of TB, as BIII (moderate evidence based on opinions of respected authorities).²¹

Precautions to prevent adults from being bitten by mosquitoes should be used stringently for infants and children. This will also reduce their risk of developing impetigo at the sites of mosquito bites and acquiring through insect bites (according to country) dengue fever, filariasis, leishmaniasis, encephalitis, and trypanosomiasis.

Malaria can be fatal, and mefloquine should be given prophylactically to children if they are going to live in chloroquine-resistant areas. Children tolerate mefloquine well, but some experience nausea: of children given 20 to 30 mg/kg mefloquine as a single dose, 10% to 20% had nausea and vomiting, and 40% were dizzy.²² Parents should be warned that, although their children might have some nausea, it

is crucial to give them mefloquine because malaria can be fatal.

A third of travelers to less developed countries get diarrhea. Children dehydrated from diarrhea or other causes should be given the World Health Organization's "oral rehydration solution" (WHO-ORS). Powder or tablets provide 3.5 g of sodium chloride, 1.5 g of potassium chloride, 2.5 g of sodium bicarbonate, and 20 mg of glucose dissolved in 1 L of fluid.¹⁴ Alternatively, slightly salty soups; juices; and complex carbohydrates, such as cheese and crackers, can be given.

Supplies to consider taking abroad are cloth diapers (disposable diapers are often not available); a car seat; and a medicine kit. Because soil might contain hookworm larvae and hepatitis A virus, provision for safe play must be made. Food, water, and finger foods must be clean, as must fingers and eating surfaces. Food handlers can carry hepatitis and enteric infections; food should be purchased from known clean suppliers only.¹⁹

Identifying unusual levels of risk

Travelers who have no plans other than to stay abroad for a long period and wander about many high-risk countries without taking preventive measures place themselves at high risk. Professionals, such as veterinarians and biological field workers, might spend long periods in fields and woods observing and penetrate the environments of animals and insects that transmit disease.

Medical workers should be advised about handling blood products. Family members of medical workers, who undertake tasks in hospitals but have not been warned about risks, should be particularly advised: 33% of Canadian missionaries serving in tropical areas who handled blood products were positive for hepatitis B surface antigen, compared with 10% of those who did not handle blood products (although none were currently hepatitis B-positive).²³ Identifying risks in specific countries can be accomplished by consulting travel medicine textbooks, the Internet, and Wilson's comprehensive textbook.³

Conclusion

For patients traveling abroad, family physicians should take a careful history focusing on the countries to be visited; activities planned; tropical travel history; medical history; vaccination status; whether children are traveling; pregnancy status;

Key points

- A travel history should include countries to be visited, planned activities, previous tropical travel, medical history, vaccination status, pregnancy status, whether children are traveling, and patients' perceptions of risk.
- Higher-risk medical conditions for travel include cardiovascular disease, chronic obstructive pulmonary disease, diabetes, and immunodeficiency.
- Reliable sources of travel information include Health Canada, the United States Centres for Disease Control, and the World Health Organization. All offer on-line services that are updated regularly.

Points de rep1ère

- Durant l'anamnèse entourant un voyage, il faudrait demander quels pays seront visités, les activités prévues, les voyages antérieurs dans des pays tropicaux, les antécédents médicaux, l'état vaccinal, si la personne est enceinte, si des enfants sont du voyage et la perception des patients des risques possibles.
- Les états de santé à risque élevé durant un voyage sont les maladies cardiovasculaires, les maladies respiratoires obstructives chroniques, le diabète et l'immunodéficience.
- Au nombre des sources d'information sur les voyages figurent Santé Canada, le United States for Disease Control et l'Organisation mondiale de la santé. Tous offrent des services en direct qui sont régulièrement mis à jour.

and travelers' understanding of the risks involved and precautions needed.

Deaths among travelers abroad are mainly due to existing heart disease and accidents. Others at high risk are immunocompromised travelers, diabetics, patients with severe COPD, pregnant travelers, and children. ♦

Acknowledgment

I thank Dr Peter Teitelbaum Director of the Riverside Travel Clinic in Ottawa, Ont; Margaret Bodie-Collins, Travel Medicine Advisor in the Travel Medicine Program in Health Canada's Laboratory Centres for Disease Control in Ottawa; and Dr Alan Meltzer, Senior Health Advisor in the Office of Special Health Initiatives at LCDC, for participating in the planning and presentation of a course on travel medicine for family medicine residents in Ottawa from which this article developed. ➤

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