

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Asian Pacific Journal of Tropical Medicine

journal homepage: www.elsevier.com/locate/apjtm

Document heading

The importance of different forms of prevention in travel medicine

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ARTICLE INFO

Article history:

Received 2 February 2009

Received in revised form 7 March 2009

Accepted 8 May 2009

Available online 20 January 2010

Keywords:

Travel medicine

Preventive medicine

Graduate education

Medical assistance

Pretravel advice

Travel-related illness

Preexisting disease

Emporiatrics

ABSTRACT

The Asia–Pacific region is becoming an increasingly popular destination for holidaymakers and business travelers. Despite the seductive tourist attractions and the growing financial importance of the region, infectious diseases have unfortunately repeatedly caused major epidemics in the region. The area includes various geographical situations from high mountains to the subtropical and monsoon forests, dry deserts and seashore. The travel medicine specialist's task is to decrease the various risk of travel to the region. Infectious diseases, extreme temperatures and marine hazards could be almost entirely prevented by primary prevention forms of travel medicine such as vaccination, chemoprophylaxis and pretravel advice. There are some high-risk groups (e.g., elderly people, backpackers, families with children, adventure travelers) among the growing number of tourists. Obviously, the increased numbers of such travelers result in a rising incidence of travel-related illnesses and accidents. For those groups, primary prevention sometimes is not enough. The pretravel medical check up, specialists' consultations and treatment, as forms of secondary prevention, are also essential in travel medicine. Patients who suffer from serious illnesses or who have accidents must often be repatriated. "State-of-the-art repatriation", as a special form of tertiary prevention of travel medicine will play an important role in the future and is directly related to effective travel insurance, which could help in providing good medical care to the patients even far from their home. The levels, methods and importance of prevention in travel medicine are discussed in this article.

1. Introduction

According to some forecasts for 2010, the numbers of international travelers will reach as many as 1 billion and in 2020 the figures suggest 1.6 billion. Most of the travellers will come from the far east Asian and Pacific region. On the other hand, expected tourist arrivals in east Asia and the Pacific region will be second only to Europe^[1]. Asia and especially China was the fourth among the top ten tourist destinations in 2005 and 2006^[2]. International data shows that among European travelers spending their holiday at tropical or subtropical regions, as many as 43–49% will experience some form of travel-related, often incapacitating, health problem^[3,4]. The most frequent medical problem has been gastrointestinal (GI) disorders, and the incidence has not changed much over the years. The percentage of European travelers showing GI symptoms

varies, but it never goes below 34% and sometimes it has reached as high as 50–65%^[5]. Travel-related medical problems could be almost entirely prevented, but knowledge of travel medicine is not enough to decrease these problems. The travelers' active participation in the prevention process remains the basic issue. In fact, international literature displays a rankling picture. Generally only 24–36% of travelers seek travel health advice^[6,7] even if they intend to travel in disease-prone areas^[8].

Today, travel medicine does not only mean prevention (travel health) but it has become an interdisciplinary or even a multidisciplinary medical science, which operates both in the field of prevention and therapeutics^[9]. Parallel to the development of the discipline, the levels of prevention, the tasks involved and the corresponding forms of prevention have been established in practice, but have not yet been defined formally^[10].

2. Categorization of travel-related illness

Travel diseases can have a deep impact on enjoyment as well as on the health status of the traveler. Besides

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preventing both emerging and re-emerging infectious diseases, we also have to prepare our clients for unusual climates and environmental circumstances, accident prevention, marine and other hazards and to alert them

to safety measures. In assessing travel-related medical problems, we analyzed the necessary forms and methods of prevention before, during, and sometimes after the trip (Table 1).

Table 1

Categorization of travel-related illnesses.

Etiology of travel-related illnesses	Characteristic of the illness	Illnesses	Possibility for prevention
The pathogenic factor is the traveling itself	Provoked by the travel, as in nausea	Jet-lag, motion sickness, deep vein thrombosis, traveling psychosis	Pretravel advice, symptomatic therapy
Independent pathological events, which accompany the travel	Provoked by the travel as a source of dangerous situations	Traveler's diarrhea, environmental problems, infections, orthopedic problems	Vaccination, chemoprophylaxis, pretravel advice
Travel is an accidental factor	Caused by pathological processes in the organs or by external hazards	Trauma, cardiac or brain vascular attacks	Safety devices, therapy of symptoms, operation, pretravel advice
Preexisting disease, exacerbated by travel	Triggered by the circumstances of the travel	Chronic diseases such as cardiovascular disorders, chronic obstructive pulmonary diseases, epilepsy diabetes, hypertony	Supervision of existing medication, pretravel advice

As using the term "travel medicine" in its extended meaning and define it as a science devoted to researching, preventing and treating peritrip medical problems, we use the term "prevention" in its extended meaning, too. Therefore, we also have to categorize the different levels of prevention and apply the classical three-leveled categorization to travel medicine.

3. Primary prevention

The tools of primary prevention, such as biomedical prophylaxis, (vaccination and chemoprophylaxis) and pretravel advice were the initial steps of travel medicine to prevent emerging and re-emerging infectious diseases and decrease or even eliminate the risk factors that travelers had to face. However, it soon became clear that there are many other threats during travel besides infectious diseases. Pretravel advice must include vaccination, the traveler information on food-borne diseases, the safety measures, the prevention of traffic and sport accidents as well as on envenomation and poisoning. Good advice should contain guidelines for self-treatment and should draw the traveler's attention to taking out appropriate insurance.

4. Secondary prevention

Deteriorations or imbalances in preexisting medical problems during the journey could be prevented by a careful pretravel checkup and treatment. Thus, secondary travel medicine prevention should preclude the problem before it causes further damage. The main risk of a traveler with preexisting disease will come generally from exacerbations or complications of their underlying disease rather than from travel-related illnesses. Therefore the physicians (and the patients themselves) should make an objective and detailed assessment of these risks, before they consider any patient fit to travel. During the preparation of a traveler, the physician might need to enter into therapeutic processes, so this activity differs from simple medical advice and should be considered as a secondary level of preventive travel medicine. The various health conditions present a challenge to the travel medicine specialist, who anticipates

any potential problems and provides advice tailored to the patient's comfort and safety. The treatment of any complication abroad is the task of a local doctor (and is considered tertiary prevention), who should try to control the condition and begin temporary or definitive treatment.

5. Tertiary prevention

The main aim of tertiary prevention in travel medicine is early treatment to prevent any further damage to the patient. In this sense, the first and often temporary treatment of an acute patient abroad—with internal or trauma surgery problems and all forms of medical emergencies—belongs to the tertiary level of prevention. This kind of patient is treated as an outpatient, or in the worst case, has to be hospitalized and often repatriated. Most of the phases of repatriation entail medical activity. The local treating doctor has to prepare the patient for the trip and decide the modality and timing of the transport. Any critically ill patient has to be escorted by a doctor to avoid any complications arising during repatriation. Thus, repatriation itself is considered a special form of tertiary prevention.

Obviously, the borders between the three prevention levels are not always clear and sometimes the activity of a travel medicine specialist lies in between the prevention levels. For example, during the pretravel advice we evaluate the traveler's experiences of the previous trip, using feedback from the tertiary prevention level to the primary one. The complex matrix of prevention in travel medicine is displayed in Table 2.

6. The importance of the prevention levels in travel medicine

When traveling abroad, the various forms of travel hazards and medical emergencies require a multilateral and interdisciplinary approach to preventive medicine. In terms of the three levels of prevention and prevention methods in the field of travel medicine, of necessity we have to involve all the doctors, who get involved with a traveler, no matter in what field of medicine they work. Obviously, primary prevention remains the most important element in preparing

travelers for their trip. Family doctors and the travel clinics are the unambiguous basis of vaccination, chemoprophylaxis and pretravel advice. However, sometimes physicians working in another field of medicine can provide useful contributions to the successful preparation of the traveler. Travelers to extreme environments and those who spend long periods in settings with limited health care resources need to have more detailed pretravel screening and education than the routine short-term traveler^[11]. Therefore occupational medicine specialists should participate in

the primary prevention as well. However, even in the field of medical advice there is still a lot to do. The main misconception is the over-emphasizing of vaccination as a means of primary prevention^[12]. While all general practitioners (GPs) can provide information on infectious diseases and perform vaccination, only 45%–70% of them provide further, important information on personal safety, on appropriate insurance^[13], environmental hazards^[14] and medical assistance abroad^[15].

Table 2

Prevention matrix of travel medicine.

Prevention method		Prevention in practice	Period of trip	Prevention provided by
Primary prevention	Risk assessment and analysis	Pretravel advice for healthy travelers, expatriates and long term travelers	Before the trip	General practitioner (GP), travel clinic, occupational medicine specialist
	Biomedical prophylaxis	Vaccination Chemoprophylaxis		
Secondary prevention	Risk assessment upon medical checkup	Pretravel advice for the chronically ill patient	Before the trip	GP, occupational medicine specialist, travel clinic
	Biomedical prophylaxis	Vaccination Chemoprophylaxis		
Tertiary prevention	Medical attendance, balancing or re-balancing the disease	Preparing patients with preexisting diseases for travel	During the trip	GP, travel medicine clinic, specialists
	Medical intervention	Definitive or temporarily treatment		
	Definitive treatment at home	Repatriation in time by appropriate transportation		
	Analysis of medical problems during trip, feedback to primary prevention	Post-travel medical check up	After the trip	GP, travel medicine clinic, specialists, occupational medicine specialist

In the field of medical attendance, or during the repatriation process (i.e., secondary- and tertiary levels of prevention) different specialists could be indispensable. Therefore, different specialists need to be aware of the basic elements of travel medicine and vice versa. The travel medicine specialist must be involved in the therapy and diagnosis of a traveler on the spot, as well as into the repatriation process.

7. New ways of prevention

The demand for better and more innovative approaches to effective prevention is an evergreen topic of travel medicine professionals^[16]. Continuous education and training for professionals is a part of keeping their knowledge up-to-date. New and streamlined solutions have been developed by doctors, such as e-mail advice, but guidelines protecting physicians from the legal and ethical consequences are still lacking^[17], so in many countries this new communication technology is restricted by regulations.

Relatively less medical advice focuses on the travel- or leisure sport activity-related diseases, such as motion sickness, mountain sickness and prevention of trauma by safety devices. They should be an integral part of pretravel advice, especially for backpackers. The nontraditional field of travel medicine, such as wilderness medicine requires a non-traditional way of education and training for doctors^[18]. This has proved to be an effective and attractive mode of postgraduate medical education^[19,20].

It seems that the traveler is often reluctant to visit a travel medicine clinic or their GP to seek medical advice. Instead, they try to get some information from pharmacies^[21]. The role of pharmacists offering travel advice and consequently in primary prevention is increasing^[22] and there are even some specialized pharmacies in the USA^[23]. The role of pharmacists in offering travel advice could play an important role in eastern European countries, where the travel medicine clinic network is underdeveloped^[24]. This would also require a postgraduate training in travel medicine^[25]. Some data have shown that almost half of all travelers' main source of travel-related medical information is nonmedical^[26]. Unfortunately, Internet based information is often at a low level^[27, 28] and might be accessible only by multiple clicking. Travel brochures that give information on health care prevention are potentially an important source of travel health advice. However, such commercial leaflets usually contain poor and insufficient information on the topic^[29].

All the efforts of the travel medicine specialist are less effective without health promotion coming from other sources. Infection prevention is one of the main tasks of public health authorities, therefore they should improve and increase their publicity campaigns for travel health and vaccination to prevent travel-associated infections and re-importation of such diseases^[30]. The contributions of the travel industry to preventive activity are not only an ethical issue, but also could prove more effective, as they are

closest to the client.

8. Discussion

During the short lifetime of the travel medicine discipline (only 20 years), it has emerged that almost all travel-related diseases and—possibly—accidents could be preventable. Travel medicine can produce significant and relevant results in the prevention of travel-related medical problems. The full scale of prevention activity should not remain in the field of primary prevention, but it should also focus on the assessment and special preparation of the chronic patient as a traveler (secondary prevention) and provide an initial treatment abroad and, if necessary, organize a state-of-the-art repatriation. Therefore, the preventive approach has to include the secondary—and tertiary levels as well. Subsequently, travel medicine should provide not merely primary care, but the hospital-based medical specialties. Using modern communication facilities such as the internet and e-mail for advice, and special and complex training of the doctors involved, travel medicine promises outstanding effectiveness never seen before. On the other hand, all of these efforts of travel medicine specialists are in vain if there is no recipient. Encouraging the travelers to seek pretravel advice and involving the travel industry in the prevention process is indispensable for success. This is especially true for Europeans who intend to enter and explore the fascinating Asia-Pacific region.

References

- [1] WHO. WHO long term forecast tourism 2020 vision. In: *Tourist market and trends, world overview and tourism topics*. World Trade Organization; 2001
- [2] World Trade Organization. Available at : <http://www.infoplease.com/ipa/A0198352.html>.
- [3] Ahlm C, Lundberg S, FesséK, Wiström J. Health problems and self-medication among Swedish travellers. *Scand J Infect Dis* 1994; **26**: 711–7.
- [4] Rack J, Wichmann O, Kamara B, Günther M, Cramer J, Schönfeld C, et al: Risk and spectrum of diseases in travelers to popular tourist destinations. *J Travel Med* 2005; **12**: 248–53.
- [5] Reid D, Dewar RD, Fallon RJ, Cossar JH, Grist NR. Infection and travel: the experience of package tourists and other travellers. *J Infect* 1980; **2**: 365–70.
- [6] Toovey S, Jamieson A, Holloway M. Travelers: knowledge, attitudes and practices on the prevention of infectious disease: results from a study at Johannesburg International Airport. *J Travel Med* 2004; **11**: 16–22.
- [7] Hamer DH, Connor BA. Travel health knowledge, attitudes and practices among United States travelers. *J Travel Med* 2004; **11**: 23–6.
- [8] Van Herck K, Castelli F, Zuckerman J, Nothdurft H, Dahlgren AL, Van Damme P, et al. Knowledge, attitudes and practices in travel-related infectious diseases: The European airport survey. *J Travel Med* 2004; **11**: 3–8.
- [9] Dupont HL, Steffen R. Travel Medicine 2010. In: Dupont HL, Steffen R, editors. *Textbook of travel medicine and health*. 2nd ed. London: B. C. Decker Hamilton; 2001, p. 534.
- [10] Felkai P. Analysis of the prevention of travel related illness on the basis of the recent achievements of travel medicine. *Hungarian Med J* 2008; **2**: 649–86.
- [11] Callahan MV, Hamer DH. On the medical edge: preparation of expatriates, refugee and disaster relief workers, and peace corps volunteers. *Infect Dis Clin North Am* 2005; **19**: 85–101.
- [12] Hoveyda N, Begrens R. More travel advice and fewer vaccinations are needed. *BMJ* 2002; **325**: 260–4.
- [13] Leggat PA, Heydon JL, Menon A. Health advice given by general practitioners for travellers from New Zealand. *N Z Med J* 1999; **112**: 158–61.
- [14] Hill DR, Behrens RH. A survey of travel clinics throughout the world. *J Travel Med* 1996; **3**: 46–51.
- [15] Leggat PA, Heydon JL, Menon A. Safety advice for travelers from New Zealand. *J Travel Med* 1998; **5**: 61–4.
- [16] Duval B, Serre GD, Shadmani R, Boulianne N, Pohani G, Naus M, et al. A population based comparison between travelers who consulted travel clinics and those who did not. *J Trav Med* 2007; **14**: 269–73.
- [17] Sing A, Salzman JR, Sing H. Problems and risks of unsolicited e-mails in patient-physician encounters in travel medicine settings. *J Travel Med* 2001; **8**: 109–12.
- [18] Hearn S. Mountain rescue medicine *BMJ* 2000; **321**(7274): S2–7.
- [19] Houghton W. The power of scenario. *Wilderness Environ Med* 1997; **8**: 2,127–8.
- [20] Felkai P, Clements C. New ways for—practice oriented—post-gradual medical education: Training of a "Ski-Camp Doctor". *Wilderness & Environ Med* 2008; **19**: 133–9.
- [21] Kodkani N, Jenkins JM, Hatz CF. Travel advice given by pharmacists. *J Travel Med* 1999; **6**: 87–93.
- [22] Goad JA. Travel medicine and the role of the pharmacist. *Adv Pharmacy* 2004; **2**: 318–24.
- [23] Brennan C. Pharmacist-run travel medicine clinic. *Ann Pharmacother* 2004; **38**: 2160–5.
- [24] Felkai P. Involving the pharmacists into pretravel advice providing—a campaign in Hungary: Preliminary report. *Hungarian Med J* 2009; **3**(1): 178–81.
- [25] Teodósio R, Gonçalves L, Imperatori E, Atouguia J. Pharmacists and travel advice for tropics in Lisbon (Portugal). *J Travel Med* 2006; **13**: 281–7.
- [26] Hamer DH, Connor BA. Travel health knowledge, attitudes and practices among United States travelers. *J Travel Med* 2004; **11**: 23–6.
- [27] Sing A, Salzman JR, Sing H. Evaluation of health information provided on the Internet by airlines with destinations in tropical and sub-tropical countries. *Commun Dis Public Health* 2000; **3**: 195–7.
- [28] Horvath LL, Murray CK, DuPont HL. Travel health information at commercial travel websites. *J Travel Med* 2003; **10**: 272–8.
- [29] Shickle D, Nolan Farrel MZ, Evans MR. Travel brochures need to carry better health advice. *Commun Dis Public Health* 1998; **1**: 41–3.
- [30] Heudorf U, Tiarks-Jungk P, Stark S. Reisemedizinische Beratungen und Impfungen als infektions-pr ä ventive Aufgabe—Daten der Sprechstunde des Stadtgesundheitsamtes am Main 2002–2004. *Das Gesundheitswesen* 2006; **68**(5): 316–22.

Executive Editor: Beijia Tan