

Prevention of insect bites in travellers, by using appropriate clothing, insecticide treated bednets and effective insect repellents

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Introduction

Mosquitoes alone transmit diseases to over 700 million people a year and 1 in 17 people will die of these. Health professionals need to emphasise to travellers the importance of not getting bitten, rather than just relying on vaccinations or chemoprophylaxis. Travellers are often unaware that many diseases are not vaccine-preventable, and that there is resistance even to newer antimalarials like mefloquine. Often they are less careful about avoiding bites because they have been immunized or are on chemoprophylaxis.

A study done on 547 Dutch travellers who had gone to malarial countries found that only 60% had taken their malaria chemoprophylaxis properly, 80% wore suitable clothing, 73% used insect repellent and 56% used bednets. Five became infected with *Plasmodium falciparum* malaria (Cobelius and Leentvaar-Kuijpers 1997).

Many travellers do not have access to, or do not wish to pay to consult, specialist travel medicine clinics. Most travellers see their GP or no one at all. Unfortunately, GPs may not have specific travel medicine knowledge. In a study of German GPs, only 9% offered the correct malaria chemoprophylaxis for Thailand and 2% offered the correct vaccinations for Kenya (Hatz et al. 1997)!

Prevention measures

The relative importance of different measures depends on where the person is travelling and the behaviour of local vectors (Hii et al. 2002). For instance, bednets are most useful against nocturnally feeding mosquitoes such as *Anopheles* spp. that may transmit malaria and are less useful against diurnal biters such as *Aedes aegypti* that may transmit dengue fever.

Insecticide-impregnated bednets (IBNs)

Bednets have been used for centuries, with some success, but since the 1970s bednets soaked with insecticide, particularly permethrin, which is safer than DDT, have been trialed extensively in many countries.

Effectiveness

There are numerous studies showing the efficacy of IBNs. Their use in Gambia has reduced mortality from all causes in children under 5 years old by 63% (Lancet 1994). Most of the studies have focused on malaria, but the mosquito vectors for lymphatic filariasis have also been studied. In Kenya, immunoassays showed a shift away from human to animal blood meals after extensive bednet use (Boch et al., 1998).

Safety

Pyrethroids are synthetic insecticides based on pyrethrum from chrysanthemums. They do not persist in the environment, are poorly absorbed through the skin and are rapidly metabolised if they do enter the circulation. Several toxicology studies have concluded that there is little or no hazard from their use in IBNs (Zaim et al. 2000).

Does using IBNs cause resistance?

Some anopheline strains have developed resistance to various insecticides since the introduction of IBNs, although other pyrethroids such as lambda-cyhalothrin and deltamethrin are still effective. It is felt more research is needed in this area (Darriet 2000).

Insect Repellents

Applying insect repellents to exposed skin is vital, both to protect from daytime bites and at night before bed. Many people prefer to use "natural" products such as citronella because of concerns about

safety of chemicals containing DEET. However, these are less effective and need to be reapplied every 20-30 minutes. DEET (N,N-diethyl metatoluamide) is the most effective and widely used repellent.

Effectiveness and safety

A 10% solution of DEET lasts up to 4 hours (the maximum strength recommended for children) and a 35% solution lasts up to 12 hours (maximum for adults). A new slow release formulation of 20% DEET in a protein bound water base has been developed which lasts 24 hours and leaves less residue (Medicine Planet 2000). DEET has been used by the US army since 1946 and available to the public since 1957. Apart from rashes, there have only been 14 cases of side effects reported, all from excessive and prolonged use. The American Academy of Paediatrics has a useful set of recommendations for use in children. It should not be used on infants under 12 months old (Medicine Planet 2000).

Clothing

Long sleeved shirts and long trousers and socks should be worn at dawn, dusk and night. These can be soaked in or sprayed with permethrin. If untreated, material thickness is critical, and no skin should be left exposed unless treated with a repellent (WHO 2002).

Implementation of Policy

For Health Professionals

An interesting, informative (and brief) supplement to the existing travel reference material should be developed emphasising the importance of bite prevention and covering effectiveness and safety of methods, plus sources for obtaining materials such as IBNs. This should also be circulated to pharmacists as some travellers consult them for travel advice.

Most GPs want to give appropriate advice but are hampered by lack of time and a bewildering array of sources of information. In a New Zealand study, 96% of GPs consulted the Ministry of Health's booklet "Health Advice to Overseas Travellers" and 92% consulted "New Ethicals", whereas only 2% accessed computer databases (Leggat et al 2000). It would therefore be best if the supplement were incorporated into these publications (in a prominent position), rather than being yet another separate booklet, which may get lost, discarded or not referred to.

For the Travellers

I believe that if travellers were made more aware of the seriousness of diseases from insect bites, they would be more careful about bite prevention. The NZ MoH already has an excellent booklet for travellers which mentions bite prevention briefly, but this should be expanded on to discuss effectiveness and side effects of methods, including proper use to minimize toxicity and answers to common questions. It should also list where IBNs can be purchased. In addition to the booklet being available in medical centres and pharmacies, travel agents and airlines should supply this booklet when a ticket is purchased, to reach those who do not consult a health professional.

Another possible beneficial effect of travellers using IBNs would be that the local people would see them and maybe be encouraged to use them. Perhaps each traveller could donate their IBN at the end of their trip to a local health centre or organization (with proper instructions), especially if it is of long lasting material. Until recently, IBNs needed reimpregnating every 6 months or after 2 washes, but PermaNet is now available which is still effective after 21 washes (CICC 2002) and several years. Obviously a whole population strategy would be best, but this approach may help somewhat towards local awareness and acceptance of IBNs.

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