PRACTICE OBSERVED

Practice Research

Malaria prophylaxis: postal questionnaire survey of general practitioners in south east Wales

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Abstract

Postal questionnaires were sent to 494 general practitioners in south east Wales asking about their experience and understanding of antimalarial prophylaxis; 293 were returned, giving a response rate of 59%. Forty eight (16%) of the respondents reported being consulted by immigrants returning home for advice about malaria prophylaxis, of whom 13 (27%) overestimated the time for which their protective immunity might last after leaving the malarious area. Two hundred and eighty respondents (96%) considered that they were responsible for advising travellers and 195 (67%) would always consult a publication before giving chemoprophylactic advice (magazines were particularly popular), but only 18 (6%) would always consult a specialist centre—the Ross Institute in eight cases (3%), a local centre in 39 (13%). Only about half of the doctors were aware of chloroquine resistance in Kenya and Thailand. Over half would withhold chloroquine in pregnancy, and many chose pyrimethamine alone or sulfadoxine-pyrimethamine as suitable chemoprophylactic drugs, though neither is still recommended by the World Health Organisation. One hundred and ninety two respondents (66%) would give advice about protective measures other than chemoprophylaxis.

More must be done to encourage general practitioners to contact specialist centres and to educate them in the use of antimalarial chemoprophylactic drugs.

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Introduction

Several reports have criticised the advice about antimalarial prophylaxis given to travellers to malaria endemic regions by general practitioners.[1-3] As these studies have addressed the traveller rather than the doctor, however, we decided to question general practitioners about their experience and understanding of antimalarial prophylaxis to see why this seemingly unsatisfactory situation should occur.

Methods

A four page questionnaire was compiled containing 28 questions which were mainly fixed format to facilitate computer coding of replies. This was posted to the 494 general practitioners on the medical lists of the South Glamorgan and Gwent Family Practitioner Committees between 16 January and 12 March 1987. The questionnaires were not coded and were accompanied by a covering letter confirming that respondents' replies would be anonymous. Replies were stored and analysed by a microcomputer. For simplicity we have rounded percentages and refrained from quoting in every case the proportion of respondents who omitted a question.

Results

Of the 494 questionnaires sent out, 293 were returned, a response rate of 59%. Two hundred and forty seven (84%) of the respondents were full time principals, 45 (15%) part time principals (of whom four were also clinical assistants), and one a locum. None of the questionnaires was returned as undelivered.

As the replies were anonymous non-respondents could not be followed up. Nevertheless, we had two reasons for not coding the questionnaires: firstly, we thought that as the questionnaire interrogated the respondents on their knowledge and understanding of an aspect of their medical practice and asked for details of their prescribing habits they would be more likely to reply if they believed that their anonymity would be respected; secondly, respondents might otherwise have been tempted to give the answer that they thought we wanted to hear rather than one which accurately represented

their activities, and for the questions testing their knowledge they might have been tempted to look up the correct answer. Sheikh and Mattingly suggested that any response rate less than 100% is unacceptable as the respondents are likely to be atypical of the population surveyed.[4] In a review of surveys carried out by the Institute of Social Studies in Medical Care between 1961 and 1977, however, Cartwright found that "on the whole the comparisons between the professionals who participated in our studies and those who did not are reassuring because they do not indicate any large bias . . . in practice the extent of the biases did not seem to be strongly related to the response rate: the number and direction of identified biases were at least as great in the study of terminal care, in which the response rate was 79%, as in the study of medicines, in which it was 56%."[5] Furthermore, she found that response rates were decreasing with time, possibly as a result of the increase in surveys among doctors, and that surveys of prescribing habits seemed to be especially "threatening" and had lower response rates.

We were concerned that our results should accurately reflect the understanding and practice of our respondents and believe that the results suggest that the respondents were honest and therefore that the provision of anonymity was justified. We could not, however, assess whether our respondents were typical of the general practitioners in south east Wales, but it seems unlikely that those who failed to reply had a higher standard of practice or better understanding of malariology.

REQUESTS FOR ADVICE ON PROPHYLAXIS

Most respondents were asked for advice "occasionally" (n=174; 59%) or "quite often" (100; 34%), but 13 (4%) were consulted "very frequently" and only 4 (1%) had "never" been consulted. On the whole, most respondents (142; 48%) thought that requests for advice were increasing, 117 (40%) that they were unchanged, and only 2 (1%) that they were decreasing; 32 doctors (11%) declined to comment. Nevertheless, of those consulted "very frequently" and "quite often," 11 (85%) and 71 (71%) respectively thought that requests were increasing.

Most respondents (273; 93%) were consulted by tourists or by people going to work abroad (148; 51%), but 48 (16%) had been consulted by immigrants returning home and 48 by students.

RESPONDENTS' ATTITUDES TO GIVING ADVICE

Almost all of the respondents (280; 96%) considered that they should bear the responsibility for providing advice, 93 (33%) of whom believed that they alone were responsible. One hundred and forty nine respondents (51%), however, thought that the responsibility should be shared by travel companies, 102 (35%) by specialist centres such as the Ross Institute, 41 (14%) by chemists, and 9 (3%) by other parties such as embassies and company medical officers.

Table I shows how respondents chose from five options on how they would respond to a request for advice on prophylaxis. Most were willing to give advice without suggesting that the traveller should check with a second source; this, however, requires that the advice given should be correct. The most common factors deterring respondents from giving advice were: "the situation changes rapidly/I don't have a suitable reference book" (n=91; 31%), "getting advice from specialist centres takes too much time" (42; 14%), "I don't have the address/phone number of a specialist centre" (24, 8%), and "it doesn't attract an 'item of service' fee" (22; 8%). Just over half of the respondents (148; 51%), however, chose none of the available options, and 44 (15%) indicated that they would never be deterred. Most respondents (259; 88%) would "always" ensure that travellers intended taking prophylaxis when they attended for immunisations, 30 (10%) would "sometimes," and 2 (1%) would "never" do so.

If a patient requested a specific chemoprophylactic apparently advised by a specialist centre most (239; 82%) of the respondents would write a prescription only after checking that it was correct, whereas 43 (15%) would do so without checking and 5 (2%) would refuse to write a prescription. If, however, the advice had come from a friend or employer then only one respondent would write a prescription without checking that it was correct, 254 (87%) would do so after checking, and 33 (11%) would refuse to write a prescription.

TABLE I—*How general practitioners would respond to request for advice on prophylaxis*

Option	No (%) of doctors
Always give advice (perhaps getting advice yourself first)	255 (87)
Always give advice but suggest patients check it with someone else	28 (10)
Sometimes give advice, otherwise suggest patients contact someone else	6 (2)
Refuse to give advice but suggest patients contact someone else	1 (<1)

KNOWLEDGE OF MALARIA EPIDEMIOLOGY

Respondents' knowledge of malaria epidemiology was tested by asking them to indicate whether chemoprophylaxis was required for nine index countries and whether there existed important resistance to chloroquine in four. Table II gives their replies. Though in this study countries were referred to without further qualification (to simplify format), some countries may require prophylaxis only for certain areas or seasons, and for visits confined to major cities chemoprophylaxis may not be required at all; hence a specialist centre should always be contacted with full details of the itinerary before travelling. In general, respondents' knowledge of malaria epidemiology was poor, and travellers may be exposed to malaria unprotected if the practitioner fails to seek further information.

REFERENCE TO PUBLICATIONS AND SPECIALIST CENTRES

We were encouraged that 195 (67%) of the respondents "always" consulted a publication before giving advice on chemoprophylaxis; nevertheless, 88 (30%) did so only "sometimes" and 4 (1%) "never" consulted a publication. Table III lists the publications used by respondents stratified by how often they would also consult a specialist centre. Use of the *British National Formulary* was directly related to the frequency of contacting a specialist centre, whereas use of the *Monthly Index of Medical Specialities (MIMS)* was inversely related. Magazine articles were popular, especially among those less likely to contact a specialist centre. As these are updated regularly, not surprisingly 261 (89%) of the respondents thought that their reference source had been published in 1986 or 1987 and 24 (8%) since 1980.

TABLE III—*Numbers (percentages) of respondents consulting particular publication before giving advice on malaria prophylaxis stratified by frequency (always, sometimes, never) of also consulting specialist centre*

Publication	Always (n=18)	Sometimes (n=188)	Never (n=186)
British National Formulary	11 (61)	97 (52)	35 (41)
Monthly Index of Medical Specialities (MIMS)	2 (11)	44 (23)	27 (31)
DHSS publications	3 (17)	73 (39)	21 (24)
Magazines	9 (50)	135 (72)	58 (67)
ABC of Healthy Travel	0	7 (4)	3 (3)
Other	0	10 (5)	2 (2)

Though publications provide general guidelines for prophylaxis, more accurate and up to date advice should always be sought from one of the specialist centres, such as the London School of Hygiene and Tropical Medicine, Liverpool School of Tropical Medicine, or East Birmingham Hospital. Despite this, however, only 18 (6%) respondents replied that they would always contact a specialist centre for advice, while 188 (64%) would do so sometimes and 86 (29%) never. Two doctors would consult neither a publication nor a specialist centre before giving advice—presumably relying on their undergraduate knowledge or guesswork.

TABLE II—*Numbers (percentages) of respondents indicating that malaria prophylaxis is required, or that chloroquine resistance exists, for 10 index countries (certain areas within a country might not require prophylaxis)*

Need prophylaxis (true for all except Greece)*									Have chloroquine resistance (true for all four)†			
Greece	Thailand	Bali	Brazil‡	Kenya	Tanzania	Gambia	Egypt§	Oman	Thailand	Bali	India	Kenya
7 (2)	246 (84)	213 (73)	219 (75)	271 (92)	270 (92)	275 (94)	220 (75)	179 (61)	145 (49)	92 (31)	176 (60)	158 (54)

*Correct reply for all countries: 108 respondents (37%). †Correct reply for all countries: 42 respondents (14%). ‡Certain regions only. §Seasonal requirement.

Phillips-Howard *et al* found in a survey of travellers contacting the Ross Institute for advice on prophylaxis that inquirers frequently recalled the advice incorrectly, and they warned that "general practitioners should recognise . . . that any information reported back to them by their patients may not be correct."[3] The final 200 questionnaires dispatched asked the general practitioners if they would suggest that the patients should contact a specialist centre themselves. Of the 99 who replied, 51 said that they would do so "sometimes," two "always," and only 46 "never."

Table IV shows which specialist centres the respondents might contact.

TABLE IV—*Centres that general practitioners might consult for advice on prophylaxis (may consult more than one)*

Centre	No (%) of doctors	Centre	No (%) of doctors
Tropical diseases hospital:		Malaria reference laboratory	64 (22)
London	109 (37)	"Bristol"	2 (1)
Liverpool	21 (7)	"Heathrow"	2 (1)
Birmingham	10 (3)	Local hospital, clinics, public health laboratories	39 (13)
Ross Institute	8 (3)		

Thirty seven (13%) chose more than one, and plainly a substantial proportion would rely on local sources, whose information might not be as accurate as that of the major centres. Most respondents (186; 63%) would contact only one centre and follow the advice given exactly, whereas 15 (5%) would contact only one but might modify the advice and 23 (8%) might contact more than one depending on the advice given; only one respondent admitted regularly to "shopping around" the centres. General practitioners should contact only one centre and follow the advice given exactly, and centres should endeavour to provide consistent advice so as to avoid confusion.

PRESCRIBING HABITS

Drugs for use abroad should not be prescribed on an FP10; this was not appreciated by 153 (52%) of the respondents, so not surprisingly 171 (58%) replied that they would give an FP10 for chemoprophylactics requiring prescription and only 116 (40%) would give either a private prescription or a combination of both. For drugs available without prescription 144 (49%) respondents would give verbal recommendations, 120 (41%) written, and the remainder either would not recommend such drugs or omitted the question.

Both Cook[6] and the World Health Organisation[7] advise that drugs should be started a week before departure (so that adequate blood concentrations of the weekly drugs may be achieved and the tolerance of other agents assessed before departure) and must be continued for at least four and preferably six weeks after return (to control incubating infections with *Plasmodium falciparum*—though *P vivax* and *P ovale* infections may break through after this time). Most of the respondents (236; 81%) would start chemoprophylaxis a week before departure, 22 (8%) one month before, 5 (2%) two weeks before, and 21 (7%) on the day of departure. Seven respondents would start weekly drugs a week before but daily drugs on the day of departure. On return 270 (92%) respondents would continue the drugs for a further four to six weeks; but 20 (7%) would stop the drugs after only one week; one respondent thought that the drugs should be stopped immediately.

The final 429 questionnaires dispatched asked which drugs or combinations of drugs would be suitable chemoprophylactic regimens for areas with and without reported resistance to chloroquine. Eleven combinations of the five most commonly used drugs were suggested, and respondents could choose as many as they wished and specify alternative drugs or combinations (though none did). Table V shows how often each drug combination was chosen from the 250 questionnaires returned.

Current WHO guidelines for adults are[7]:

Areas with no resistance of P falciparum to chloroquine—Chloroquine 300 mg base weekly on the same day each week

Chloroquine resistance not widespread and of low degree—Chloroquine 300 mg base weekly (proguanil 200 mg daily may be added to reduce risk of breakthrough)

Highly chloroquine resistant P falciparum widespread—Chloroquine 300 mg base weekly plus either proguanil 200 mg daily or dapsone-pyrimethamine one tablet weekly (never more); people taking these combinations should have monthly blood counts.

The areas with some degree of chloroquine resistance cover large parts of India, South East Asia, east Africa, and Central America, but the situation is volatile; hence the need for expert advice for each traveller.

Combinations of sulfadoxine and pyrimethamine are no longer recommended by the WHO for continuous prophylaxis owing to increasing reports of toxic epidermal necrolysis and agranulocytosis but instead are kept in reserve for treating fever in travellers to areas with high chloroquine resistance.[7] Table V, however, shows that this combination was a popular choice among respondents, as was pyrimethamine alone, which is no longer recommended owing to widespread resistance of *P falciparum*, which makes it essentially useless when used alone. This supports the finding of Campbell that 12% of travellers receiving advice from their general practitioner were taking pyrimethamine alone.[1]

TABLE V—*Respondents' choices of chemoprophylactic drugs for areas with and without chloroquine resistance. Figures are numbers (percentages) of respondents (250 questionnaires returned)*

	Resistance absent	Resistance present
Chloroquine*	120 (48)	2 (<1)
Proguanil	68 (27)	27 (11)
Pyrimethamine	18 (7)	12 (5)
Dapsone-pyrimethamine	26 (10)	29 (12)
Sulfadoxine-pyrimethamine	7 (3)	19 (8)
Chloroquine+proguanil†	49 (20)	70 (28)
Chloroquine+pyrimethamine	4 (2)	7 (3)
Chloroquine+dapsone-pyrimethamine†	20 (8)	51 (20)
Chloroquine+sulfadoxine-pyrimethamine	1 (<1)	15 (6)
Proguanil+dapsone-pyrimethamine	10 (4)	48 (19)
Proguanil+sulfadoxine-pyrimethamine	4 (2)	20 (8)

*Recommended by WHO[7] for areas without resistance.
†Recommended by WHO[7] for areas with resistance.

Interestingly, the illogical combination of proguanil and pyrimethamine (both folate antagonists) was often chosen by respondents, suggesting a lack of understanding of chemoprophylactic pharmacology.

OTHER ANTIMALARIAL MEASURES

Both Cook and the WHO have emphasised that the need for antimalarial measures other than chemoprophylaxis has increased with the rise in resistance to the prophylactic drugs.[6,7] Travellers must be reminded to observe measures to reduce contact with mosquitoes, such as sleeping in airconditioned/screened rooms, using antimosquito sprays or burning coils in the room, having mosquito nets over the bed that are not torn, staying inside between dusk and dawn (when the mosquito feeds), and wearing light coloured clothes that cover the body plus insect repellents (for example, diethyltoluamide) on exposed parts of the body if they must go outside.

Respondents were asked whether they would volunteer advice about personal measures to avoid contact with mosquitoes; 150 (51%) claimed that they would give the general advice that avoiding bites was important and 147 (50%) would specifically mention insect repellents, 137 (47%) the wearing of protective clothing after dusk, and 73 (25%) the benefit of staying inside after dusk. Fifty five (19%) respondents would give all the above advice and 9 (3%) would also mention bed nets. A total of 101 (34%) respondents, however, would volunteer none of this important advice.

RISK OF MALARIA DESPITE CHEMOPROPHYLAXIS

Both Cook and the WHO cautioned that some breakthrough infections are bound to occur despite a full course of appropriate chemoprophylaxis,[6,7] and patients should be warned to seek medical advice immediately a fever occurs so that a blood film can be checked. Surprisingly, 105 (36%) respondents thought that an attack of malaria was "very unlikely" after chemoprophylaxis, and one respondent thought it "impossible"; 183 (62%) thought an attack "possible" and 3 (1%) "quite likely."

On being asked how long after return a patient was at risk of an attack of falciparum malaria 168 (57%) respondents chose six months, 78 (27%) one to three years, 13 (4%) five years, and 19 (6%) 10 years. Figures for an attack of vivax malaria were identical, except that 76 respondents chose one to three years and 11 five years. Only 50 respondents chose a latent period for vivax malaria that was longer than that for falciparum disease, which was offset by 49 who indicated the reverse. Falciparum malaria may recur up to a year after leaving the malarious area, and vivax malaria after two to three years. Thus respondents might well fail to make a diagnosis of malaria because of misconceptions about the protection afforded by chemoprophylaxis and the latent period of the infection.

PROPHYLAXIS IN SPECIAL CASES

Pregnancy—Cook reiterated the deleterious effects of malaria in pregnancy on both mother and fetus, with increased maternal anaemia, abortions, miscarriages, and stillbirths.[6] Furthermore, pregnancy enhances the susceptibility to malaria, though the mechanism is unknown. The best advice to a pregnant woman wishing to travel to a malarious area is "don't"; but if she must go both Cook and the WHO recommend proguanil and chloroquine in the usual doses as completely safe.[6 7] The WHO does not recommend sulfadoxine-pyrimethamine preparations in pregnancy, whereas Cook thinks that this combination given with a folic acid supplement is a suitable choice for a pregnant woman travelling to an area with a high incidence of chloroquine resistance.[6] Of our respondents, however, only 112 (38%) said that they would prescribe chloroquine to a pregnant woman, whereas 160 (55%) would not, 11 (4%) were undecided, and 10 (3%) omitted the question. Reasons for withholding chloroquine were "general unease about drugs in pregnancy" (129 respondents; 81%), "highly teratogenic" (23; 14%), and "malaria unlikely to harm fetus" (7; 4%).

Immigrants returning to malarious areas—Inhabitants of malarious areas develop protective immunity which may become ineffective after a few years out of the area.[6] Respondents were asked how long they thought this immunity lasts after leaving the malarious area; 62 (21%) chose "a few months," 118 (40%) "a few years," 48 (16%) "many years," and 45 (15%) "never goes." Hence 93 (32%) of the respondents overestimated the duration of protective immunity, and for those who reported giving advice to immigrants the proportion was 27% (13 of 48 respondents). Cook recommends that returning semi-immune adults should treat clinical attacks promptly with antimalarials as continued chemoprophylaxis would prevent immunity developing. For children, however, he recommends chemoprophylaxis with proguanil for an arbitrary period of one year and prompt treatment of fever with antimalarials thereafter.[6]

Discussion

This is the first study directed at the general practitioner, and the reply rate suggests that general practitioners are interested in malaria prophylaxis. Those who replied, however, were likely to be more motivated and thus may have been atypical, and interpretation of the replies assumes that the respondents were honest throughout —though the nature of the results suggests that this was so.

Most of the respondents were willing to give advice and considered that it was their responsibility to do so (contrary to the suggestion by Phillips-Howard *et al*[3]). The number consulting a specialist centre was disappointingly low and agrees with the finding of Phillips-Howard *et al*, who reported that only 12% of inquirers to the Ross Institute were general practitioners.[3] We, however, found that many general practitioners seek advice from centres outside London. Some respondents thought that obtaining specialist advice took too long and mentioned the cost of telephoning. That a substantial proportion of general practitioners modify the advice received or seek alternative advice is unjustifiable, and more should be done to standardise and simplify prophylaxis guidelines.

Magazine articles were popular sources of information, confirming Campbell's statement that "concern has been expressed that many general practitioners may use unsolicited publications as their major sources of advice."[1] These publications, however, provide free, up to date information, and provided that they are accurate and the practitioner is encouraged to seek additional specialist advice they perform a valuable service. Interestingly, there seemed to be two groups of practitioners, one who used the *British National Formulary* and tended also to contact specialist centres, and the other who used *MIMS* or magazines without reference to a specialist centre.

Many of the respondents got requests from immigrants returning home and, regardless of whether they advised immigrants, nearly a third overestimated the time for which the protective immunity gained by inhabitants of malarious areas lasts after leaving the area. Campbell found that significantly more white than non-white travellers received antimalarial advice when they visited their general practitioner[1]; more must be done to make general practitioners and the immigrant community aware of the risks from impaired immunity to infection, especially in the case of children.

Basic epidemiological knowledge was poor, especially awareness about chloroquine resistance; only about half of the respondents were aware of resistance in Thailand and Kenya. Though some respondents argued that they would always look up the requirements, the replies did not generally support this.

Campbell found that only 46% of travellers knew of a method of personal protection other than chemoprophylaxis and concluded that "General practitioners do not provide travellers with adequate information about other methods of personal protection."[1] Most of our respondents, however, claimed that they volunteered advice about personal protection, but as these measures are restrictive it may be that travellers choose to forget them.

Table V shows that the drugs recommended by the WHO for areas with and without chloroquine resistance were the most popular choices, but there was more scatter in the choices of the first of these, suggesting more uncertainty among respondents.

Respondents showed a worrying lack of knowledge about the safety of chloroquine in pregnancy and the real risk to mother and fetus travelling unprotected to malarious areas; more should be done to provide them with this information. Many also overestimated the effectiveness of chemoprophylaxis, and practitioner and traveller alike must retain a high degree of suspicion about fevers in the returned traveller.

With the world control of malaria deteriorating and foreign travel increasing, general practitioners remain in the front line in the fight against imported malaria. This study suggests that more needs to be done to educate them in the epidemiology of malaria and the choice and correct use of chemoprophylactic drugs. Unfortunately, the study supports many of the deprecatory findings of Campbell[1 2] and Phillips-Howard *et al*.[3]

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Telephone numbers of the specialist centres mentioned are: London School of Hygiene and Tropical Medicine (Ross Institute) 01-636 8636; Liverpool School of Tropical Medicine 051-708 9393; East Birmingham Hospital 021-772 4311.

References

1 Campbell H. Imported malaria in the UK: advice given by general practitioners to British residents travelling to malaria endemic areas. *J R Coll Gen Pract* 1987;37:70-2.
2 Campbell H. Imported malaria in Britain: survey of British residents travelling to areas in which malaria is endemic. *Br Med J* 1985;291:1013-4.
3 Phillips-Howard PA, Blaze M, Hurn M, Bradley DJ. Malaria prophylaxis: survey of the response of British travellers to prophylactic advice. *Br Med J* 1986;293:932-4.
4 Sheikh K, Mattingly S. Investigating non-response bias in mail surveys. *J Epidemiol Community Health* 1981;35:293-6.
5 Cartwright A. Professionals as responders: variations in and effects of response rates to questionnaires, 1961-77. *Br Med J* 1978;ii:1419-21.
6 Cook GC. Plasmodium falciparum infection: problems in prophylaxis and treatment in 1986. *Q J Med* 1986;236:1091-115.
7 World Health Organisation. *Vaccination certificate requirements and health advice for international travel*. Geneva: World Health Organisation, 1987.

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