The Impact of the Travel Clinic Consultation on Travellers' Health Beliefs and Adherence to Malaria Chemoprophylaxis

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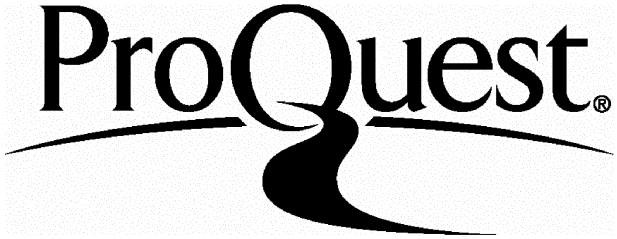

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ABSTRACT

Background: There are approximately 2,000 cases of imported malaria in the UK every year and there is evidence that adherence to chemoprophylaxis is poor. Social cognition models have been developed in an attempt to explain a wide range of health behaviours and a previous study has demonstrated the applicability of two such models to the area of adherence to malaria prophylaxis. The communication between doctors and patients has also been shown to relate to adherence to treatment and a number of recommendations have been made for improving the consultation.

Objectives: The present study examined the predictive value of cognitions specified by the Health Belief Model (Rosenstock, Stretcher & Becker, 1988) and the Theory of Planned Behaviour (Azjen & Madden, 1986), as well as how these were influenced by the travel clinic consultation. In addition, the relationship between the interaction in the consultation and adherence to prophylactic recommendations was investigated.

Methods: The participants were 130 consecutive travellers attending a travel medicine clinic who were due to travel to a malarious region. Pre- and post-consultation questionnaires were administered and a follow-up telephone interview was conducted between 4 and 7 weeks after the traveller's return to the UK. The consultations were audiotaped and analysed using Roter's Interaction Analysis System, which provides a quantitative assessment of the communication. A content analysis method was also employed to examine information exchange specific to malaria and malaria prophylaxis.

Results: Significant changes in travellers' health beliefs were found as a result of the consultation. Perceived susceptibility to malaria, perceived benefits of medication and intentions to adhere significantly increased. There was also a significant

reduction in the perceived permanent nature of side effects of medication. No significant changes were found for perceived severity of malaria, perceived behavioural control nor the belief that side effects would reduce enjoyment of the trip. In total, 107 participants were successfully contacted at follow-up, of whom 62% reported full adherence, 26% reported partial adherence and 12% reported poor/no adherence to the recommended medication. The three groups were found to be significantly different in terms of their length of stay, beliefs and intentions as well as their communication in the consultation. A multinomial logistic regression analysis revealed that length of stay, perceived benefits of medication pre-consultation, health professional discussion about adherence and traveller questions/statements independently predicted reported adherence.

Conclusions: The results suggest that there is scope for improving the consultation. It is proposed that incorporating strategies from motivational interviewing, emphasising benefits of medication and resolving potential barriers to adherence would be particularly helpful. Implications for future research are discussed and it is suggested that readiness to engage in behaviour change, perceived effort of adherence and social influences whilst in a malarious region will be important concepts to investigate.

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CHAPTER 1: INTRODUCTION

The area of adherence to medical treatment has produced an enormous amount of research in recent years. In the general population, estimates of adherence range from 7 to 85 percent (Kaplan & Simon, 1990). The percentage of people who are judged as adherent varies according to the criterion used and the method of measurement. There also appear to be different rates of adherence to different aspects of the treatment protocol. Poor adherence results in increased costs to the NHS as it often leads to such things as extra visits to the doctor and unnecessary hospitalisation. However, this area is also complicated as there is not a consistently positive relationship between adherence and health outcome (Becker, 1985).

Poor adherence is an issue in all areas of medicine and travel medicine is no exception. Malaria is a major health risk that many travellers face and adherence to preventative measures has consistently been found to be poor (Bradley, Warhurst, Blaze & Smith, 1998; Lobel, Phillips-Howard, Brandling-Bennett, *et al.,* 1990; Phillips-Howard, Blaze, Hurn & Bradley, 1986). The number of cases of imported malaria is currently static and totals approximately 2,000 per year (Behrens & Carroll, 2001). There are a number of influences on adherence across disease types which have been identified and investigated. These include the disease or regimen issues, information provided, understanding, memory, the patient's beliefs and cognitions, doctor-patient communication. There have also been attempts to try to predict adherence and a number of theoretical models have developed since the 1970s.

This chapter will provide an overview of the issues relating to the concept and measurement of adherence to treatment, discuss some of the most prevalent theoretical models which aim to predict adherence and outline the relationship between doctor-patient communication and these factors. The ways in which these issues relate to the area of travel medicine and malaria prophylaxis will then be outlined as well as the rationale for the current study.

ADHERENCE

Concept of Adherence

Some authors have used the terms compliance and adherence interchangeably. However, there has recently been increasing focus on the concepts underpinning these terms with a move towards the use of adherence in preference to compliance. The Oxford English Dictionary definition of compliant is "obedient" whereas the definition of adherent is "sticking to". As several authors have highlighted (Noble, 1998; Stimson, 1974; Tuckett, Boulton, Olson & Williams, 1986) "non-compliance" implies an authoritarian affiliation with an unequal relationship between the doctor and patient. In non-compliance, it is implicit that the fault lies with the patient as they have failed to follow the clinician's advice. Indeed, this was reflected in early research which focused on demographics and personality traits in the hope of defining the "non-compliant patient". However, studies of this kind have generally failed to find any significant relationships (see Kaplan & Simon, 1990; Ley, 1979 for reviews).

Such an approach fails to take account of the patient's views or concerns and does not represent a negotiated approach to treatment nor does it acknowledge the dynamic

nature of adherence. This is in contrast to the term adherence, which implies that the patient is more active and that there is more of an egalitarian relationship. It is also implicit that there is a difference in the communication style between the doctor and patient (Noble, 1998). In view of these issues, the term adherence will be used throughout this thesis.

Non-adherence can incorporate a number of different behaviours, either in isolation or in combination, and these can vary across different aspects of the treatment regime. Such behaviours include:

- not taking enough medicine
- taking too much medicine
- not observing the correct interval between doses
- not observing the correct duration of treatment
- taking additional non-prescribed medications

(from Ley & Llewelyn, 1995).

It has been proposed that adherence is best seen on a continuum as opposed to being a dichotomous concept (Kjellern, Ahlner & Sli, 1995). In a similar vein, the Royal Pharmaceutical Society (1996) reported that terms such as poor, incomplete or inadequate adherence are better descriptives than non-adherence. There have also been different definitions of what is deemed adequate adherence and this usually ranges from 75-100% (Myers & Midence, 1998).

Measuring Adherence

There are several different ways that adherence can be measured, including pill and bottle counts, blood and urine tests, mechanical devices (e.g. pill box monitor), direct observation, patient self-report and clinician's judgement. There are frequently low correlations between the different measurements of adherence when they have been compared in the same study with a tendency for the latter two to provide substantially inflated levels of adherence (e.g. Norell, 1981; Spector, Kinsman, Mawhinney *et al.*, 1986).

Patients' self-report has been the most common method due to the ease with which it can be obtained. Such methods have also been found to have long-term predictive validity (e.g. Morisky, Green & Levine, 1986). However, the type of self-report method employed is also important to consider as different methods have been found to yield different results in other areas of psychological research (e.g. Myers, 1994). Myers and Midence (1998) stress the importance of considering these issues when interpreting results since there are a number of possible reasons for patients under-reporting non-adherence. Patients may deliberately conceal instances of non-adherence from the investigator, they may forget instances of non-adherence, or they may think they are adhering when they are in fact not doing so due to a lack of understanding or difficulties with recalling the regime (Ley, 1988). Suggested means of improving self-report include emphasizing a non-judgemental approach in order to reduce people's motivation to deceive and asking sufficient questions to provide enough information to establish a clear picture of adherence (Ley, 1988).

Influences on Adherence

There are a number of potential influences on adherence across disease types which have been noted in the literature (Myers & Midence, 1998). These include:

- characteristics of the patient (e.g. age, gender, socioeconomic status)
- disease or regimen issues (symptom relief versus prophylaxis, interference with daily lifestyle, complexity, noxious treatments)
- patients' beliefs and cognitions
- information provided
- memory
- doctor-patient communication

Adherence to medical advice can be seen as a health behaviour and several models have been applied in order to try to understand the ways in which the above variables impact on adherence. These models have largely resulted from developments in health and social psychology and are usually referred to as social cognition models.

SOCIAL COGNITION MODELS

Health Belief Model

The Health Belief Model (Becker & Maiman, 1975) was specifically developed in order to try to explain health related behaviours. It states that the factors relating to health behaviour are: perceived susceptibility to illness; anticipated severity of the consequences of the illness; effectiveness of a recommended health behaviour; costs of enacting that behaviour. The model also incorporated cues to action which were considered to be wide-ranging and could be either internal (e.g. symptoms) or

external (e.g. public health campaigns, professional advice) in nature. Originally, the concepts of susceptibility and severity were combined into a threat index. It was predicted that a person would engage in a behaviour if they deemed that there was a sufficient threat to their health and that the benefits outweighed the costs. Since its conception, the HBM has been through a number of revisions which have resulted in the incorporation of additional concepts such as health motivation (Becker, Haefner & Maiman, 1977) and self-efficacy (Rosenstock, Stretcher & Becker, 1988). Health motivation refers to a person's readiness to be concerned about health matters and self-efficacy refers to the person's perception of how capable they feel in dealing with the situation.

Self-efficacy was a term first introduced to the psychology literature by Bandura in 1977. It is an important concept to consider as it has also been incorporated into other social cognition models. Indeed, the inclusion of self-efficacy beliefs has been shown to enhance other models' ability to predict various preventative health behaviours (e.g Schwarzer & Fuchs, 1995; Barnhoorn & Adriaanse, 1992). It predicts how much energy people are prepared to apply when faced with averse or difficult to manage situations and the degree to which they will persevere (Bandura, 1977). Bandura (1997) also highlights that people's beliefs about their own self-efficacy are strongly influenced by successes or failures in relation to previous health behaviours.

The HBM is one of the most widely cited in the literature and has also been shown to have predictive power (Kelly, Mamon & Scott, 1987; Reid & Christensen, 1988). However, the model has been operationalised and applied in different ways across

studies, therefore it is difficult to draw any firm conclusions. A meta-analysis of studies relating the HBM to preventative health behaviours found that on average 24% of the variation in behaviour was accounted for by combined HBM variables (Zimmerman & Vernberg, 1994). A subsequent review of prospective studies incorporating more stringent criteria revealed a smaller proportion of the variance could be accounted for by the HBM (Abraham & Sheeran, 1997).

There are a number of criticisms of the HBM which have been cited in the literature. There appears a need to investigate the beliefs underlying constructs such as "barriers" and "benefits" in order to articulate in more detail how individuals conceptualise these variables (Horne, 1997; Horne & Weinman, 1994). The HBM also fails to include an intention stage between beliefs and behaviour and does not specify the relationship between social factors (e.g. desire for others' approval) on health-related behaviour (Sheeran & Abraham, 1995). In general, the consensus appears to be that the HBM works best when it is used as originally intended as a predictive model for preventative behaviours (Janz & Becker, 1984).

Theory of Reasoned Action and Theory of Planned Behaviour

The Theory of Reasoned Action (Fishbein & Ajzen, 1975) originally came from research investigating the relationships between attitudes and behaviour. It is not specific to health, but it has been widely applied in this area of research. The TRA postulates that a person's intentions mediate between their underlying attitudes and their behaviour. Intention formation is hypothesised to be influenced by a person's attitudes as well as subjective norms. Attitudes are based on beliefs about the likely

consequences of a particular behaviour as well as the evaluations of those consequences, including beliefs specified by the HBM. Subjective norms are a person's perceptions of the extent to which significant other people approve of a given behaviour and the degree of motivation to comply with these people's expectations. Although intentions are thought to precede and predict behaviour, the strength of the relationship between intentions and behaviour varies across studies and between behaviours (Connor & Sparks, 1995).

The Theory of Planned Behaviour (Azjen & Madden, 1986) incorporated the concept of perceived behaviour control into the TRA. This is similar to the concept of self-efficacy which was incorporated in the later revision of the HBM. The TPB has been found to have predictive power in relation to a number of health behaviours such as clinic attendance and adherence to treatment (Abraham, Clift & Grabowski, 1999; Conner and Sparks, 1995; Godin & Kok, 1996).

The above Social Cognition Models have several limitations, which have previously been highlighted in the literature. They have been criticized for being over-simplistic in their operationalisation of the constructs at the expense of examining potential qualitative differences between beliefs under the same construct and also for being vague about the way in which demographic or personality variables impact as distal determinants of cognitions and behaviour (Connor & Sparks, 1995). The way in which the models have been evaluated has also been criticized with many questionnaire measures failing to meet criteria for adequate reliability or validity or omitting to report any methods of standardisation. Additional criticisms have come

from studies where past behaviour as opposed to cognitions has been found to be more strongly predictive of future behaviour (Mullen, Hersey & Iverson, 1987; Sutton & Eiser, 1990). However, Azjen (1987; 1991) has criticised these studies for failing to include key cognitions and has proposed that past behaviour cannot be considered as a causal factor since it lacks any explanatory value. Instead, he has suggested that the effects of past behaviour on future behaviour are mediated by variables in Social Cognition Models. For example, Azjen (1991) concluded that past experience of a behaviour may be an important source of expectations about and attitudes towards repeating that behaviour in the future. The importance of past behaviour in determining contemporary beliefs has also been outlined by Bandura (1997) as detailed above.

There is also the notion that interaction between behaviour and cognition may be dynamic rather than static. Weinstein (1988) suggests that some constructs (e.g. perceived susceptibility) are best described in stages. Prochaska and Di Clemente's (1983) stages of change model is one of the most commonly cited; however, there are also the health action process approach (Schwarzer, 1992), precaution adoption process (Weinstein, 1988) and goal setting theory (Bagozzi, 1992). Leventhal's self-regulatory model of illness (Leventhal, Nerenz & Steele, 1984) sees the interaction between cognitions and behaviours as a dynamic process rather than the result of a single or stage decision. However, the self-regulatory model emphasises the importance of concrete symptom experience in formulation representations and guiding appraisal of the efficacy of coping, therefore it is not appropriate for considering preventative behaviours. For more detailed reviews of Social Cognition

Models the reader is directed to Connor and Norman (1995) and Horne and Weinman (1998).

DOCTOR–PATIENT COMMUNICATION

The area of doctor-patient communication has been increasingly researched over recent years. Recognition of the impact of the consultation on subsequent health behaviours has resulted in increasing emphasis on defining 'good' communication and on training doctors to communicate better with their patients (Cushing, 1996). Studies have found clear links between the quality of communication and outcomes such as patient satisfaction, recall and understanding and adherence in a range of health care settings (Hall, Roter & Katz, 1988; Roter, Hall & Katz, 1988; Noble, 1998; Stewart, 1995). However, full consideration of the relationships between all of the potential process and outcome variables is outside the scope of this thesis and the emphasis of the following section will be in relating communication in the consultation to subsequent adherence.

Measuring Doctor-Patient Communication

A number of different interaction analysis systems have been developed and used to quantify aspects of the interaction between the doctor and patient. Traditionally, these systems have been divided into two main categories. One group is intended to capture the instrumental (task-focused) behaviour and the other is designed to measure affective (socio-emotional) behaviour. However, some systems such as the Roter Interaction Analysis System (RIAS) (Roter, 1995) attempt to capture both types of behaviour.

A review of such systems carried out by Boon and Stewart (1998) revealed that few instruments are widely used and many have never been demonstrated to be either valid or reliable. However, some instruments have been through a more rigorous process of standardization and have been widely used by researchers (e.g. Bales' Interaction Process Analysis, 1950; RIAS). The authors concluded that future efforts should be aimed at refining existing instruments rather than developing new measures. Inui, Carter, Kukull and Haigh (1982) conducted a direct comparison of three of the main systems that have been utilised in this area of research, namely Stiles' Verbal Response Modes (Stiles, 1978), Bales' Interaction Process Analysis and the RIAS. They suggested that the choice of system be determined by the outcome variable of interest. For example, they found that the RIAS was superior when considering adherence to medications involving a strict regime, but that both the Bales' system and RIAS were equivalent when considering patient satisfaction.

Relationship to Adherence

There is evidence that instances of non-adherence are often a forbidden topic in the consultation (Noble, 1998) and that when they are revealed they are seen as threatening to both doctors and patients (Hessen-Klemens, 1987; Ross & Phipps, 1986). Doctors appear to be poor at identifying non-adherence with a consistent tendency to overestimate adherence (Becker, 1985). In addition, the traditional conceptualization of compliance as opposed to adherence held the implicit assumption that the patient would unquestioningly follow the advice given; however,

it is evident that this does not occur and patients approach health services with a more complex agenda.

When considering adherence Stewart (1984) found that interviews where the physician requested the patient's point of view and the patient was able to provide this were the most successful. In addition, physician behaviour, particularly behaviour which initiated some kind of discussion, such as asking for the patient's opinion, had more impact on outcome than the patient behaviour. This kind of behaviour may be seen as giving patients permission to express their views and concerns. Stewart also found that a high frequency of patient-centred behaviour was related to significantly higher reported adherence and close to significantly better pill counts and satisfaction. Patient-centred behaviour can be considered as either supportive or encouraging behaviours displayed by the physician. Carter *et al.* (1982) found a positive relationship between sharing opinions and patient knowledge about illness and subsequent adherence to treatment. A negotiated approach to treatment developed for working with psychiatric patients has also been found to have a beneficial impact on adherence (Eisenthal, Emery, Lazare & Udin, 1979).

Although research has highlighted the importance of facilitating the patient's involvement in the consultation, there is frequently a failure to adequately do this. Patients generally contribute a smaller proportion of the overall communication and substantial amounts of information may not be elicited from the patient (Roter, 1989). McClellan (1986) found that doctors frequently fail to successfully elicit what the patient would like to know and how they understand the information they are being

given. A failure to elicit beliefs and provide relevant information has been related to a failure to adhere to advice (Francis, Korsch & Morris, 1969; Korsch, Gozzi & Francis, 1968). There is also evidence that patients feel uncomfortable asking questions even when they recognise that it is an important part of behaviour in the consultation and, as a result, levels of this type of behaviour are low (Frankel, 1987; Roter, 1977; 1989). It seems that this lack of comfort is not limited to the patients but is also felt by doctors (Frankel, 1987). However, doctors have also been found to be frustrated with patients who do not articulate their concerns and requirements for information during the consultation (Levinson, Stiles, Inui & Engle, 1993).

It appears that physician information-giving is the most frequent behaviour in the consultation and this has also been found to relate to adherence (Roter, 1989). Roter conducted a meta-analysis of research utilising a number of different interaction analysis systems and found that physician information-giving was positively related to adherence as well as to recall of information. The meta-analysis also found that physician positive talk was positively related to adherence whereas question-asking and negative talk were negatively related. Street (1991) found that the amount of information given may be related to the personal characteristics of patients and their communication styles. For example, patients who asked more questions, expressed more concerns and were more anxious received more information than patients asking fewer questions, expressing less concerns and less anxiety. Other researchers have also related the amount of information provided by physicians to the amount of questions asked by the patient (Waitzkin, 1984).

There is also evidence that adherence increases if the doctor initiates a discussion about adherence and asks more questions about it (Hall, Roter & Katz, 1988). However, the way in which this is done is also important with the emphasis on giving the patient permission to disclose non-adherence through the normalization of difficulties associated with adhering to the treatment plan (Fletcher, 1989; Sanson-Fisher, Campbell, Redman & Henrikus, 1989). Noble (1998) also highlights the importance of agreeing a clear and explicit contract with the patient and pre-empting possible difficulties with adherence through the exchange of information in the context of a good therapeutic alliance. Daltroy (1993) described a model which included a series of steps that a doctor can use as a guide for conducting the consultation and ensuring that the information given meets both the needs of the doctor and the patient. This includes the identification of potential barriers to adherence and subsequent plans to overcome them. It has been suggested that patients will enter into a negotiation and work towards a suitable alternative when barriers to adherence are identified (Wilson, 1995).

Theoretical Frameworks for Improving Communication and Adherence

Although it is evident that there are relationships between particular communicative behaviours and adherence, theoretical frameworks for understanding these relationships are poorly developed. Pendelton (1983), in a review of the literature, stressed the importance of developing a model to integrate the research findings and proposed the input–process–outcome model. This suggests that input variables will influence the process of the consultation which will then influence immediate and longer-term outcomes. In a later review of the literature by Ong *et al.* (1995) the need

to establish a systematic theory of doctor-patient communication was again highlighted. They proposed a similar framework to Pendelton, which outlined three main categories of variables, namely background, process and outcome. They suggested that background factors may relate directly to outcomes such as adherence, but that this relationship can also be mediated by the instrumental and affective behaviours in the consultation.

Health beliefs can be considered as input or background variables, which are potentially amenable to change during the consultation. Producing a change at the process level can then produce a change at the outcome level and there is evidence to suggest that addressing health beliefs during the consultation can have a positive effect on subsequent adherence to treatment. Inui *et al.* (1976) conducted a study, which involved giving a group of physicians a tutorial on ways of using the Health Belief Model to reduce non-adherence in hypertension. This resulted in their patients having better knowledge of hypertension, better adherence to the medication regime and better blood pressure control than the patients of doctors who had not been given the tutorial. However, Janz and Becker (1984) criticised the interpretation of these results. They pointed out that the tutored doctors received more information than controls about levels of adherence in their patients and that no data was collected to show that patients health beliefs had actually changed.

The importance of eliciting patients' health beliefs can also be considered in terms of biases in information processing. People's pre-existing beliefs will influence the way in which information is attended to and remembered, with the resulting tendency for

beliefs to be maintained even when a person is faced with contradictory evidence (Beck, 1967; 1976). Ley (1982) suggests that beliefs should be obtained during the consultation so that communication can then be targeted at areas where the patient's beliefs might impede the reception of the message. It has been suggested that eliciting health beliefs is particularly important in consultations where the emphasis is on health education as opposed to treatment (King, 1983). This is because the physician is imparting information in an attempt to try to persuade a patient to modify their behaviour.

Effective communication is essential in travel medicine since the vast majority of health threats can only be protected against by changes in behaviour (Cossar, 2000). The pre-travel consultation is a primary opportunity to educate travellers about potential risks and to influence their subsequent health behaviours.

MALARIA

Malaria is a potentially fatal disease that many travellers will be at risk from, with trips to malaria-endemic countries having increased over recent years. The number of cases of imported malaria in the UK is currently 2,000 cases per year (Behrens & Carroll, 2001) and the mortality rate for cases of *falciparum* malaria is approximately 0.4% (Winstanley & Behrens, 1999). However, the number of recorded cases of malaria is likely to substantially underestimate the actual occurrence (Legros, Gay, Belkaid & Danis, 1998). Although poor adherence to recommendations has been a consistent finding in this area, attempts to address this from a psychological perspective have been limited. The following section will outline the nature of

malaria and recommended prophylactic measures, as well as the specific issues relating to adherence to recommendations, travellers' health beliefs and the influence of communication on both these factors.

Disease Characteristics

Malaria is a disease caused by a parasite which is present in certain tropical countries. It is transmitted by the bite of the female anopheline mosquito, which feeds between dusk and dawn. There are four different species of human malaria parasite, of which *Plasmodium falciparum* causes the most severe illness. The other three species result in a less serious disease. There is a relatively short incubation period and illness usually begins within 2-4 weeks of the infected bite. The predominant clinical features are similar to influenza in the early stages including fever, headaches and muscle pains followed by profuse sweating and rigors. Vomiting and diarrhoea can also occur. If it is not diagnosed and treated early it can progress rapidly, resulting in jaundice, anaemia, impaired consciousness, coma and circulatory collapse in the case of *falciparum* malaria. A blood test is required in order to confirm a diagnosis and medical advice should always be sought. However, self-treatment may be used in some cases of emergency e.g. if a person is in a rural area away from medical facilities. Prompt treatment at the onset of the first fever usually prevents progression and results in a rapid recovery (Walker, 2000).

Methods of Prevention

The WHO (1998) laid down guidelines for malaria prophylaxis and the latest publication of the British National Formulary (BMA/RPS, 2001) included updated

advice with respect to this issue. There is at present no vaccine against malaria, although there are preventative measures that travellers can take to reduce the risk of contracting the disease. These measures include careful adherence to prophylactic medication, which inhibits replication of the parasite in the blood if contracted. This should be started at least one week before entering the malarious area and continued for four weeks after leaving in order to cover the incubation phase of *falciparum* malaria. The four main prophylactic drugs available in the UK are chloroquine (Avloclor, Nivaquine), proguanil (Paludrine), mefloquine (Lariam) and doxycycline (Vibramycin).[1] The recommended prophylaxis is dependent on the country to be visited with endemic areas predominantly being in Africa, South and Central America and the Middle East. Since none of the medications are 100% effective, it is also important for travellers to employ behavioural measures that help to prevent being bitten by mosquitos in malarious regions (e.g. repellents, nets, long clothing), and to seek medical advice promptly if any potential symptoms develop.

Adherence to Prophylactic Measures

Adherence to preventative measures has consistently been found to be poor, resulting in a proportion of travellers taking inadequate precautions. Phillips-Howard *et al.* (1986) found that only 48% of 326 British travellers who had contacted a malaria advisory service reported that they had adhered fully to the regimen they had been recommended. Similarly, in a large study of European and North American travellers, 48% of 5489 travellers reported that they were following a regimen for malaria prophylaxis which would be considered adequate (Lobel, Phillips-Howard,

[1] Trade names in parentheses

Brandling-Bennett *et al.*, 1990). Both of these studies used self-report, which tends to over-estimate rates of adherence to recommendations. More recently, in 64% of imported cases of *falciparum* malaria into the UK, the affected individual had taken no prophylaxis (Bradley, Warhurst, Blaze, Smith & Williams, 1998).

A number of studies across Europe and North America have found that certain groups of travellers are more at risk for not taking adequate precautions against malaria (Gyorkos, Svenson, Maclean, Mohamed, Remondin & Franco, 1995; Harries, Forshaw & Friend, 1988; Held, Weinke, Mansmann, Trautmann & Pohle, 1994; Huzly, Schonfeld, Buerle & Bienzle, 1996; Kollaritsch & Wiedermann, 1992; Lobel, Phillips-Howard, Brandling-Bennett *et al.*, 1990; Phillips-Howard, Blaze, Hurn & Bradley, 1986). These are:

- people visiting friends and relatives
- business travellers
- travellers under the age of 40
- people who had been to the area on a previous trip
- travellers staying longer than four weeks.

Approximately two-thirds of inadequate adherence to prophylactic medication is related to the failure of travellers to continue with the regimen on their return home for the specified time period, with the remainder predominantly being due to the irregular use of medication.

Beliefs about Malaria

Travellers, like other groups of patients, have explanatory models of illness and beliefs about treatment. Studies of travellers' beliefs about malaria and prophylactic measures have found a number of misconceptions. In a survey of 502 British travellers before their appointment at a travel clinic, Behrens and Phillips-Howard (1989) found that 27% thought that malaria occurred in countries such as Spain or Australia, 31% thought that malaria was contracted by drinking local water, 23% would take inappropriate action if they suspected malaria, and if symptoms of suspected malaria persisted after an initial visit to a doctor, 14% would not seek further medical help. There was an apparent lack of awareness of the seriousness of contracting malaria. Misconceptions about prophylaxis were also prevalent among people staying abroad for longer periods, whom it would be expected would be better informed.

In a study of British residents of Malawi, Harries *et al.* (1988) found that two of the most common reasons for not taking any malaria chemoprophylaxis were dislike of taking medication for long periods and the assumption that several years' residence in Africa had produced immunity. Harries *et al.* also found that 27% were not intending to take chemoprophylaxis for the recommended four weeks on their return to Britain and 10% were not intending to take any at all on their return. These reasons indicate that people in this sample did not fully understand the nature of the illness nor the mechanism of chemoprophylaxis.

Sources of Information

Travellers' beliefs and attitudes about malaria and prophylaxis are shaped by the information available to them. Travellers have been found to contact on average two to three sources of advice about malaria prophylaxis (Kollaritsch & Wiedermann 1992, Phillips-Howard, Blaze, Hurn & Bradley, 1986). These sources include travel medicine clinics, general practice surgeries, travel agents and telephone information lines. In addition, travellers compare notes with people within their own social network, a phenomenon called 'lay consulting' (Scambler, Scambler & Craig 1981). Phillips-Howard *et al.* (1986) found that one of the most common reasons given for failing to adhere to the recommended regimen of medication was being told that it was unnecessary by friends or local people.

In addition to these factors, adherence to prophylaxis is influenced by information from the mass media. Mefloquine (Lariam) became the recommended prophylactic agent for visitors to high-risk malarious regions in 1993. In November 1995, a BBC television programme, Watchdog, brought the drug to the attention of the British public with reports of individuals who claimed that mefloquine had led to them developing severe neuropsychiatric disorders (e.g. seizures, psychotic episodes). Watchdog maintained the focus on mefloquine toxicity in their programming for a period of roughly one year and newspapers and magazines followed with further reports of adverse events in travellers who had used mefloquine. Following the media attention, Reid *et al.* (1998) reported that a number of travellers requiring ITU treatment for malaria had chosen not to use mefloquine due to concerns about

toxicity. Reid *et al.* felt that health beliefs created by the media had altered travellers' use of mefloquine.

Predicting Adherence to Malaria Prophylaxis

A previous study conducted by Abraham, Clift and Grabowski (1999) applied two social cognition models, namely the HBM and TPB, to the prediction of adherence to malaria prophylaxis. They employed a brief self-report questionnaire to measure the cognitions of travellers who were returning from Gambia. They then successfully followed up 167 of the original participants between 5 and 7 weeks following their return in order to measure adherence.

Their findings indicated that constructs from these two models combined were able to explain approximately 50% of the adherence amongst mefloquine users and 40% amongst chloroquine and proguanil users. In the mefloquine users behavioural intentions was the strongest predictor with perceived side effects having a smaller but independent effect on adherence. There were slightly different findings for the group who used chloroquine and proguanil where adherence in the region visited was the strongest determinant of adherence on return. Although perceived behavioural control was found to be the major determinant of intentions, the effect of this variable on adherence was entirely mediated by intentions.

There were a number of limitations to the study, namely the extremely brief nature of the follow-up measure of adherence (essentially consisting of only two questions), the bias towards the TPB model at the expense of adequately testing the HBM and the

focus on travellers to only one country. However, this was the first study of its kind and the results confirmed the feasibility and utility of employing social cognition models to develop a greater understanding of travellers' behaviour in this area. At the latest literature search there were no further published studies.

Impact of the Consultation

The consultation at the travel medicine clinic mediates between travellers' initial beliefs about malaria and prophylaxis and outcomes such as adherence to preventative recommendations. The role of communication between the professional and the traveller in ensuring that travellers are able and willing to follow the advice they are given has been discussed by Noble (1997). She outlined a number of key points for effective communication:

- accurate and complete information
- warn travellers not to modify their regimen on the basis of advice from non-professional sources
- check whether the traveller understands the advice
- use of strategies to help the traveller recall the information
- take into account the traveller's lay beliefs and correct any misconceptions
- discuss potential barriers to adherence
- monitor adherence.

In addition, Abraham, Clift and Grabowski (1999) suggested that a discussion at the time of prescribing prophylactic drugs may influence the traveller's behaviour. Specifically, they proposed that enhancing perceived behavioural control over

adherence, emphasizing susceptibility to malaria and reassuring about the side effects of mefloquine might encourage subsequent adherence.

CURRENT STUDY

The study aimed to determine whether constructs from the Theory of Planned Behaviour and the Health Belief Model could be used to predict adherence to malaria prophylaxis in a sample of travellers attending a travel medicine clinic. It also aimed to establish whether the consultation resulted in changes to travellers' health beliefs and to identify features of the communication between the health professional and the traveller during the consultation which were associated with changes in travellers' health beliefs and subsequent adherence.

Research Questions

(1) What are travellers' health beliefs about malaria and malaria prevention on arrival at a travel medicine clinic and when they leave?

(2) What is the impact of the travel clinic consultation on beliefs about malaria and malaria prevention?

(3) What are the relationships between health beliefs, communication during the consultation and adherence to recommendations?

Hypotheses

(1) The consultation will result in significant changes in the traveller's health beliefs about malaria and malaria prophylaxis. Perceived susceptibility, perceived severity,

perceived benefits, perceived behavioural control and reported behavioural intentions will increase. Perceived costs will decrease.

(2) The changes in health beliefs will be related to the communication between the traveller and the health professional during the consultation. The extent of change in beliefs will be positively correlated with the quantity of discussion about malaria and malaria prophylaxis.

(3) The extent of adherence to malaria prophylaxis will be related to travellers' health beliefs. Perceived susceptibility, perceived severity, perceived benefits, perceived behavioural control and reported behavioural intentions will be positively correlated with adherence. Perceived costs will be negatively correlated with adherence.

(4) The extent of adherence to malaria prophylaxis will be related to the communication during the consultation. Higher levels of health professional information-giving and positive talk will be associated with greater adherence whereas health professional question-asking and negative talk will be associated with lower levels of adherence. Higher levels of traveller participation in the consultation will be positively correlated with adherence.

(5) Discussion of potential barriers to adherence during the consultation will result in greater adherence.

CHAPTER 2: METHOD

DESIGN

This was a prospective study which aimed to test the predictive value of the Health Belief Model and Theory of Planned Behaviour in relation to adherence to malaria chemoprophylaxis. The impact of the consultation on the constructs identified from these two models was measured by administering questionnaires examining travellers' health beliefs pre and post-consultation. In addition, the relationship between process variables (the communication during the consultation) and the two main outcome variables (post-consultation health beliefs and adherence to malaria chemoprophylaxis) was examined. Communication was examined using two systems which provided quantitative data amenable to statistical analysis. Adherence was assessed using a structured interview conducted over the telephone at follow-up. Follow-up interviews were arranged for four weeks after the traveller's return to the UK in order to make contact as soon as possible following completion of the recommended course of medication.

STATISTICAL ANALYSIS

Firstly, the communication within the consultation will be examined in order to identify the most frequent communicative behaviours, as well as any differences between the travellers and health professionals. The results will then be analysed in relation to each of the five hypotheses using both parametric (One-way ANOVA) and non-parametric tests (Wilcoxon signed ranks, Kruskal Wallis, Spearman rank correlations). Since this incorporates a relatively large number of statistical tests, a

number of measures will be taken in order to control for Type I errors. Where applicable Bonferroni corrections will applied. In addition, the more conservative threshold for significance ($p<0.01$) will be used throughout. Finally, the issue of predicting adherence will be addressed by entering the relevant variables into a multinomial logistic regression analysis.

PARTICIPANTS

The participants in the study were a consecutive series of travellers attending a travel clinic. The travel clinic was a fee-paying clinic, providing pre-travel advice as well as vaccinations and medications, and attendance was by appointment only. Inclusion criteria were intention to travel to a malaria-endemic region, first attendance at the clinic in relation to the forthcoming trip and aged over 18 years. In addition, travellers were only included if they were returning to the UK by the end of March 2001 in order to allow sufficient time to conduct the follow-up interview within the study period. Travellers who did not speak or understand sufficient English to take part were excluded. There were no other exclusion criteria.

A power analysis had been conducted using figures from Abraham, Clift and Grabowski (1999) and from this it was concluded that a sample of at least 100 participants was reasonable, considering the time constraints and the fact that change in beliefs (pre- to post-consultation) was being investigated. Participants were recruited over a period of 15 weeks. In total, 130 (87%) of the 149 people approached agreed to participate. The most common reason for declining was a lack of time as many people had to return to work following their appointment. A total of

123 people completed both pre- and post-consultation questionnaire measures, 101 consultations were successfully recorded on audiotape and 107 people completed the follow-up interview. The reasons for some consultations not being recorded included equipment failure (e.g. loss of recording power due to batteries having run out) as well as omitting to start the recording. Twenty-one people were lost to follow-up due to changes in travel arrangements or repeated failure to make successful telephone contact, and in some cases the contact details appeared to be no longer valid. There was a full data set for a total of 82 participants.

The demographic details for the whole sample can be see in Table 1. The participants were predominantly white British, well educated and experienced in terms of previous travel and use of anti-malarial medication. The most prevalent reason for the trip was for tourism and the mean length of stay was 3.7 weeks.

Table 1. Sample characteristics (N = 130)

Sex	
Male	74 (57)
Female	56 (43)
Age	
Mean	36.7
SD	13.09
Range	18 - 77
Ethnicity	
White	102 (79)
Black	18 (14)
Asian	3 (2)
Oriental	2 (1.5)
Mixed Race	3 (2)
Other	2 (1.5)
Nationality	
British	110 (85)
European	4 (3)
African	7 (5)
Australasian	5 (4)
American	4 (3)
Further Education	
Yes	99 (76)
No	31 (24)
Length of stay (weeks)	
Mean	3.7
SD	4.21
Range	1-26
Purpose of visit	
Tourism	77 (59)
Visit friends/family	23 (18)
Work/study	25 (19)
Work/study & Visit friends/family	5 (4)
Visited area before	
Yes	37 (28.5)
No	93 (71.5)
Previously used anti-malarial drugs	
Yes	81 (62)
No	49 (38)
Previously contracted malaria	
Yes	14 (11)
No	116 (89)

Note: percentages in parentheses

The study was approved by the Joint UCL/UCLH Committees on the Ethics of Human Research (Appendix I). In accordance with their guidelines the project was explained to all participants and a written information sheet was provided (Appendix II). All participants were given the opportunity to ask any questions before providing written consent (Appendix III). In order to ensure confidentiality, each participant was assigned a code number which was used to identify their responses on the questionnaires and the audio-taped consultation.

HEALTH PROFESSIONALS

Five different health professionals, of whom four conducted the majority, carried out the consultations. The health professionals differed in their professional discipline, gender and the number of years of experience in travel medicine (See Table 2).

Table 2. Characteristics of the Health Professionals

Job Title	Gender	Experience	No. of travellers seen
Consultant Physician	Male	12 years	23
Senior nurse	Male	3 years	10
Staff nurse	Female	5 years	36
Staff nurse	Female	1 year	31
Staff nurse	Female	1 year	1

PROCEDURE

Participants were approached and asked to participate in the waiting room on their arrival at the clinic. If they agreed to participate, prior to the consultation, participants were asked to complete the *Survey about Malaria Prevention Questionnaire* (Appendix IV) and the *Perceptions of Malaria Questionnaire (PMQ)* (Appendix V). Following completion of the questionnaires, participants were given a slip of paper with their code number on it and were asked to hand this over to the health professional when they went into the room for their consultation. The consultations were recorded on audiotape using a Sony Professional Walkman and Stereo Microphone. At the beginning of the interview, the health professional started the recording, read out the participant number, then conducted the consultation as normal.

Immediately after the consultation, participants were asked to complete a second *PMQ*. The date of their return to the UK was checked and the participant was asked to provide as many contact telephone numbers as possible. Structured follow-up interviews (Appendix VI) were then held with participants over the telephone on average 4.5 weeks (range from 4 to 7 weeks) after returning from their trip.

MEASURES

Survey about Malaria Prevention Questionnaire

The questionnaire was developed for the present study to record demographic details, travel plans and previous experience. The questionnaire was also designed to measure the traveller's knowledge of malaria transmission, symptoms, prophylactic

measures, curability, seriousness, sources of information used, knowledge and attitudes towards anti-malarial medication. The responses to these particular questions will not be included in this thesis although they have been reported elsewhere (Farquharson, Noble & Behrens, 2001; Noble, Farquharson & Behrens, 2001). A combination of both free response and forced choice questions were used.

The first draft of the questionnaire was revised following consultation with colleagues and professionals working in the area of travel medicine. Further modifications were made following pilot work with travellers attending the travel clinic.

Perceptions of Malaria Questionnaire

As there was no previous scale available which could be used or modified, a new scale was developed for the present study to assess the traveller's perceived susceptibility to malaria, perceived severity of malaria, perceived benefits of anti-malarial medication, perceived costs of anti-malarial medication, perceived behavioural control over taking the medication and intentions to take the medication as recommended.

Items were generated using previous research into the Health Belief Model and Theory of Planned Behaviour as a guide. Where possible items were adapted to relate to malaria. Additional items were generated by consulting the literature in the area of travel medicine, discussion with relevant experts and anecdotal accounts from staff working in the travel clinic.

The relevant constructs from the HBM and TPB were operationally defined as follows:

- **Perceived Susceptibility** - the degree to which an individual perceives themselves to be at risk from malaria and the concern that they have about this health threat
- **Perceived Severity** - the medical severity of the disease and the extent to which it would be likely to impact on an individual's future life
- **Perceived Benefits** - the perceived benefits of taking anti-malarial medication
- **Perceived Costs** - potential barriers to adhering to the recommended anti-malarial medication, including practical barriers as well as costs to health or well-being
- **Perceived Behavioural Control** - the degree to which an individual has control and is confident that they will be able to take the medication as directed
- **Behavioural Intentions** - an individual's intentions and desires in relation to taking anti-malarial medication

A seven-point scale ("strongly disagree" to "strongly agree") was used, as Abraham (personal correspondence, 2000) revealed that in their study such a scale had been found to be better at differentiating people's responses and at limiting the number of responses in the middle. A mid-point was included in order to allow people the freedom to express a neutral standpoint as it was felt that it might be irritating for participants if they were forced into either agreeing or disagreeing with statements.

Particular consideration was given to items for the perceived susceptibility construct since there can be both positive and negative correlations between perceived risk and behaviour. Perceived high risk may lead to good adherence to the recommended prophylactic regime. However, if a person believes that they will adhere strongly to the prophylactic regime then they may rate their risk of contracting malaria as low. The items for this construct were therefore developed with the emphasis on perceived risk if an individual was not taking adequate preventative measures.

The questionnaire was read and commented on by health psychology researchers and staff at the travel clinic. Modifications were then made in response to comments. Early versions of the questionnaire were also piloted on travellers attending the travel clinic. This allowed for qualitative feedback on individual items. In addition, the pilots on small groups of 20 people meant that small informal reliability analyses could be carried out. Calculating Cronbach's alpha for each construct revealed whether any items should be excluded.

A total of 28 items were included in the final version of the questionnaire. Five items were included under each construct from the HBM and four items under the two constructs from the TPB. It was decided that an equal number of items for the whole questionnaire should be worded negatively and positively. This was in order to try to reduce the influence of acquiescence. The order of presentation of the final items included in the questionnaire was randomised. It was emphasised in the introductory

statement to the questionnaire that the responses would only be accessed as part of the project and would not be shown to the travel clinic staff.

Internal Consistency

Due to time constraints, it was not possible to do a formal reliability check in advance of the current study. However, once the data was collected a reliability analysis was carried out before proceeding with any further analysis of the data. Items which had low item-total correlations and were lowering the overall alpha coefficients were omitted. This applied to one item from the benefits subscale and two items from the susceptibility subscale. It was found that the items under the costs construct were not conceptually grouping therefore the two items which were felt to be most important were selected and treated as individual items. These were the two items relating to side effects of medication ("Side effects of medication will reduce the enjoyment of my stay" and "Side effects of anti-malarial medication are temporary") as it has been suggested that these are the most salient costs (Abraham, Clift & Grabowski, 1999). The final alpha coefficients for each construct were as follows:

Perceived Susceptibility 0.59

Perceived Severity 0.64

Perceived Benefits 0.56

Perceived Behavioural Control 0.68

Behavioural Intentions 0.68

Since these coefficients are still relatively low, this needs to be taken into consideration when interpreting the results presented in the following chapter.

Content Validity

Since the items were generated in order to accurately and adequately reflect the content of the construct, the criteria for content validity can be assumed to have been met.

Construct Validity

The questionnaire was designed in order to cover all the facets of the operational definition for each construct and should therefore meet the requirements of construct validity. The operational definitions were derived from recent reviews of the literature relating to the HBM and TPB.

Consultation analysis

The consultations were transcribed verbatim by an independent transcriber. Any references to the identity of the participant or health professional were deleted from the transcripts. Transcripts were then unitized so that the utterances made by each speaker were clearly separated. Roter's (1997) operational definition of an utterance as "the smallest discriminable speech segment to which a classification may be assigned" was used. The unitised files were then imported into a software program designed to facilitate coding of dialogues (Code-A-Text, Version 3, 1998). Consultations were then coded using both the RIAS (Roter, 1997) and the malaria content analysis system designed for this study.

RIAS (Roter Interaction Analysis System)

The RIAS has a total of 39 mutually exclusive coding categories. Roter obtained an inter-rater reliability of 0.78 over all categories, ranging from 0.58 to 0.99 on physician categories and 0.67 to 0.99 on patient categories (Boon and Stewart, 1998). The system measures both socio-emotional exchange and task-focused exchange

There are 15 coding categories for socio-emotional exchange and the guidelines state that these should be allocated to utterances in preference to any of the task coding categories if a decision needs to be made between two codes. Sample items are "uh huh" (Shows agreement or understanding), "I don't believe that" (Shows disapproval – direct), "Oh, I'm afraid this will hurt" (Shows concern or worry). Three of the codes are solely for physician utterances whereas the other 12 categories are applicable to either physician or patient utterances.

A total of 24 coding categories are included for measuring the task-focused exchange. Two of these are only applicable to patient utterances and three are exclusively for physician utterances. The other 19 codes can be applied to either physician or patient utterances. Ten of the codes refer to asking questions, of which five are open-ended questions and five are closed-ended questions. In addition, a total of five codes refer to giving information. Sample items are "How often should I take these pills?" (Asks closed-ended question – therapeutic regimen), "I did have a chest x-ray about three months ago" (Gives information – medical condition), "OK?" (Asks for understanding).

All of the codes, except for the code relating to transitions, were used in this study (see Appendix VII for summary of descriptions for each code). The transcripts were coded by two raters (the investigator and the project supervisor). There was an initial training period and meetings were arranged in order to clarify areas of ambiguity when applying the RIAS to the travel clinic consultations. A subset of 5 consultations were coded by both raters in order to examine inter-rater reliability. Calculation of Cohen's kappa revealed this to be 0.76.

Malaria Content Analysis

The content analysis system was devised for this study in order to measure the communication which was specific to malaria. A total of 16 categories were included in this system (see Appendix VIII for summary of descriptions for each code). Cohen's kappa calculated for the five consultations which were double coded revealed the inter-rater reliability to be 0.84.

Five of the codes related to information exchange about malaria, methods of prevention and treatment. A further three coding categories measured communication relating to the *rationale* for employing methods of prevention and treatment. The remaining 8 codes measured communication about general reasons for non-adherence as well as potential barriers for the individual traveller in relation to the forthcoming trip. Sample utterances are "Have you taken anti-malarial drugs before?" (Exchange of information re: chemoprophylaxis), "Primetherine kills the mosquitoes on contact so they can't bite you through the net" (Rationale for behavioural prophylactic measures), "I'm not very good at remembering to take tablets" (General reasons for

non-adherence to chemoprophylaxis) and "I don't see the point in taking repellent because I usually get bitten even when I use it" (Potential barriers for this trip – behavioural prophylactic measures).

Follow-up interview

A structured telephone interview assessed adherence to the recommended anti-malarial medication. Adherence was assessed through the responses to four questions. Travellers were first asked if they had had any difficulties following the advice given. Although this was a general question some travellers responded with difficulties that they had experienced in relation to taking the medication (e.g. forgetting). They were then asked to respond on a four-point scale (ranging from "always" to "never") to the question "Were you able to take the medication every day/week as instructed?". This was followed by two further questions, which asked travellers if they had continued to take the medication for the recommended time period and the date of their last tablet. On the basis of their responses travellers were divided into three groups as follows:

- **100% -** travellers who adhered to the full chemoprohylactic regime and did not miss any doses
- **Partial -** travellers who missed one or two doses or adhered fully whilst away on their trip but did not complete the course on their return to the UK
- **Poor/None -** travellers who missed more than two doses or did not follow any of the advice relating to the chemoprophylactic regime

Travellers were also asked to provide reasons for abandoning or modifying prophylactic recommendations. In addition, the interview assessed the traveller's recall of recommendations about chemoprophylaxis, their experience of any side effects and their perceived risk of malaria given the precautions that they had taken. However, the reponses to these latter questions will not be included in this thesis.

CHAPTER 3: RESULTS

Normality checks were carried out before proceeding with the analysis. For those variables which were not normally distributed and did not respond to transformations non-parametric tests were employed. The descriptive results will be presented first followed by an examination of the results in relation to each of the five hypotheses. The issue of predicting adherence will then be addressed by presenting the results of a multinomial logistic regression analysis.

CONSULTATION ANALYSIS

The consultations predominantly lasted between 15 and 20 minutes. The mean number of words and utterances per consultation for the whole sample (n = 101) were 2301 (S.D. 1206) and 377 (S.D. 183) respectively. On average, the health professional contributed 73 percent of the communication, whereas the traveller contributed only 27 percent.

Roter Interaction Analysis System

There was significantly more task-focused exchange than socio-emotional exchange (see Table 3). On average, 68% of the consultation was devoted to task-focused behaviours and 32% devoted to socio-emotional exchange.

Table 3. Number of task-focused and socio-emotional utterances per consultation

	Task-focused		Socio-emotional		
	M	SD	M	SD	t(100)
Whole Consultation	257.96	120.68	117.81	69.51	21.48***
Health Professional	181.43	89.25	49.82	26.79	20.43***
Traveller	76.53	40.04	67.99	46.20	19.21***

Note: *** $p<.001$

Task-focused Exchange

Within the task-focused exchange the most frequent categories were for giving information, particularly for the therapeutic regimen (GT), medical condition (GM) and lifestyle (GL/S) as well as checking for understanding (Check) (see Table 4). These four categories combined accounted for 65% of the task-focused exchange.

Table 4. RIAS Task-focused categories for whole consultation

	M	SD	Range	% of total utterances
Gives info – Therapeutic regimen (GT)	66.50	32.52	11-175	17.6
Gives info – Medical condition (GM)	46.66	30.49	3-149	12.3
Gives info – Lifestyle (GL/S)	28.22	16.92	2-80	7.4
Checks for understanding (Check)	25.43	12.69	5-64	6.7
Counsels/directs behaviour –Medical Condition/Therapeutic Regimen(CMT)[1]	18.99	13.31	0-62	5.0
Gives orientation/instruction (Orient)	16.89	11.81	0-49	4.5
Counsels/directs behaviour – Lifestyle/ Psychosocial (CLP)[1]	12.00	9.40	0-44	3.2
Closed question - Therapeutic regimen ([?]T)	8.71	4.84	0-25	2.3
Closed question - Medical condition ([?]M)	7.60	4.80	0-22	2.0
Asks for understanding (?U)	6.50	5.41	0-23	1.7
Closed question – Lifestyle ([?] L/S)	4.49	3.16	0-13	1.2
Gives info – other (G Other)	3.28	4.77	0-26	0.9
Open question – Therapeutic Regimen (?T)	2.91	2.76	0-22	0.8
Open question – Lifestyle (?L/S)	2.42	1.77	0-8	0.6
Open question – Medical condition (?M)	2.19	2.03	0-8	0.6
Asks for opinion (?O)	1.87	1.97	0-12	0.5
Gives info – Psychosocial (GP/S)	1.17	1.98	0-9	0.3
Closed question – Other ([?] Other)	0.81	1.32	0-7	0.2
Requests for services or medication (?Service)[2]	0.49	1.26	0-10	0.1
Open question – Other (?other)	0.47	0.74	0-3	0.1
Bid for repetition (?Bid)	0.27	0.51	0-2	0.1
Closed question – Psychosocial ([?] P/S)	0.09	0.30	0-1	0.0
Open question – Psychosocial (?P/S)	0.02	0.14	0-1	0.0

Note: [1]Health Professional only categories, [2]Traveller only categories

The most frequent categories for the health professional were giving information relating to the therapeutic regimen (GT) and medical condition (GM), counselling/directing behaviour in relation to the therapeutic regimen or medical condition (CMT), checking for accuracy of understanding (Check) as well as giving orientation or instructions (Orient) (see Table 5). These five categories combined accounted for 70% of the health professional's task-focused exchange. The most frequently coded categories for the traveller were giving information relating to the medical condition (GM), therapeutic regimen (GT) and lifestyle (GL/S). These three categories accounted for 72% of the travellers' task-focused exchange.

Independent samples t-tests were used to examine the differences between the health professionals and travellers for the five most frequent codes which could be applied to both parties. This revealed that the health professionals engaged in significantly more information-giving in relation to the medical condition ($t=3.65$, $df=100$, $p<.001$), the therapeutic regimen ($t=12.92$, $df=100$, $p<.001$) and lifestyle issues ($t=-3.74$, $df=100$, $p<.001$). The health professionals were also found to engage in significantly more checking for understanding ($t=10.54$, $df=100$, $p<.001$), and provided more orientation and instructions ($t=14.65$, $df=100$, $p<.001$).

Table 5. RIAS Task-focused categories for health professional and traveller

	Health Professional			Traveller		
	M	SD	Range	M	SD	Range
GM	26.72	21.38	0-81	19.94	13.50	0-89
GT	47.91	26.23	2-125	18.58	10.05	0-50
GL/S	11.63	11.55	0-71	16.58	9.92	1-52
GP/S	0.04	0.24	0-2	1.13	1.90	0-7
G Other	1.73	3.33	0-19	1.54	1.89	0-8
CMT	18.99	13.31	0-62	-	-	-
CLP	12.00	9.40	0-44	-	-	-
(?) M	6.30	4.38	0-22	1.31	1.61	0-7
(?)T	4.56	3.03	0-13	4.15	3.33	0-17
(?)L/S	3.67	2.83	0-11	0.81	1.26	0-5
(?)P/S	0.07	0.26	0-1	0.03	0.17	0-1
(?) Other	0.43	0.99	0-7	0.39	0.76	0-4
?M	1.49	1.53	0-7	0.70	1.18	0-4
?T	1.10	1.24	0-6	1.81	2.49	0-19
?L/S	1.96	1.46	0-7	0.46	0.87	0-4
?P/S	0.02	0.14	0-1	0.00	0.00	0
?Other	0.26	0.52	0-2	0.21	0.57	0-3
?U	6.44	5.40	0-23	0.05	0.24	0-1
Check	17.91	9.08	4-50	7.51	6.87	0-29
Orient	16.18	11.16	0-48	0.71	1.21	0-9
?O	1.87	1.97	0-12	-	-	-
?Bid	0.15	0.41	0-2	0.12	0.33	0-1
?Service	-	-	-	0.49	1.26	0-10

In order to reduce the number of categories for further analysis four main categories within the task-focused exchange were derived. This procedure was based partly on Roter's (1989) study, with the category definitions included in her meta-analysis used as a guide. The first two categories grouped the information-giving and question-asking categories for analysis in relation to the hypotheses. A 'checking understanding' category was used to capture the behaviour relating to the

development of a shared understanding, including checking how the information provided was being received. In addition, a 'counsels/directs behaviour' category was included since this was one of the most frequent behaviours that the health professional engaged in and related to information being provided with the intention of directly influencing the traveller's behaviour. Although the coding category for orientation and giving instructions was also one of the more frequently observed this was not included in any of the higher order categories. It merely served the purpose of facilitating the process of the consultation and would not be expected to relate to outcome. The codes included for each of the four categories are detailed below:

- **Information-giving** - information provided about the medical condition, therapeutic regimen, lifestyle and psychosocial issues, plus all other types of information (GM, GT, GL/S, GP/S, GOther)
- **Question-asking** – all closed and open-ended questions relating to the medical condition, therapeutic regimen, lifestyle and psychosocial issues, plus questions about any other issues ([?]M, [?]T, [?]L/S, [?]P/S, [?]Other, ?M, ?T, ?L/S, ?P/S, ?Other)
- **Checking Understanding** – restatements or reflections back of information to check for accuracy or shared understanding (Check) and questions which checked whether the information had been followed or understood (?U)
- **Counsels/Directs Behaviour** – statements intended to persuade, influence, direct or change the other's behaviour in relation to the medical condition or therapeutic regimen (CMT) and to lifestyle or psychosocial issues (CLP)

These categories were used in the remainder of the analysis when examining task-focused aspects of the consultation.

Socio-emotional Exchange

Agree was the most frequent category and accounted for 61% of the socio-emotional exchange overall. This category included signs of agreement or understanding (e.g. "I see", "okay"), conceding a point (e.g. "you were right") and apologies (e.g. "I'm sorry I'm late"). Personal remarks/social conversation (Personal), reassurance/encouragement (R/O), direct approval (Approve) and jokes or laughing (Laughs) were also relatively frequent (see Table 6). These categories jointly accounted for an average of 29% of the socio-emotional exchange. This meant that the five categories combined accounted for 90% of the socio-emotional communication with the other 10 categories being rarely used.

Table 6. RIAS socio-emotional categories for the whole consultation

	M	SD	Range	% of total utterances
Shows agreement or understanding (Agree)	71.80	38.54	12-203	19.0
Personal remarks/social conversation (Personal)	11.53	19.84	0-128	3.1
Reassures/encourages/shows optimism (R/O)	8.58	7.47	0-41	2.3
Shows direct approval (Approve)	7.87	6.84	0-41	2.1
Laughs/tells jokes (Laughs)	6.39	8.53	0-36	1.7
Shows concern or worry (Concern)	3.71	5.21	0-25	1.0
Shows direct disapproval (Disapprove)	1.88	2.46	0-17	0.5
Back-channel responses (BC)[1]	1.54	2.33	0-13	0.4
Shows general criticism (Crit)	1.30	4.33	0-37	0.3
Partnership (Partner)[1]	1.29	2.00	0-9	0.3
Empathy (Empathy)	0.54	1.13	0-8	0.1
Self-disclosure (SDis)[1]	0.52	1.67	0-12	0.1
Asks for reassurance (?Reassure)	0.41	0.64	0-2	0.1
Legitimizes (Legit)	0.36	0.91	0-5	0.1
Gives general compliment (Gen[Comp])	0.08	0.31	0-2	0.0

Note: [1]Health Professional only categories

Agree was the most frequent category for both the health professional and the traveller, accounting for 50% and 69% of their socio-emotional exchange respectively (see Table 7). The other four most frequent categories were the same as those for the consultation as a whole and jointly accounted for an average of 36% of the health professionals' socio-emotional exchange. The other categories for the traveller, which were relatively frequently coded, were personal remarks/social conversation (Personal), direct approval (Approve) and jokes or laughing (Laughs). These three codes combined accounted for 22% of the travellers' socio-emotional exchange.

The number of utterances made by the travellers and the health professionals were compared for the five most common categories. An independent samples t-test revealed that the travellers communicated significantly higher levels of agreement throughout the consultation ($t=-8.08$, $df=100$, $p<.001$). Mann-Whitney tests found that the travellers displayed significantly higher levels of laughter or jokes ($Z=-3.11$, $p<.01$) and that the health professionals engaged in more instances of reassurance or encouragement ($Z=-7.48$, $p<.001$). No significant differences were found for personal remarks/social conversation or direct approval.

Table 7. RIAS socio-emotional categories for health professional and traveller

	Health Professional			Traveller		
	M	SD	Range	M	SD	Range
Agree	24.96	13.14	4-69	46.84	30.66	2-173
R/O	6.78	5.94	0-30	1.80	2.57	0-11
Personal	5.46	8.64	0-51	6.08	11.45	0-77
Approve	3.43	2.90	0-14	4.45	4.98	0-27
Laughs	1.96	2.60	0-11	4.43	6.43	0-29
BC	1.54	2.33	0-13	-	-	-
Concern	1.30	2.48	0-13	2.42	3.92	0-24
Partner	1.29	2.00	0-9	-	-	-
Disapprove	1.09	1.89	0-13	0.79	1.24	0-6
Empathy	0.53	1.13	0-8	0.01	0.10	0-1
Crit	0.52	1.40	0-7	0.77	3.59	0-34
SDis	0.52	1.67	0-12	-	-	-
Legit	0.36	0.91	0-5	0.00	0.00	0
Gen(Comp)	0.05	0.26	0-2	0.03	0.17	0-1
?Reassure	0.03	0.17	0-1	0.38	0.63	0-2

The socio-emotional exchange categories were divided into positive and negative talk in order to group the coding categories for analysis in relation to the hypotheses. Positive talk was defined as communicative behaviours which demonstrated active listening or encouraged the other person to continue, positive affect, partnership building and approval. Negative talk included behaviours which indicated disagreement, criticism, confrontation and negative affect such as worry or concern. The socio-emotional exchange codes were grouped as follows:

- **Positive Talk** – personal remarks/social conversation (Personal), laughs/tells jokes (Laughs), showing direct approval (Approve), giving general complimants (Gen[Comp]), showing agreement or understanding (Agree), back-channel responses (BC), showing empathy (Empathy), reassures/encourages/optimizes (R/O), legitimizes (Legit), partnership (Partner), self-disclosure (SDis)
- **Negative Talk** – showing concern or worry (Concern), showing direct disapproval (Disapprove), showing general criticism (Crit), asking for reassurance (?Reassure)

Malaria Content Analysis

The number of utterances which were specific to malaria ranged from 7 to 397. This indicates that there was very limited discussion of malaria in some consultations although there was always at least some mention of issues relating to malaria by both the health professional and traveller (see Table 8). The average percentages of

utterances specific to malaria and malaria prophylaxis were 34% for the consultation as a whole, 35% for the health professionals and 32% for the travellers.

Table 8. Total number of utterances coded as discussion about malaria

	M	SD	Range
Whole consultation	128.67	79.15	7-397
Health Professional	81.75	48.23	4-225
Traveller	46.92	34.26	2-172

The same four categories were found to be coded most frequently for both the health professional and traveller (see Table 9). These were information exchange regarding chemoprophylaxis (IC), the nature of malaria (NM), side effects (IS) and behavioural prophylaxis (IB). These four categories combined made up 75% of the discussion relating to malaria (73% for health professionals; 77% for travellers). Very little information was exchanged regarding the rationale for prophylactic measures and either barriers or facilitators relating to adherence (RC, RB, RH, GC+, GC-, GB+, GB-, BTC+, BTC-, BTB+, BTB-). Indeed, there were no utterances relating to potential barriers to adherence for behavioural preventative measures in any of the consultations.

Table 9. Malaria content analysis categories for health professional, traveller and combined total

	Health Professional		Traveller		Total	
	M	SD	M	SD	M	SD
Information re: chemoprophylaxis (IC)	23.58	18.22	14.93	12.55	38.51	29.47
Information re: nature of malaria (NM)	14.73	13.16	8.80	9.27	23.53	21.66
Information re: side effects (IS)	12.71	11.83	7.55	8.81	20.27	19.73
Information re: behav. prophylaxis (IB)	8.96	9.46	5.07	6.71	14.03	15.66
Rationale for behav. prophylaxis (RB)	7.73	7.24	3.03	3.58	10.76	10.31
Rationale for chemoprophylaxis (RC)	4.64	5.00	2.22	3.20	6.86	7.85
Information re: treatment (IH)	3.76	4.99	1.98	3.42	5.74	8.09
Rationale for treatment (RH)	3.17	4.19	1.21	2.20	4.38	6.13
Facilitations re: med adherence for this trip (BTC+)	0.71	1.90	0.68	1.84	1.40	3.38
Barriers to med adherence for this trip (BTC-)	0.50	1.44	0.74	2.06	1.24	3.26
Facilitations re: behav. prophylaxis for this trip (BTB+)	0.38	1.35	0.25	0.70	0.62	1.88
General barriers to med adherence (GC-)	0.40	1.43	0.23	0.95	0.62	2.31
General facilitations re: med adherence (GC+)	0.24	0.72	0.17	0.72	0.41	1.34
General barriers to behav. prophylaxis (GB-)	0.20	0.82	0.06	0.42	0.26	1.15
General facilitations re: behav. prophylaxis (GB+)	0.04	0.20	0.00	0.00	0.04	0.20
Barriers to behav. prophylaxis for this trip (BTB-)	0.00	0.00	0.00	0.00	0.00	0.00

Influence of Traveller Demographics on the Consultation

No significant differences in any of the consultation variables were found as a result of the traveller's age, sex, ethnicity, nationality, education, previous experience of malaria or anti-malarial medication. The only significant direct effect of any traveller demographic variable was for previous experience. There was significantly less information-giving by the health professional if the traveller had visited the area before (see Table 10).

Table 10. The influence of traveller previous experience on information giving

	Visited area before		Not visited area before		
	M	SD	M	SD	t(99)
HP Info-giving	66.34	37.05	99.78	56.13	2.69**
T Info-giving	60.21	3.92	56.81	31.93	-0.53
Total Info-giving	126.55	48.43	153.58	80.82	1.69

Note: ** $p<.01$

Influence of Health Professional Variables on the Consultation

The consultations were found to differ according to the sex and seniority of the health professional. Junior staff were defined as the staff grade nurses and senior staff included the senior nurse and consultant physician. Since the female staff were also the junior staff it was not possible to separate these two variables. It was found that the female/junior staff conducted significantly longer consultations with more socio-

emotional exchange. This consisted of more positive talk by both the health professional and traveller, but no differences in the levels of negative talk. In addition, there was more task-focused exchange, which consisted of more question-asking and counselling/directing behaviour by the health professional as well as more checking for understanding when the consultation as a whole was examined. There were no differences in the information giving categories nor in the total number of utterances coded on the malaria content analysis (see Table 11).

Table 11. The influence of health professional sex/seniority on RIAS and Malaria Content Analysis codes

	Female/Junior		Male/Senior		
	M	SD	M	SD	t(99)
Health Professional					
Socio-emotional	57.69	25.94	33.61	20.77	4.65***
- positive talk	54.59	23.94	31.00	19.18	4.94***
- negative talk	3.10	4.36	2.61	3.11	0.58
Task-focused	203.18	92.63	136.31	62.05	3.74***
- info-giving	96.81	52.26	69.97	50.71	2.44
- question-asking	22.13	9.79	15.15	6.05	3.76***
- counsels / directs	35.91	22.61	20.85	11.42	3.60***
- check understanding	26.40	12.85	20.12	8.57	2.54
Malaria CA Total	83.13	50.90	78.91	42.81	0.41
Traveller					
Socio-emotional	78.13	48.66	47.09	32.31	3.32***
- positive talk	73.54	46.77	43.21	27.69	3.44***
- negative talk	4.59	6.16	3.88	7.19	0.51
Task-focused	82.13	41.75	65.00	34.02	2.05
- info-giving	62.03	30.42	49.03	24.60	2.14
- question-asking	10.32	8.21	8.91	7.18	0.84
- counsels / directs	-	-	-	-	-
- check understanding	8.25	7.13	6.18	6.46	1.41
Malaria CA Total	46.88	35.24	47.00	32.68	-0.16
Whole consultation					
Socio-emotional	135.82	71.24	80.70	48.63	4.01***
- positive talk	128.13	67.10	74.21	41.21	4.24***
- negative talk	7.69	9.46	6.48	9.40	0.60
Task-focused	285.31	125.26	201.61	88.29	3.44***
- info-giving	158.84	74.42	119.00	65.73	2.62
- question-asking	32.46	13.97	24.06	8.30	3.19**
- counsels / directs	35.91	22.61	20.85	11.42	3.60
- check understanding	34.65	16.15	26.30	11.71	2.65**
Malaria CA Total	130.01	82.83	125.91	72.13	0.24

Note: **p<.01, ***p<.001

FOLLOW-UP

Adherence

A total of 107 travellers were successfully contacted at follow-up (see Table 12). Of these 66 (62%) reported having fully adhered to the recommended medication, 28 (26%) had partially adhered and 13 (12%) reported poor/no adherence. Chi-square tests revealed that there were no significant differences across the three adherence groups for any of the health professional variables (individual identity, sex, experience) nor for the traveller's age, sex, ethnicity, nationality, education, previous experience of malaria or anti-malarial medication nor previous visits to the area. However, a Kruskal-Wallis test revealed that there were significant differences across the groups for the length of stay ($X^2 = 23.43$, $df = 2$, $p<.001$). Travellers who adhered poorly/not at all had been on the longest trips whereas those who reported partial adherence had been on the shortest. The follow-up interview also revealed that three of the travellers had contracted malaria whilst away on their trip and had had to seek treatment. All three travellers reported having fully adhered to the recommended medication.

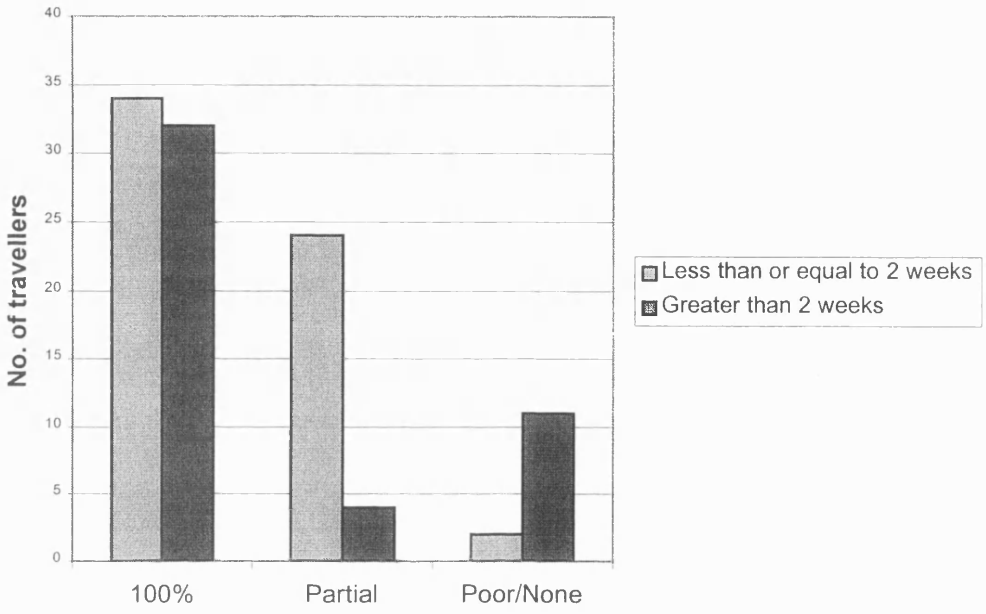
Table 12. Characteristics of the three adherence groups

	100% (n=66)	Partial (n=28)	Poor/None (n=13)
Sex			
Male	37 (56)	15 (54)	9 (69)
Female	29 (44)	13 (46)	4 (31)
Age			
Mean	39.1	34.0	37.9
SD	14.87	9.98	11.58
Range	18-77	20-55	23-61
Ethnicity			
White	56 (85)	21 (75)	8 (61)
Black	7 (11)	4 (14)	3 (23)
Asian	1 (1)	-	1 (8)
Oriental	1 (1)	-	-
Mixed Race	1 (1)	2 (7)	1 (8)
Other	-	2 (7)	1 (8)
Nationality			
British	56 (85)	21 (75)	8 (61)
European	2 (3)	-	-
African	3 (4)	2 (7)	1 (8)
Australasian	3 (4)	-	-
American	2 (3)	1 (4)	-
Further Education	54 (82)	19 (68)	10 (77)
Length of stay			
Mean	3.56	2.00	6.23***
SD	3.65	0.90	5.73
Range	1-26	1-5	1-22
Purpose of visit			
Tourism	41 (62)	18 (64)	5 (38)
Visit friends/family	11 (17)	6 (14)	3 (23)
Work/study	10 (15)	4 (14)	4 (31)
Work/study & visit friends/family	4 (6)	-	1 (8)
Visited area before	19 (29)	8 (29)	5 (38)
Previously used anti-malarial drugs	45 (68)	17 (61)	10 (77)
Previously experienced side effects	15 (23)	8 (29)	5 (38)
Previously contracted malaria	5 (8)	5 (18)	1 (8)
Contracted malaria on this trip	3 (5)	-	-

Notes: percentages in parentheses, ***p<.001

In order to further investigate the differences in the length of stay across the three adherence groups a median split was carried out on this variable. This resulted in two groups; one group who were going for two weeks or less and the other who were going for more than two weeks (see Fig. 1). A chi-square analysis found that there were significant differences across the three adherence groups ($X^2 = 19.28$, df =2, $p<.001$). This revealed that the group who reported poor/no adherence had predominantly been on trips which were greater than two weeks whereas the group that reported partial adherence had predominantly been on trips of two weeks duration or less. In the group who reported 100% adherence approximately half had been on trips for two weeks or less and half had been on trips which lasted more than two weeks.

Fig. 1 Length of stay for the three adherence groups



Reasons for non-adherence

The reasons provided by the travellers for lack of adherence to chemoprophylaxis were examined (see Table 13). It was found that in the partial adherers the most common reason provided was forgetting to take the tablets. This was reported by 50 percent of travellers. Side effects and lack of mosquito bites were also cited as reasons by several travellers. This is in contrast to the poor/no adherence group whose most common reason was low perceived risk. However, several travellers in this group also cited side effects and forgetting.

Table 13. Reasons for lack of adherence in the partial and poor/no adherence groups

	Partial (n=28)	Poor/None (n=13)
Forgetting	14	3
Side effects	7	3
Lack of mosquito bites	4	-
Low perceived risk	1	4
Dislike of tablets	2	2
Reliance on other measures	-	2
Lack of perceived effectiveness	-	2
Local advice	-	2
Illness	2	-
Lack of motivation	1	-

Note: some travellers gave more than one reason

HYPOTHESES

Hypothesis 1: The consultation will result in significant changes in the traveller's health beliefs about malaria and malaria prophylaxis

It was hypothesized that perceived susceptibility, perceived severity, perceived benefits, perceived behavioural control and reported behavioural intentions would increase and that perceived costs would decrease. Wilcoxon signed ranks tests revealed that there were significant increases in perceived susceptibility, benefits and behavioural intentions as well as significant reductions in the perceived permanent nature of side effects following the consultation (see Table 14). All of the changes that took place were in the expected direction. However there were no significant changes in perceived severity, perceived behavioural control nor the belief that side effects would reduce the enjoyment of the stay therefore the hypothesis was only partially supported.

Table 14. Comparison of Perceptions of Malaria Questionnaire components pre and post-consultation (n=123)

	Pre-consultation		Post-consultation		
	M	SD	M	SD	Z
Susceptibility	15.68	3.67	16.65	3.28	-3.34**
Severity	29.42	4.67	28.81	4.90	-1.61
Benefits	25.00	3.18	25.79	2.68	-3.08**
Reduced enjoyment	4.25	1.93	4.18	1.93	-0.46
Permanent side effects	3.36	1.63	2.96	1.68	-2.95**
PBC	25.28	3.54	25.36	3.23	-.67
Behavioural Intention	25.06	3.88	26.43	2.62	-4.42***

Note: **p<.01, ***p<.001

Relationship Between the Perceptions of Malaria Questionnaire Components

Pre-consultation

In order to investigate the relationship between the constructs the correlations between the PMQ components were calculated (see Table 15). Behavioural intention was found to correlate positively with susceptibility, benefits and behavioural control. Severity did not bear any relationship to behavioural intention although this construct did correlate positively with perceived behavioural control. Neither of the items measuring perceived side effects were found to relate to intentions. However, reduced enjoyment was found to correlate negatively with perceived behavioural control. Overall there were only two modest correlations using Cohen's criteria (modest = 0.4-0.69) and these were the significant correlations between behavioural intentions and both perceived benefits and perceived behavioural control.

Table 15. Spearman rank correlations between the PMQ components pre-consultation

	Susc	Sev	Ben	↓Enjoy	Perm	PBC	BI
Susc	1.0	.22	.28***	.16	-.16	.28***	.27**
Sev		1.0	.18	-.06	.01	.28**	.17
Ben			1.0	-.14	-.10	.37***	.48***
↓Enjoy				1.0	.09	-.30***	-.22
Perm					1.0	-.19	-.16
PBC						1.0	.53***
BI							1.0

Note: **p<.01, ***p<.001

Post-consultation

From the correlations between the *PMQ* components calculated post-consultation, it was found that behavioural intention correlated positively with perceived behavioural control, benefits, susceptibility and severity (see Table 16). There were no significant correlations between intention and either of the side effects measures nor did these correlate with perceived behavioural control. Overall, there were the same two modest correlations between behavioural intentions and both perceived benefits and perceived behavioural control.

Table 16. Spearman rank correlations between the PMQ components post-consultation

	Susc	Sev	Ben	↓Enjoy	Perm	PBC	BI
Susc	1.0	.17	.24**	-.09	-.01	.27**	.28**
Sev		1.0	.24**	.02	.03	.04	.23**
Ben			1.0	-.13	-.18	.32***	.48***
↓Enjoy				1.0	.08	-.05	-.01
Perm					1.0	-.13	-.22
PBC						1.0	.52***
BI							1.0

Note: **p<.01, ***p<.001

Relationship Between the PMQ Components and Length of Stay

In order to see whether the length of stay was related to any of the traveller's health beliefs this variable was correlated with each of the PMQ subscales (see Table 17). Spearman rank correlations found a significant low negative correlation between the length of stay and the traveller's reported intentions to adhere to the recommended chemoprophylaxis. This meant that the longer the forthcoming trip the lower the reported intention to adhere.

Table 17. Spearman rank correlations between the PMQ components and length of stay

	Susc	Sev	Ben	↓Enjoy	Perm	PBC	BI
Length of stay	.00	-.17	-.15	.11	.03	.01	-.25**

Note: **p<.01

Hypothesis 2: The changes in health beliefs will be related to the communication between the traveller and the health professional during the consultation

It was hypothesized that the extent of change in beliefs would be positively correlated with the quantity of discussion about malaria and malaria prophylaxis. A change in PMQ score was calculated for each construct by subtracting scores pre-consultation from scores post-consultation. There were no significant correlations between any of the changes in cognitions and the total amount of discussion relating to malaria and malaria prophylaxis (see Table 18). The results did not therefore support the second hypothesis. However, there was a negative correlation between the change in severity score and the number of utterances coded as information exchange regarding the rationale for hospital treatment for malaria. In addition, there was a significant negative correlation between the number of facilitatory comments relating to behavioural preventative measures and the change in the belief that side effects of medication would reduce the enjoyment of the trip. Both these correlations would be considered to be low according to Cohen's criteria.

Table 18. Spearman rank correlations between changes in health beliefs and malaria content analysis codes

	Susc	Sev	Ben	↓Enjoy	Perm	PBC	BI
NM	.09	-.19	.14	.02	-.01	.12	.13
IC	.11	-.16	-.00	-.00	.05	-.05	-.06
IS	.01	-.07	.12	.03	.16	.05	.03
IB	-.02	.06	-.03	-.17	.07	.09	.00
IH	.09	-.10	.04	-.10	.06	-.05	.09
RC	.38	-.14	.11	-.08	-.03	.06	-.06
RB	.15	-.19	.08	-.06	.10	-.00	.03
RH	.25	-.32**	.09	.13	-.12	-.06	-.08
GC-	-.05	.04	-.04	.17	-.09	.01	-.13
GC+	.05	-.02	.12	.05	.06	-.02	.02
GB-	.03	-.10	.02	-.03	-.01	-.03	-.09
GB+	-.00	-.25	-.03	-.08	-.12	.01	-.05
BTC-	.02	-.14	.04	.19	.06	.02	.12
BTC+	-.04	.02	.04	.14	.09	.03	.05
BTB-	-	-	-	-	-	-	-
BTB+	-.05	.10	.04	-.30**	.11	-.02	.05
Total	.15	-.21	.10	-.01	.02	.09	.08

Note: **p<.01

Hypothesis 3: The extent of adherence to malaria prophylaxis will be related to travellers' health beliefs

It was hypothesized that perceived susceptibility, perceived severity, perceived benefits, perceived behavioural control and reported behavioural intentions would be positively correlated with adherence. Perceived costs was hypothesized to be negatively correlated with adherence. Kruskall Wallis tests revealed that there were significant differences across the three adherence groups for perceived benefits pre-consultation and behavioural intentions both pre and post-consultation (see Table 19). Both of these constructs were positively related to adherence as predicted, therefore the third hypothesis was partly supported.

Table 19. PMQ components pre and post-consultation across the three adherence groups

	100% (n=50)		Partial (n=23)		Poor / None (n=11)		
	M	SD	M	SD	M	SD	X^2 (2)
Pre							
Susceptibility	16.21	3.14	15.78	3.98	14.31	3.71	2.87
Severity	30.57	3.97	30.53	4.44	25.67	5.94	8.40
Benefits	25.95	2.39	24.06	3.63	22.92	4.44	11.78**
↓Enjoy	4.30	1.80	4.82	2.09	4.00	2.27	3.32
Perm.	3.21	1.60	3.54	2.03	4.08	1.60	3.11
PBC	26.10	2.68	25.54	3.21	22.21	4.83	7.67
BI	26.20	2.80	25.00	3.92	21.92	4.66	10.27**
Post							
Susceptibility	16.82	3.20	17.08	2.74	14.50	4.23	4.13
Severity	29.60	4.24	30.32	4.90	24.42	6.50	8.50
Benefits	26.29	1.85	25.40	2.87	23.67	4.38	7.13
↓Enjoy	4.26	2.00	4.42	1.86	4.00	1.81	0.55
Perm.	3.02	1.82	2.92	1.57	3.17	2.12	0.00
PBC	26.02	2.70	25.60	2.87	23.83	3.74	5.43
BI	27.14	1.60	26.68	2.19	23.83	3.79	14.48***

Note: **p<.01, ***p<.001

Hypothesis 4: The extent of adherence to malaria prophylaxis will be related to the communication during the consultation

Higher levels of health professional information-giving and positive talk were hypothesized to be associated with greater adherence whereas health professional question-asking and negative talk were hypothesized to be associated with lower levels of adherence. In addition, it was hypothesized that higher levels of traveller participation in the consultation would be positively correlated with adherence.

There were no significant differences across the groups in either the total number of words or utterances nor in the amount of socio-emotional exchange. However, one-way ANOVAs revealed that there were differences across the groups in the amount of traveller task-focused exchange, specifically for information giving and question asking (see Table 20). Post-hoc Bonferroni tests revealed that there were only significant differences between the partial and poor/non-adherers for information giving ($p<.01$) and for question-asking ($p<.01$). There were no significant differences across the three groups for the health professional task-focused exchange nor when the consultation was considered as a whole. In addition, there were significant differences across the groups in the total number of utterances coded using the malaria content analysis system for the traveller only. Post-hoc Bonferroni tests revealed that these differences only existed between the partial and poor/non-adherers. There were no significant differences across the groups in the levels of participation in the consultation. The results do not really support the fourth hypothesis. However, there is a relationship between the amounts of information-

giving and question-asking and subsequent adherence. The findings also suggest that it is the traveller who is using the consultation differently.

Table 20. Differences across the three adherence groups for the RIAS task-focused exchange, Malaria Content Analysis total and level of participation

	100% (n=50)		Partial (n=23)		Poor / None (n=11)		
	M	SD	M	SD	M	SD	F (2, 81)
Health Prof.							
Task-focused	177.10	75.86	171.30	86.13	208.18	125.02	.73
- info-giving	88.70	49.76	88.09	53.55	93.91	65.34	.05
- quest-asking	19.06	9.22	17.52	7.77	21.73	7.35	.89
- counsel/direct	28.78	16.61	28.87	19.71	42.09	33.57	2.05
- understand	23.56	11.28	19.91	7.22	27.00	11.46	1.91
Malaria CA	82.00	46.54	71.39	43.04	102.18	63.06	1.53
Participation	70.92	9.59	75.35	8.88	65.82	10.26	3.95
Traveller							
Task-focused	78.08	37.38	61.09	31.28	112.82	51.72	6.91**
- info-giving	59.50	28.24	46.09	23.36	80.55	34.67	5.74**
- quest-asking	9.48	6.65	8.39	6.16	16.73	12.13	5.16**
-counsel/direct	-	-	-	-	-	-	
- understand	7.70	6.73	5.87	5.91	13.09	10.29	3.94
Malaria CA	47.36	32.60	36.04	25.65	74.64	51.54	4.83**
Participation	29.08	9.59	24.65	8.88	34.18	10.26	3.95
Whole consult.							
Task-focused	255.18	104.61	232.39	112.75	321.00	174.46	2.14
- info-giving	148.20	69.20	134.17	71.53	174.45	95.92	1.12
- quest-asking	28.54	11.29	25.91	9.00	38.45	17.41	4.44
- counsel/direct	28.78	16.61	28.87	19.71	42.09	33.57	2.05
- understand	31.26	13.28	25.78	11.30	40.09	19.94	4.04
Malaria CA	129.36	75.66	197.43	66.94	176.82	113.38	2.86

Note: **p<.01

Hypothesis 5: Discussion of potential barriers to adherence during the consultation will result in greater adherence

For the health professional only, Kruskal-Wallis tests revealed that there were significant differences across the groups in the number of utterances involving either potential difficulties or facilitative suggestions relating to adherence to chemoprophylaxis (see Table 21). The highest levels were in the poor/non-adherence group and the lowest in the full adherence group. These results were therefore in the opposite direction to that hypothesized.

Table 21. Information exchange regarding facilitatory statements and potential barriers to adherence to chemoprophylaxis for the forthcoming trip across the three adherence groups

	100% (n=50)		Partial (n=23)		Poor / None (n=11)		
	M	SD	M	SD	M	SD	X^2 (2)
Health Prof.							
- BTC+	0.54	1.98	0.57	1.70	1.82	2.09	14.78***
- BTC-	0.14	0.53	0.57	1.20	1.91	3.05	10.78**
Traveller							
- BTC+	0.56	1.88	0.48	1.12	2.27	3.17	5.17
- BTC-	0.34	1.12	0.61	1.16	3.36	4.48	8.91
Whole consult.							
- BTC+	1.10	3.36	1.04	2.77	4.09	5.15	9.78
- BTC-	0.48	1.49	1.17	2.01	5.27	7.00	9.62**

Note: **p<.01, ***p<.001

PREDICTION OF ADHERENCE

In order to identify the predictive values of the variables that were found to differ across the adherence groups, a multinomial logistic regression analysis was conducted. The variables for potential inclusion in this analysis were:

- Length of stay
- Perceived benefits pre-consultation (*PMQ*)
- Behavioural intentions pre and post-consultation (*PMQ*)
- Traveller question-asking (*RIAS*)
- Traveller information-giving (*RIAS*)
- Health professional discussing potential barriers to adherence to medication (*Malaria Content Analysis*)
- Health professional discussing potential facilitators of adherence to medication (*Malaria Content Analysis*)

Firstly, checks for multicollinearity were carried out. Significant correlations were found between the two variables from the RIAS (Pearson's $r = 0.57$, $p<.001$). These were therefore combined into a single variable called traveller statements and questions. The two variables from the malaria content analysis were also found to be significantly correlated (Spearman's rho = 0.48, $p<.001$). Therefore they were combined to form a single variable called discussion about adherence to medication. Reported behavioural intentions pre and post-consultation were significantly correlated (Spearman's rho = 0.58, $p<.001$). It was decided to only include the pre-

consultation measures of both perceived benefits and behavioural intentions. In addition, perceived benefits and reported behavioural intentions prior to the consultation were significantly correlated therefore the analysis was initially run twice; firstly with perceived benefits and secondly with behavioural intentions. This revealed very little difference with the same variables being indicated as significant predictors therefore the final analysis that was carried out included both variables. A total of five predictor variables were therefore entered into the regression, namely length of stay, perceived benefits, reported behavioural intentions, traveller statements and questions, plus health professional discussion about adherence to medication.

A test of the full model with all five predictors against a constant-only model was statistically reliable ($X^2 = 58.51$, $df = 10$, $p<.001$). This indicated that the variables as a set reliably distinguished between the three adherence groups. Perceived benefits, length of stay, traveller statements/questions and discussion about adherence were all found to be significant independent predictors of adherence. In order to examine this in more detail the comparisons between the three groups will be considered in turn (see Table 22):

Table 22. Multinomial logistic regression analysis of adherence to chemoprophylaxis

	B	Wald test (z-ratio)	Odds Ratio	95% CI for Odds Ratio	
				Lower	Upper
100% vs. Poor/None					
Perceived benefits	0.25	2.19	1.28	0.92	1.78
Behavioural intentions	0.21	3.47	1.24	0.99	1.55
Length of stay	-0.16	2.72	0.85	0.70	1.03
Statements /Questions	-0.02	3.51	0.98	0.95	1.00
Discussion re: adherence	-0.34	6.46*	0.71	0.55	0.93
100% vs. Partial					
Perceived benefits	0.36	7.31**	1.44	1.11	1.88
Behavioural intentions	0.09	0.80	1.09	0.90	1.33
Length of stay	1.27	8.01**	3.58	1.48	8.65
Statements /Questions	0.03	5.33*	1.03	0.00	1.06
Discussion re: adherence	-0.27	3.25	0.77	0.57	1.02
Partial vs. Poor/None					
Perceived benefits	-0.12	0.39	0.89	0.61	1.29
Behavioural intentions	0.12	0.95	1.13	0.88	1.45
Length of stay	-1.44	9.77**	0.24	0.09	0.58
Statements /Questions	-0.05	9.80**	0.95	0.92	0.98
Discussion re: adherence	-0.08	0.17	0.93	0.65	1.32

Note: *p<.05, **p<.01

100% compared to Poor/No Adherence

Greater amounts of health professional discussion about adherence were associated with a significantly lower likelihood of 100% adherence ($Z=6.46$, $p<.05$).

100% compared to Partial

Higher scores for perceived benefits were significantly associated with an increased likelihood of 100% adherence ($Z=7.31$, $p<.01$). Travellers who were going for a longer trip were significantly more likely to adhere fully to the recommended chemoprophylaxis ($Z=8.01$, $p<.01$). Greater amounts of traveller statements/questions were associated with an increased likelihood of 100% adherence ($Z=5.33$, $p<.05$).

Partial compared to Poor/No Adherence

Travellers who were going on a longer trip were significantly less likely to partially adhere to the recommended chemoprophylaxis ($Z=9.77$, $p<.01$). Greater amounts of traveller statements/questions were associated with a significantly lower likelihood of partial adherence ($Z=9.80$, $p<.01$).

CHAPTER 4: DISCUSSION

This was a longitudinal study which aimed to determine the predictive value of constructs taken from the Health Belief Model and the Theory of Planned Behaviour in relation to adherence to malaria chemoprophylaxis. It also aimed to examine the impact of the travel clinic consultation on travellers' health beliefs and subsequent adherence. This chapter will discuss the results in relation to each of the five hypotheses examined. The limitations of the study will be considered and the implications of the findings both for future research and services will be highlighted.

HEALTH BELIEFS

Hypothesis 1. The consultation will result in significant changes in the traveller's health beliefs

The first hypothesis was partially supported. The results revealed that there were significant changes in the expected direction for four of the seven beliefs examined. There were significant increases in perceived susceptibility to malaria, perceived benefits of anti-malarial medication and reported intentions to adhere. In addition, there were significant reductions in the perception of side effects as being permanent in nature following the consultation. However, there were no significant changes in the perceived severity of malaria, perceived behavioural control over adherence nor in the belief that side effects of medication would reduce the enjoyment of the stay.

These results suggest that the routine consultation taking place in the travel clinic is having the desired impact on some of the beliefs that travellers have on arrival at the clinic. However, three of the beliefs examined did not show any significant changes and the issues surrounding this finding will now be considered. A substantial proportion of the travellers had previously taken antimalarial medication therefore their sense of self-efficacy in relation to their ability to adhere to the recommended medication is likely to have been strongly influenced by the successes or failures related to this previous experience (Bandura, 1997). Since this construct has been highlighted as being an important predictor of intentions to adhere (Abraham, Clift & Grabowski, 1999) and actual adherence (Sheeran & Abraham, 1995), it would be desirable for the consultation to increase the traveller's perceived behavioural control. Discussion of the traveller's previous experience of taking medication with the aim of identifying facilitatory factors (e.g. leaving the medication in a visible place) and devising plans to overcome any difficulties would be expected to achieve this outcome.

The perception of side effects reducing enjoyment of the trip may be more resistant to change since all anti-malarial drugs do have side effects and these should be discussed at the time of prescribing (Reid, *et al.*, 1998). It is therefore understandable that travellers would report that taking medication, which may produce side effects, would reduce their enjoyment. The extent to which that is deemed to have a negative impact on enjoyment is highly subjective and it is unclear how the consultation might impact on this. This is in contrast to the other item examining side effects which relates to their permanent nature. Here, it is clearer that education provided by the health

professional, which points out that side effects resolve once the medication is discontinued, may result in travellers changing their beliefs.

Perceived severity did not significantly change and it may be that considering the severity of malaria in general as a disease is not specific enough as there are different types. It is not clear whether the traveller was making the judgment in relation to *falciparum* malaria or one of the less serious forms. Since the travellers were going to a variety of different countries not all would have been at risk from the most serious strain. In addition, it may be that knowledge of effective treatment for malaria lessened the perceived severity of the disease. The consultation may therefore have resulted in changes in both directions with some travellers reporting an increase in perceived severity and others reporting a decrease. These changes would then cancel each other out when comparing pre and post measures for the group as a whole.

Hypothesis 2. The extent of change in beliefs will be positively correlated with the quantity of discussion about malaria and malaria prophylaxis

There were no significant correlations between any of the changes in health beliefs and the total amount of discussion relating to malaria and malaria prophylaxis. The results did not therefore support the second hypothesis. It is not clear how the information discussed was being received by the traveller therefore it may be that it was not fully understood or that the travellers' pre-existing beliefs were influencing how the information was processed. The extent to which the traveller's health beliefs were actively elicited or spontaneously reported in the consultations was unclear. For example, a question such as "What do you know about malaria?" may elicit the

traveller's beliefs with the result of information subsequently being targeted at any areas of misconception potentially leading to belief change. Alternatively, information about malaria such as "Malaria is transmitted by mosquitoes which bite between dusk and dawn" may have been provided without first eliciting the traveller's existing understanding and this may not have led to changes in health beliefs. In the content analysis system both utterances would have been coded under the same category, namely information exchange regarding the nature of malaria, therefore the system may not have been sensitive to some of these subtleties.

Analysis of the relationships between the changes in beliefs and the individual categories of the information exchange in relation to malaria and malaria prophylaxis did reveal some significant correlations. There was a negative correlation between the change in severity score and the number of utterances coded as information exchange regarding the rationale for hospital treatment for malaria. This meant that the more discussion about the rationale for treatment the greater the reduction in perceived severity. It may be that this was due to the emphasis on the curability of malaria when discussing early detection and treatment if malaria is suspected. Such a message is important to convey to the traveller as they may still contract malaria even if they adhere fully to all the recommendations. However, being aware that it can be effectively treated may reduce the perceived severity of the disease.

In addition, there was a significant negative correlation between the number of facilitatory comments relating to behavioural preventative measures (e.g. "I recommend that you take a mosquito net in case there isn't one provided") and the

change in the belief that side effects of medication would reduce the enjoyment of the trip. It is difficult to see why these should be related and it may be that the significant correlation is a result of a type I error.

ADHERENCE

At the time of the follow-up interview 66 travellers (62%) reported having fully adhered to the recommended medication, 28 (26%) had partially adhered and 13 (12%) reported poor/no adherence. It was found that the length of stay was significantly different across the groups with the majority of the poor/no adherence group going for longer than two weeks and the majority of the partial adherers going for two weeks or less. Those people who fully adhered to the recommendations were approximately equally divided in the length of time that they were going for. Reasons given for lack of adherence also differed across the groups. It was found that in the partial adherers the most common reason provided was forgetting to take the tablets and this was reported by 50% of those travellers. Side effects of the medication and lack of mosquito bites whilst away were also cited as reasons by several travellers. This was in contrast to the poor to no adherence group whose most common reason was low perceived risk although side effects and forgetting were also cited by several travellers in this group. These findings imply that there are qualitative differences between those people who miss one or two doses and those people who demonstrate poor or no adherence.

The follow-up interview also revealed that three of the travellers had contracted malaria whilst away on their trip and had had to seek treatment. All three of the

travellers reported having fully adhered to the recommended medication. This highlights the lack of a consistently positive relationship between adherence and health outcome.

Hypothesis 3. The extent of adherence to malaria prophylaxis will be related to travellers' health beliefs

The third hypothesis was partially supported. There were significant differences across the three adherence groups for perceived benefits pre-consultation and behavioural intentions both pre and post-consultation. Those people who fully adhered perceived greater benefits from taking the medication and reported higher levels of intention to adhere. Although perceived benefits following the consultation was no longer significantly different across the groups it did follow the same pattern as prior to the consultation with all groups showing increases. Perceived susceptibility, perceived severity, perceived behavioural control and perceptions of side effects of medication did not differ across the three adherence groups. It may be that the effect of these other beliefs on adherence was mediated by perceived benefits and behavioural intentions.

Post-hoc tests examined the relationship between length of stay and health beliefs. These revealed a significant negative correlation between length of stay and intention to adhere. It may be that this is related to the perceived effort of having to adhere to the medication for longer periods of time. Although this concept may have been captured by some operational definitions of the costs construct from the Health Belief Model as well as by some definitions of self-efficacy it may be a health belief which

should be investigated in its own right. Perceived effort of adherence appears to be very different from perceived side effects or other potentially negative consequences of taking the medication. It is possible that "perceived effort" appears later in the decision-making process after the person has decided whether or not the behaviour is something that they are potentially willing to engage in as well as establishing their perceived behavioural control over the behaviour. People may decide that they are indeed confident in their ability to carry out the behaviour if they want to. They may make a judgement about how much effort would be required in order to do this, then reconsider the benefits of the health behaviour before deciding whether or not they intend to carry out the behaviour.

It is also possible that those people who were going for a longer trip did not intend to adhere due to a desire to fit in with the people whom they would be in contact with whilst away. It could therefore be that the social influences whilst away were impacting on their decision-making. Social influences were not measured in this study and those measured in Abraham, Clift and Grabowski's (1999) study were not found to relate to adherence. However, they only measured the social influences during the period of interest in their study, namely when the traveller was back in the UK. The impact of social influences whilst in the endemic region has previously been noted. Tajfel (1981) found that some South Asians reported a dislike of taking malaria chemoprophylaxis on home visits because it marked them as outsiders.

Hypothesis 4. The extent of adherence to malaria prophylaxis will be related to the communication during the consultation

It was hypothesized that higher levels of health professional information-giving and positive talk would be associated with greater adherence, whereas health professional question-asking and negative talk would be associated with lower levels of adherence. There were significant differences across the groups in the amount of information-giving and question-asking. However, this was only for the traveller and not for the health professional as hypothesized. Those people who were deemed to be poor/non-adherers gave more information and asked more questions in the consultation than the other two groups. There were no differences across the adherence groups in the levels of either positive or negative talk.

The findings suggest that the differences in the consultation are being driven by the traveller and that they are making use of this contact time in a different way. This would also suggest that the travellers' beliefs are being expressed in the consultation and that they are actively seeking information. However, despite increased questions there were no differences in the amount of information provided. This is in contrast to the results of previous studies which have found that levels of information-giving increase when patients ask more questions (e.g. Street, 1991; Waitzkin, 1984). It may be that the travel clinic consultations are designed to impart the relevant advice for the trip in question and that information will be provided regardless of whether the traveller actively asks for it.

It was also hypothesized that higher levels of traveller participation in the consultation would be positively correlated with adherence. There were no significant differences across the groups in their overall levels of participation in the consultation. However, contrary to expectations, from the descriptive statistics it appeared that the poor/no adherence group showed the highest levels of participation. It may be that these travellers hold strong beliefs and are being over-dominant in the consultation with the result that the physician agenda is not being met. Such a dynamic has been noted before (e.g. Davis, 1968) and Lowenstein *et al.* (1989) emphasise the need for negotiation in the case of conflicting agendas in order to reconcile the differences. It may that there is an optimum level of participation in order for both the health professional and traveller agendas to be met.

Hypothesis 5. Discussion of potential barriers to adherence during the consultation will result in greater adherence

There were significant differences across the groups in the number of utterances involving either potential difficulties or facilitative suggestions relating to adherence to chemoprophylaxis for the health professional only. The highest levels were in the poor/no adherence group and the lowest in the full adherence group. These results were therefore in the opposite direction to those hypothesised. These results imply that potential barriers to adherence are being identified and that some facilitative suggestions are being made at the time of the consultation. However, there does not appear to have been sufficient negotiation to arrive at a shared plan to overcome the difficulties.

PREDICTING ADHERENCE

Adherence was found to be predicted by length of stay, perceived benefits of medication, the amount of discussion about adherence to chemoprophylaxis by the health professional and traveller statements/questions. Although behavioural intention was not found to be a significant predictor of adherence this variable correlated modestly with perceived benefits, which was a significant predictor of adherence. The importance of reported behavioural intentions in predicting adherence should not therefore be underestimated. The ways in which these two variables may be related will be discussed when considering the implications of the study for future research.

Longer trips were associated with a lower likelihood of full adherence to the recommended medication when this group were compared to poor/non-adherers, but an increased likelihood of full adherence when a comparison was made with partial adherers. The possible influences of perceived effort of adhering for a longer time and a desire to fit in whilst away were previously discussed. However, the majority of travellers who reported partial adherence were going for less than two weeks. It may be that following such a short trip travellers did not feel that they had been exposed to a sufficient degree of risk in order to warrant continued use of medication. Indeed, four people in this group cited a lack of mosquito bites as the reason for discontinuation of the tablets. It may also be that travellers were less willing to tolerate side effects once they returned from their trip, or that they were not able to adapt the strategies that they had employed for remembering to take the tablets whilst away once back in their normal routine.

The greater the perceived benefits of medication the more likely that the traveller would fully adhere. This was only a significant predictor between the full and partial adherers. It may be that greater perceived benefits of anti-malarial medication on return to the UK is particularly important although this was not specifically measured by the *Perceptions of Malaria Questionnaire (PMQ)*. Premature discontinuation of the medication could be a result of a lack of understanding of the way in which the medication works as well as the impact of side effects experienced. During the consultations there was relatively little discussion about the rationale for chemoprophylaxis and it may be that travellers were not aware of the importance of continuing for the four weeks after return even when they were apparently well. In addition, side effects of medication were frequently cited as reasons for lack of adherence. If the traveller perceived greater benefits then this may have increased their acceptance of side effects (e.g. nausea, insomnia), especially when they were back at work and may have found them more difficult to endure.

The number of traveller questions/statements was found to be positively predictive of full adherence when this group were compared to the partial adherers but negatively predictive when compared to poor/non-adherers. This finding supports the earlier suggestion that there may be an optimum level of participation required in the consultation in order to meet the agendas of both parties. The consultations of those people who reported poor/no adherence were characterised by more traveller questions/statements and more health professional discussion about adherence. It may be that these travellers were already thinking about not adhering or were ambivalent

and were demonstrating this in the consultation. This would require a different approach from the health professional and an assessment of the traveller's readiness to consider taking chemoprophylaxis before providing further information about the recommended medication. For those people who were not considering it or were ambivalent, providing information about the required behaviour would be premature. In the first instance, the health professional would need to help the traveller move towards behaviour change. This could be seen as facilitating movement through the stages of change outlined by Prochaska and DiClemente (1983). Strategies for doing this during brief contacts in medical settings have already been described in the literature (Rollnick, Heather & Bell, 1992) although they have not been applied to the area of travel medicine.

There therefore appears to be a complex relationship between the predictor variables and subsequent adherence. Adherence cannot be seen as a continuous variable as the findings imply that there are qualitative differences between those travellers who partially adhere and those who report poor/no adherence. Differences in the reasons for departure from adequate adherence were also noted in the rationales provided by travellers at the time of the follow-up interview.

LIMITATIONS OF THE STUDY

The measurement of adherence was solely through self-report and the limitations of this approach were discussed in chapter one. However, Abraham, Clift and Grabowski (1999) point out that "from the point of view of assessing cognitive models, assuming a consistent positive bias in reported adherence, would imply that

detected relationships are relatively robust" (p. 1652). In addition, the design of the study attempted to address some of the potential limitations, namely through the reassurance of travellers that their responses would remain confidential and the assessment of adherence through the asking of four separate questions at the follow-up interview. Additional methods of assessing adherence (e.g. pill counts, blood tests) also have a number of limitations and would have been likely to reduce the initial number of participants as well as increase attrition rates.

In this study the level of full adherence to malaria chemoprophylaxis was 62% which is higher than some of the other reports in the literature that have also used self-report measures. For example, two studies found that only 48% of travellers were deemed to be taking adequate precautions (Lobel, Phillips-Howard, Brandling-Bennett *et al.*, 1990; Phillips-Howard *et al.*, 1986). However, Abraham, Clift and Grabowski (1999) also found high levels of adherence, namely 77.5% for mefloquine and 69% for chloroquine and proguanil users. There are a number of possible reasons for the relatively high rates of self-reported adherence in this study.

Adherence may have increased because the participants knew that they would be getting followed up and a few people spontaneously reported that this had given them greater motivation to continue on return. Since they were also being followed up by the same investigator as had initially recruited them into the study the higher rates of adherence could be related to the concept of injunctive norms, which is included in the TPB but was not measured in this study. Injunctive norms in this context would refer to the perception of the investigator's approval of continued adherence. The

higher levels of adherence may also be related to the findings of Hall, Roter and Katz (1988) who found a positive relationship between asking about adherence and actual levels of adherence. Finally, it may be related to the location of the study and the sample characteristics. People who attend a travel medicine clinic tend to be a more motivated and knowledgeable population than the average traveller, as highlighted previously by Behrens and Phillips-Howard (1989).

The study also failed to separate out the different parts of recommendations in relation to malaria prophylaxis. It is therefore unclear whether those people who reported poor to no adherence to anti-malarial medication would also have reported poor to no adherence to behavioural prophylactic recommendations. However, the *PMQ* was specifically designed to measure travellers' health beliefs in relation to adherence to chemoprophylaxis. The travellers' scores on the subscales would not therefore be expected to relate to adherence to other preventative measures.

The *PMQ* also had a number of weaknesses that need to be taken into account when considering the results. One of the main weaknesses was the low levels of internal consistency for some of the subscales. The alpha coefficients obtained would be deemed to be in the pilot or marginal ranges (Barker, Pistrang and Elliot, 1994). However, despite this fact all of the changes between the pre and post measures were in the expected direction. In addition, the *PMQ* did not incorporate any measures of social influences which have already been discussed as potentially important factors in determining travellers beliefs and their subsequent adherence.

The methods used to measure the process of communication need to be considered as Roter and Hall (1989) have suggested that methodological limitations exist with all interaction analysis systems. It may be that the categories used were not able to capture the communication which would be relevant to the changes in beliefs as previously discussed. It has also been suggested that using coding systems to determine linear relationships between interaction and outcome measures may be inappropriate due to the continuous way in which doctors and patients affect each other during the consultation (Stiles, 1989). However, research which has measured communication in this way has revealed significant relationships between process and outcome variables as has been found in this study.

There is also the possibility of Type I errors since a relatively large number of statistical tests were conducted. However, the more conservative probability value of $<.01$ was used throughout in order to determine significance with the exception of the multinomial logistic regression analysis. In addition, there is the possibility of Type II errors, particularly in relation to the HBM constructs. The original power analysis had revealed that a sample of 165 would be needed in order to find a predictive effect for the HBM, but only 35 for the TPB. The 107 travellers who were successfully contacted at follow-up may not therefore have been a sufficiently large sample to detect an effect.

IMPLICATIONS FOR FUTURE RESEARCH

It appears that there is a need to better understand the relationship between the length of stay whilst away and adherence to recommendations. It does not appear that it is

related to perceived behavioural control and many people who are going away for a longer trip do report full adherence. It is therefore possible that it is related to the perceived effort required in order to carry out the behaviour. Deciding whether or not a behaviour is worth the effort may lead the person to reconsider the benefits. This would therefore see the relationship between the constructs measured as being more cyclical in nature rather than linear. Future studies should aim to investigate this concept which may be applicable to other health behaviours.

It is also possible that social influences whilst away are important determinants of intention to adhere as well as actual adherence. People who are going for longer trips may prefer to be seen as more like the indigenous population who would not be taking anti-malarial medication. This would also apply to people visiting friends and family who have previously been found to be a group who are at higher risk for not taking adequate precautions. In addition, people who showed poorer adherence may not have been as motivated or ready to be concerned about health matters. This is a concept included in the original Health Belief Model but was not measured in this study. It can also be seen as relating to the stages of change model outlined by Prochaska and DiClemente (1983). It is suggested that future research aims to investigate these concepts.

It is also suggested that similar studies of travellers' health beliefs are carried out in other settings in order to examine the generalisability of the results and to examine whether there are differences in the health beliefs of people accessing different sources of information. Since transcript analysis of communication is exceedingly time-consuming, self-report measures of communication could be utilized in order to

include larger numbers of participants. However, it has been suggested that there is a need to develop new measures of self-report (Street, Voigt, Geyer, Manning & Swanson, 1995) since there is a poor correlation between objective measures of communicative behaviours and self-report (Street, 1992). It may also be important to conduct a study in a non-clinical setting, as in the Abraham, Clift and Grabowski (1999) study, in order to capture those people who do not seek any pre-travel advice. In addition, it may be important to try to separate out those travellers who are going to countries where *falciparum* malaria is present from those travellers who are going to areas where only the less severe strains are present.

Finally, the results imply that adherence would improve if staff were given training on how to apply social cognition models in practice as well as strategies for negotiating areas of conflict and resolving potential barriers to adherence. The impact of such training on health beliefs and adherence could be investigated by conducting an intervention study. Such a study could also measure the travellers' ability to recall recommendations and their satisfaction with the consultation. This would provide a fuller investigation of the relationship between input variables, communication, and immediate and longer-term outcome variables.

IMPLICATIONS FOR SERVICES

The findings imply that the travel clinic consultation could be improved and that there is a need to train staff that provide travel advice. The role of clinical psychologists in working with organizations and providing appropriate staff development has been emphasized in the recent publication "The Core Purpose and Philosophy of the

Profession" (The British Psychological Society, 2001). Providing input to services in this way ensures that a larger number of people can benefit from the delivery of psychologically informed services and that psychologists are able to provide direct input to areas where there has previously been very little involvement.

Effective communication in relation to malaria prophylaxis would involve eliciting travellers' health beliefs and targeting communication accordingly, negotiating areas of difficulty or conflict and arriving at a shared plan. Since the health professional is actively trying to get the traveller to alter their behaviour at a point when they may not be ready to consider behaviour change, ideas from motivational interviewing could also be incorporated into the consultation. Rollnick, Heather and Bell (1992) developed a brief form of motivational interviewing for use in medical settings. In addition, they highlighted a number of issues to consider when training health professionals in this approach. They reported that many professionals had found the underlying principles too complex to apply and suggested that a menu of strategies or a series of questions was a more appropriate way of conveying the method. They also stressed the importance of providing a series of training sessions over a number of weeks rather than a one-off session. This would allow the health professional to first gain an overview of the method and practice applying the strategies in role-play situations. They could then try to apply it in the clinic situation with the opportunity of feeding back and discussing any problems.

The findings of this research also imply that, within the consultation, there is a need to focus more on the benefits of taking medication. This should be provided at a point

when the traveller is ready to receive the information and explained in a way that is understandable. This information should particularly emphasise the way in which the medication works, the rationale for full adherence and its effectiveness. The impact of medication on reducing the risk of developing malaria should be explained in clear terms, as it is known that the way in which risk information is presented will significantly influence decision-making (e.g. Fischoff, Slovic & Lichtenstein, 1981; McNeil, Pauker, Sox & Tversky, 1982). It would also be important to check out the traveller's response to this information in a way that recognises their autonomy in the decision-making process.

Resolving potential barriers to adherence when they arise in the consultation may include agreed strategies for remembering to take the medication, how they might accommodate different work schedules and what to do if they miss a dose. The successes and failures related to previous malaria prophylaxis could be used as a basis for this discussion, or indeed, experiences with medication in general if the traveller has not previously used anti-malarial drugs. Discussions of this kind should have a beneficial impact on the traveller's self-efficacy or perceived behavioural control, which should increase behavioural intentions and potentially subsequent adherence.

There is also the issue of generalisability of self-efficacy once it is established (Bandura, 1997). It may be that increasing the traveller's sense of control over malaria prophylaxis would generalise to other areas (e.g. hygiene, diet) that are important for the maintenance or protection of the traveller's health. This is an important point to consider as approximately 95% of the health hazards to which

travellers are exposed are related to behaviour whilst away and on return (Cossar, 2000).

The strategies described for conducting an effective consultation would be consistent with a patient-centred approach and seeing the traveller as an active participant in an egalitarian relationship. This approach would appreciate that travellers arrive at the clinic with a complex agenda as has been recognised in the more recent literature on adherence.

CONCLUDING COMMENTS

The results suggest that although there is scope for improvement, travellers' health beliefs can be positively influenced by a routine travel clinic consultation. The findings also indicate that both background and process variables are significant predictors of longer-term outcomes in this context. The relationship between these appears to be complex and may differ according to the type of inadequate adherence considered. However, theories which could potentially explain these relationships are poorly developed in the literature. Suggestions for changing the process and improving adherence include the incorporation of strategies from motivational interviewing, emphasising benefits of medication and resolving potential barriers to adherence. In addition, it appears that readiness to engage in behaviour change, perceived effort of adherence and social influences whilst in a malarious region will be important concepts to investigate in future research.

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APPENDIX I: Ethical Approval

UCL
HOSPITALS

The University College London Hospitals

The Joint UCL/UCLH Committees on the Ethics of Human Research

Committee Alpha Chairman: Professor André McLean

Please address all correspondence to:
Iwona Nowicka
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UCLH NHS Trust
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Dr L Noble
Lecturer in Communication Skills
Department of Psychiatry and Behavioural Sciences
Wolfson Building
48 Riding House Street

11/04/00

Dear Dr Noble

Study No: 00/0055*(Please quote in all correspondence)*
Title: **The impact of the travel medicine clinic consultation on health beliefs and adherence to malaria**

Thank you very much for letting us see the above application which has been agreed by Chairman's Action. The study can go ahead from the ethics point of view. Please ensure that you have obtained final approval from the Trust (via the R&D office) before proceeding with your research.

Please note that it is important that you notify the Committee of any adverse events or changes (name of investigator etc) relating to this project. You should also notify the Committee on completion of the project, or indeed if the project is abandoned. **Please remember to quote the above number in any correspondence.**

Yours sincerely

Professor André McLean, BM BCh PhD FRC Path
Chairman

APPENDIX II: Information Sheet

THE HOSPITAL FOR TROPICAL DISEASES
Mortimer Market
Capper Street
off Tottenham Court Road
London WC1E 6AU
Telephone: 020 7387 9300
020 7387 4411
Ext:.....
Fax: 020 7388 7645

www.thehtd.org

MALARIA STUDY
INFORMATION SHEET

This study aims to investigate the following three areas:

- people's knowledge of malaria before they come to the Travel Clinic
- the effectiveness of the services provided by the Travel Clinic
- people's experiences of taking anti-malarial medication

The information gathered from the study will help to improve the services provided by health professionals who work in the area of travel medicine. If you agree to participate in the study you will be asked to :

- complete two brief questionnaires before the consultation
- give permission to have your consultation with the doctor or nurse recorded on audiotape
- complete two brief questionnaires straight after the consultation
- complete a short telephone interview approximately 3 weeks after you return to the UK

This study is being conducted by an independent researcher. All the information you give will be recorded under a code number and will remain confidential.

You do not have to take part in this study if you do not want to. If you decide to take part you may withdraw at any time without having to give a reason. Your decision whether to take part or not will not affect your care and management in any way.

All proposals for research using human subjects are reviewed by an ethics committee before they can proceed. This proposal was reviewed by the Joint UCL/UCLH Committees on the Ethics of Human Research.

Investigators: Lorna Farquharson, Sub-department of Clinical Health Psychology,
UCL, 1-19 Torrington Place, London, WC1E 6BT.
Tel. 020 7380 7897, 020 7886 6221

Dr Lorraine Noble, Unit of Health Psychology, UCL,
Wolfson Building, 48 Riding House Street, London, W1N 8AA.
Tel. 020 7679 9465

APPENDIX III: Consent Form

THE HOSPITAL FOR TROPICAL DISEASES
Mortimer Market
Capper Street
off Tottenham Court Road
London WC1E 6AU
Telephone: 020 7387 9300
020 7387 4411
Ext:.....
Fax: 020 7388 7645
www.thehtd.org

CONFIDENTIAL

CONSENT FORM
MALARIA STUDY

Before deciding whether to take part in this study, please read the following questions.

If you wish to take part, please circle 'Yes' in part B and give your name in the space provided.

A. Have you read the information sheet about this study?

Have you had an opportunity to ask questions and discuss this study?

Have you received satisfactory answers to all your questions?

Have you received enough information about this study?

Do you understand that you are free to withdraw from this study

- at any time?
- without giving a reason for withdrawing?

B. Do you agree to take part in this study? Yes / No

Name (in block capitals).....

Signature: .....Date:.....

Signature of investigator: .....Date:.....

Investigators: Lorna Farquharson, Sub-department of Clinical Health Psychology,
UCL, 1-19 Torrington Place, London, WC1E 6BT.
Tel. 020 7380 7897, 020 7886 6221

Dr Lorraine Noble, Unit of Health Psychology, UCL,
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APPENDIX IV: Survey about Malaria Questionnaire

Participant No:.....

Survey about Malaria Prevention (1)

Please answer the following questions as fully and as honestly as you can. All the information you give will remain confidential.

Personal details

Age:	Sex: Male / Female	Nationality .....

Ethnicity:.....

Age left school:.....	Further education: .....

Travel plans

Destination(s)	Length of stay ..... weeks/months

What is the purpose of your visit?
please circle one:

Tourism Business Visiting friends/relatives Teaching/Study To work/live
Other (please specify).....

What do you feel are the most important threats to your health during your visit?
please tick as many as apply:

Sunburn	Diarrhoea	Hepatitis A	Accidents/injuries	HIV	TB
Malaria	Animal bites	Typhoid	Other (please specify).....		

Previous experience

Have you visited the area(s) before? Yes / No If Yes, how many times .....

Have you taken any anti-malarial medication before? Yes / No
If Yes, please state which .....
Did you experience any side effects ? Yes / No
If yes, please specify .....

Have you had malaria before? Yes / No If yes, when was last episode ? .....

Malaria prevention

Which anti-malarial medications have you heard of?

Lariam (mefloquine)	Yes / No
Nivoquine or Avloclor (chloroquine)	Yes / No
Paludrine (proguanil)	Yes / No
Vibramycin (doxycycline)	Yes / No
Others: please specify	.....

For the medications you have heard of:

What do you know about their effectiveness in preventing malaria in the areas you are going to ?				
1) Lariam (mefloquine)	very effective	somewhat effective	not effective	don't know
2) Nivoquine or Avloclor (chloroquine)	very effective	somewhat effective	not effective	don't know
3) Paludrine (proguanil)	very effective	somewhat effective	not effective	don't know
2) and 3) together	very effective	somewhat effective	not effective	don't know
4) Vibramycin (doxycycline)	very effective	somewhat effective	not effective	don't know
5) Others.....	very effective	somewhat effective	not effective	don't know

What side effects have you heard of?

Lariam (mefloquine) .....

.....

Nivoquine or Avloclor (chloroquine) .....

.....

Paludrine (proguanil) .....

.....

Vibramycin (doxycycline) .....

.....

Others: please specify..... .....

.....

If you needed an anti-malarial medication, is there any that you would rather have ? Yes / No

If Yes, please state which and why:

Lariam (mefloquine) .....

Nivoquine or Avloclor (chloroquine) .....

Paludrine (proguanil) .....

Vibramycin (doxycycline) .....

Others: please specify .....

If you needed an anti-malarial medication, is there any that you would rather <u>not</u> have ? Yes / No

If Yes, please state which and why:

Lariam (mefloquine) .....

Nivoquine or Avloclor (chloroquine) .....

Paludrine (proguanil) .....

Vibramycin (doxycycline) .....

Others: please specify .....

Where have you heard about anti-malaria medications? Please circle any which apply:

GP	Nurse at GP surgery	Other doctor	Friends/relatives
TV	Newspapers/magazines	Travel books	Partner / Spouse
Internet	Information phone line	Chemist/pharmacist	Travel agent

Other(s) please specify .....

Malaria

How is malaria contracted? Please circle as many as apply:

tap water	sexually transmitted	touch	any biting insects
mosquitos	contaminated food	coughing/sneezing	pond / lake water

What are the symptoms of malaria? Please circle as many as apply:

headache	confusion	body aches	shivering
jaundice	fever	diarrhoea	coma

How curable is malaria? Please circle one option:

totally curable mostly curable occasionally curable cannot be cured

How serious is malaria contracted whilst travelling? Please circle one option:

never kills occasionally kills often kills always kills

Apart from taking medication, what other measures can be used to prevent malaria?

Please circle as many as apply:

washing hands	vaccination	using condoms	closing windows
avoiding crowds	using fans	mosquito nets	strong perfume
using repellents	purifying water	wearing long clothing	food hygiene

Where have you heard about malaria? Please circle any which apply:

GP	Nurse at GP surgery	Other doctor	Friends/relatives
TV	Newspapers/magazines	Travel books	Partner / Spouse
Internet	Information phone line	Chemist/pharmacist	Travel agent

Other(s) please specify .....

APPENDIX V: Perceptions of Malaria Questionnaire

Participant No.:.....

Perceptions of Malaria Questionnaire

Below are a list of statements concerning your view of malaria and anti-malaria medication. Beside each statement there is a scale which ranges from (1) "Disagree Strongly" to (7) "Agree Strongly". For each item please circle the number that represents the extent to which you agree with the statement. Please answer as honestly as you can and remember that your responses will only be accessed as part of the project and will not be shown to the travel clinic staff.

1. Taking anti-malarial medication will help to protect my health

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

2. I would like to take my medication as directed throughout the whole trip

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

3. Anti-malarial medications are reasonably priced

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

4. Because I am generally a healthy person, I am at very little risk of getting malaria

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

5. Anti-malarial medication greatly reduces the risk of malaria

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

6. If I took no precautions, the chances of me getting malaria would be high

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor	Agree Mildly	Agree Moderately	Agree Strongly

Disagree

7. Even if it is inconvenient, I am sure that I will be able to take the medication as directed

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

8. Problems I would get from malaria would last a long time

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

9. Side effects of medication will reduce the enjoyment of my stay

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

10. My chances of getting malaria are slim regardless of whether I take medication

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

11. Malaria can be a fatal disease

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

12. Malaria requires hospital treatment

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

13. I am not at risk of malaria once back in this country

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor	Agree Mildly	Agree Moderately	Agree Strongly

Disagree

14. I am confident that I will be able to take the medication exactly as directed

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

15. I am very worried about getting malaria

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

16. Taking anti-malarial medication for long periods of time will not damage my health

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

17. I do not think I will continue to take the medication when I get home

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

18. I have little to gain from taking anti-malarial medication

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

19. Taking anti-malarial medication is really not that important to me on this trip

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

20. Malaria can be easily cured

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor	Agree Mildly	Agree Moderately	Agree Strongly

Disagree

21. I would be less anxious about malaria if I took anti-malarial medication

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

22. It will be an inconvenience to have to take medication during my trip

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

23. Factors outside of my control will make it difficult for me to take the medication during the trip

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

24. I intend to take my medication exactly as directed

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

25. Taking anti-malarial medication will not help to prevent future problems for me

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

26. Side effects of anti-malarial medication are temporary

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

27. If I got malaria, my life would not change

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

28. It will be too difficult for me to remember to take the medication

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree Mildly	Neither agree nor Disagree	Agree Mildly	Agree Moderately	Agree Strongly

APPENDIX VI: Follow-up Interview

Participant No:.....

Malaria Study - Follow-up Telephone Interview

1. What was the name of the medication given to you?

- Mefloquine (Larium)
- Chloroquine
- Proguanil (Paludrine)
- Doxycycline
- Malarone

2. What instructions were you given for taking this medication?

- How often
- How long
- Any particular instructions e.g. take with meals

3. Were you given any other advice to follow in terms of preventing malaria?
(Prompt by saying anything else until they have finished their list)

4. Did you have any difficulties following the advice given?

If so, what were they?

5. Were you able to take the dose every day / week as instructed ?

Always Sometimes Occasionally Never

If not, what prevented you ?

6. Were you able to take the medication for as long as recommended ?

If not, what prevented you ?

7. Did you experience any side effects from the medication?

List side effects:

8. When you started having the side effects what did you do ?

- Did you see a doctor ?
- Did you stop taking the medication or reduce the dose ?

9. When did you take your last tablet?

10. Would you take the same measures again if travelling to an area where malaria is present?

Medication -

Other measures -

11. Given the measures you were taking, did you feel you were at risk of getting malaria ?

Not at all A little Somewhat Quite a lot A great deal

12. How much were you bitten by mosquitos during your trip ?

Not at all A little Somewhat Quite a lot A great deal

APPENDIX VII: RIAS - Summary of Coding Categories

RIAS - CODING CATEGORIES FOR USE IN MALARIA STUDY

[?]M	Closed-ended questions about medical or family history, previous treatment (includes past vaccines but not medication), symptoms, allergies except to drugs, identifying details such as name, etc
[?] T	Closed-ended questions relating to past, ongoing or future drug regimens, drug allergies, treatment, lifestyle controls
[?] L/S	Closed-ended questions relating to lifestyle, work, travel plans etc to develop understanding of how this relates to his/her health
[?] P/S	Closed-ended questions relating to emotions, state of mind, stress, values and beliefs, philosophical outlook
[?] Other	All other closed-ended questions
?M	Open-ended questions relating to the same as [?] Med
?T	Open-ended questions relating to the same as [?] Thera
? L/S	Open-ended questions relating to the same as [?] L/S
? P/S	Open-ended questions relating to the same as [?] P/S
? Other	All other open-ended questions
GM	Statements of fact or opinion relating to the medical condition, symptoms, prognosis including yes or no which imparts new info in relation to a question
GT	Statements of fact or opinion relating to the ongoing or future treatment plan
GL/S	Statements of fact or opinion relating to lifestyle, work, travel plans etc
G P/S	Statements of fact or opinion relating to emotions, state of mind, stress, values and beliefs, philosophical outlook

GOther	Statements of fact or opinion relating to other issues e.g. payment
CMT	Statements intended to persuade, influence, direct or change the other's behaviour relating to the medical condition or therapeutic regime
CLP	Statements intended to persuade, influence, direct or change the other's behaviour relating to lifestyle and psychosocial issues
Orient	Instructions relating to the visit, statements telling the other person what is about to happen, orientation to topics of discussion
Agree	Signs of agreement or understanding, conceding a point, apologies
BC	Back-channel responses from the health professional indicating sustained interest, attentive listening or encouragement
Check	Restatement or reflection back of information to check for accuracy or shared understanding - does not include restatement at the end of the consultation
?Bid	Requesting repetition of the other's previous statement
?U	Check with other to see if the information has been followed or understood
?O	Questions asking for the patient's opinion, point of view, perspective, asking for permission
Partner	Statements that convey the health professional's alliance with the patient
Concern	Statements of concern or worry including self-criticism
?Reassure	Questions of concern that convey the need or desire to be reassured or encouraged

Empathy	Statements that paraphrase, interpret, recognise or name the other's emotional state
R/O	Reassures, encourages or shows optimism
Legit	Statements indicating that the other's actions, emotions, thoughts are understandable and normal
Laughs	Jokes (friendly or morbid), laughter
SDis	Health professional self-disclosure which has medical and/or emotional relevance for the patient
Disapprove	Disapproval, criticism, rejection, disbelief, sarcasm, protests/ defensive statements directed expressly at the other person
Crit	As Disapprove except directed towards another not involved in the consultation
Gen (Comp)	Compliments, approval directed towards another not in consultation
Approve	Compliments, gratitude, appreciation, approval
Personal	Personal remarks, greetings, good-byes, social conversation
?Service	Patient-initiated requests for medication or services

APPENDIX VIII: Malaria Content Analysis – Summary of Coding Categories

MALARIA CONTENT ANALYSIS CATEGORIES

NM Questions and statements which relate to knowledge, beliefs or attitudes towards malaria as well as previous experience

IC Questions and statements which relate to knowledge, beliefs or attitudes towards malaria chemoprophylaxis as well as previous experience

IS Questions and statements which relate to knowledge, beliefs or attitudes towards side effects of medication including previous experience

IB Questions and statements which relate to knowledge, beliefs or attitudes towards behavioural prophylactic measures (nets, repellents, clothing etc) as well as previous experience

IH Questions and statements which relate to knowledge, beliefs or attitudes towards treament for malaria as well as previous experience

RC Questions and statements which relate to the way in which the medication works, the rationale for taking it and its effectiveness

RB Questions and statements which relate to the way in which the behavioural prophylactic measures work, the rationale for employing them and their effectiveness

RH Questions and statements which relate to the way in which treatment works, the rationale for seeking treatment if malaria is suspected and its effectiveness

GC+ Statements which generally facilitate adherence to medication for either the traveller or other people

GC- Statements which relate to any general reasons that the traveller or other people have given for not taking their medication as instructed

GB+ Statements which generally facilitate adherence to behavioural prophylactic measures for either the traveller or other people

GB- Statements which relate to any general reasons that either the traveller or other people have given for not sticking to behavioural prophylactic measures as instructed

BTC+ Statements or questions which explicitly relate to factors that should facilitate adherence to the recommended chemoprophylactic regime for the forthcoming trip

BTC- Statements or questions which explicitly relate to any potential difficulties which the individual traveller foresees in terms of adhering to the recommended chemoprophylactic regime

BTB+ Statements or questions which explicitly relate to factors that should

facilitate adherence to the recommended behavioural prophylactic measures for the forthcoming trip

BTB- Statements or questions which explicitly relate to any potential difficulties which the individual traveller foresees in terms of adhering to the recommended behavioural prophylactic measures on this trip