Pharmacist-Initiated Interventions in Travel Health

Volume I

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ACKNOWLEDGEMENTS

"The length of this document defends it well against the risk of being read"
(Sir Winston Churchill 1874-1965)

As a child, I remember being taught the legend of "Robert the Bruce and the Spider" to illustrate the idiom "if at first you don't succeed, try, try, try again". For those unfamiliar with the tale: Robert Bruce murdered the Red Comyn in Grey Friars' Church, Dumfries and was crowned King of Scotland. The English, led by Edward I, then invaded and defeated Bruce and his supporters in six battles. With many of his family dead, his wife captured and his forces scattered, he takes refuge in a small isolated cave, where he contemplates his future - Should he try once more to win back his throne, or should he attempt to escape Scotland, never to return? He then spots a spider trying to spin its web on the roof of the cave, and watches it fail six times. Recognising the coincidence, he decides that if the spider does try once more, and then succeeds, that he too will gather his supporters and try one last time to win back his crown. Of course, on the seventh attempt the spider does finally build its web, and the rest is history….

Although the writing of this thesis pales in comparison to the exploits of Robert the Bruce, by coincidence, and due to a number of reasons, this was also my seventh attempt at a research doctorate by part-time study and also, like Bruce, this attempt would also have failed if it wasn't for the supervision, guidance, support and encouragement that I received from my supervisory team and supporters during my candidature. In this section I hope to acknowledge the people who have helped me. However, the list of people to thank is long and therefore, I apologise if I have inadvertently missed someone.

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I wish to acknowledge the help of the following people in the various studies I completed as part of this thesis:

- In the airport study (chapter 2), I wish to thank Ms Sue Cooper (Cairns Port Authority) for supporting the application to interview travellers in Cairns International Airport and Mr John

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- Finally, in the pilot study of a pharmacy-run THAS (chapter 6), I wish to thank Mrs Christine Richardson and Mr Robert Poole for allowing me to use their pharmacy as the pilot site. I would also like to thank all of their staff for their support during the pilot project, and in particular, the pharmacists who participated in the delivery of the service; Mrs Helen Barnes, Mr Chris Florence and Mr Chris Mitchell.
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I also need to acknowledge the patience, love and support that I have received from my close family and friends over the many years needed to complete this thesis. In particular, I wish to acknowledge the love and support of my two daughters, Hannah and Molly, who were a lot younger when I first started my candidature, and the more recent support of my soon to be son-in-law, Gaven Chan. I also wish to acknowledge the support of my sisters (Mrs Sheena Cartledge and Mrs Fiona Booth) and brother (Mr Frazer Heslop) and their respective families, and although they are no longer with us, I would also like to acknowledge my parents, Thomas James and Margaret Eleanor Heslop, who taught me many of the principles that I now live by. My father in particular taught me that dreams can be achieved with hard work and perseverance (the “try, try, try again” approach) and to value and take the opportunities presented by a free university education, an opportunity that he, like the many other “*ragged-trousered philanthropists*” of his generation, was not given, and which sadly, is unlikely to be offered to future generations. I also wish to give special mention to the support of my two good friends in the UK, Graham and Tricia Rothwell. Finally, I would like to acknowledge my faithful retriever, Ruairidh and my daughters’ cat Stormy, who have tried their best in recent years to chase the black dogs away.

“I mak sikkar”

(Sir Roger de Kirkpatrick 1308)

ABSTRACT

Background: Global tourism has shown an exponential increase over the past decades, with travellers visiting high risk destinations at short notice, often with limited planning. Although at greater risk of morbidity and mortality whilst overseas, only 36-52% of travellers obtain pre-travel health advice, exposing a large number of travellers to travel-related health issues. Since the 1990s, there has been growth in the number of specialist, travel health clinics and increased access to travel health information via the internet. However, in Australia, where the number of full-time, specialist travel health clinics outside state capitals is low, travellers still rely heavily on their GP for pre-travel health advice. In some countries, notably the UK, USA and Canada, community pharmacies routinely offer travel health and immunisation services, not available in Australia. Australian pharmacists may be perceived as an underutilised resource, which could play a greater role in the provision of travel health services. This has informed the main aims of this study, which were to: evaluate the perceptions of stakeholders regarding the role of pharmacists, assess the pharmaceutical care needs of a sample of international travellers, evaluate two learning methods for the delivery of travel health training of pharmacy students, and design and evaluate a proposed model for an Australian, pharmacy-run, travel health advisory service (THAS), which was compliant with current legal and professional guidelines.

Methods: A mixed methodology was used incorporating a variety of techniques such as the use of semi-structured, qualitative interviews and focus groups, the application of a bespoke travel health-specific pharmaceutical care model, the use of electronic and postal, cross-sectional, self-completion surveys and the use of a cross-over research model to evaluate and compare two learning methods. Pharmaceutical care needs assessments were used to examine travellers' medication histories for potential pharmaceutical risks (PPRs) and pharmaceutical care issues (PCIs), and a number of descriptive and inferential statistical methods, interpretive thematic analyses and a financial break-even analysis were used. Finally, a two-tiered travel health advisory service (THAS) was developed, aimed at providing travel health services to mainly lower risk travellers and/or travellers who may not normally obtain pre-travel health services from other providers. The level 1 service involved the pharmacist merely responding to individual travel health enquiries, whereas the level 2 service involved the pharmacist performing comprehensive travel risk assessments for individual clients.

Results and Discussion: The novel application of a pharmaceutical care model identified PPRs and PCIs among a sample of 218 predominantly male, middle-aged international travellers. Only 41.7% (91/218) of the sample obtained pre-travel health advice, mostly from their GP (59.3%, 34/91) or the internet (37.4%, 34/91), while only a few (2.2%, 2/91) used a pharmacist. Although 75.2% (164/218) had no PPRs, a total of 274 PCIs were identified across 61.5% (134/218) of the sample. It was identified that many Australian pharmacists surveyed (68.2%, 174/255) already offer travel health services, although for most (69%, 120/174) the workload was low and a third only respond to clients' travel-related questions. However, 89.1% (227/255) agreed that a role in travel health is appropriate for pharmacists and 72.9% (186/255) were of the opinion that travellers would support pharmacist

involvement. Although most respondents (96.9%, 247/255) had no formal training, 86.7% (221/255) agreed that pharmacists providing travel health services should complete an accredited training program. Although aware that many travellers do not seek pre-travel health advice, 52.8% (29/55) of medical practitioners (MPs) opposed extended roles for pharmacists in travel health, whereas travel agents (TAs) were generally more supportive. Comparison of team-based learning (TBL) and web-based learning (WBL) in the delivery of a travel health elective subject highlighted the superiority of TBL for developing communication and problem-solving skills and preparing students for clinical practice. However, after completion of the taught component, students concluded that a hybrid approach, incorporating TBL, WBL and some aspects of lecture-based learning (LBL) was preferable. Results from the THAS showed that 85% (39/46) of clients were visiting mainly metropolitan areas and as such, 59.3% (16/27) of level 2 clients were classified as low risk. A number of level 1 and 2 clients (26.3%, 5/19 and 40.7%, 11/27 respectively) were referred to other travel health providers, mainly to their GP for vaccinations. The THAS was rated 1/5 (high quality and very useful) by 81.8% of level 2 clients, and 66.7% of clients who had used other services before other journeys rated them as equal to, or inferior to the THAS. Importantly, all (100%) of level 1 and 2 clients said that they would use and recommend the THAS and 81.9% (9/11) of clients said that they would be willing to pay an average of $32 per visit. The information supplied was used by 85.7% (6/7) of clients who responded to a post-travel survey, and more importantly, more than half (51.7%, 4/7) said the advice had altered their behaviour and the precautions they had taken.

Conclusions: This study has highlighted that a significant number of international travellers did not obtain pre-travel health advice and, consistent with other findings, that the pharmacist is an underutilised travel health resource. Although a large number of Australian pharmacists do offer some form of travel health service, few perform full travel health risk assessments, which are more common overseas and thus, their involvement could be greatly expanded. The application of a novel pharmaceutical care model demonstrated a need for a greater emphasis to be placed on the assessment of medication-related risks associated with travel and that pharmacists are ideally trained to perform these assessments. Pharmacists are both accessible and committed to extending their role into travel health and recognise that they need further training and accreditation to perform these roles as part of the health care team. Finally, the study showed that a proposed model for a THAS could be both financially viable and valued by clients, confirming a future expanded role for pharmacists.

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
ADF	Australian Defence Force
ADR	Adverse Drug Reaction
AHPRA	Australian Health Practitioner Regulation Agency
AIDS	Acquired Immune Deficiency Syndrome
AIH	Australian Immunisation Handbook
AMH	Australian Medicines Handbook
APharmTHAS™	Australian Community Pharmacy Travel Health Advisory Service
ASCO	Australian Standard for the Classification of Occupations
BEA	Break-even Analysis
BEP	Break-even Point
BEPr	Break-even Price
BPharm	Bachelor of Pharmacy
CDC	Centers for Disease Control and Prevention
CIA	Cairns International Airport
CM	Contribution Margin
CMI	Consumer Medication Information
CPE	Continuing Professional Education
CPITC	Clinical Pharmacy International Travel Clinic
DVT	Deep Vein Thrombosis
DTPa	Diphtheria, Tetanus and Acellular Pertussis Vaccine (Child Formulation)
dTpa	Diphtheria, Tetanus and Acellular Pertussis Vaccine (Adult Formulation)
ETEC	Enterotoxigenic *Escherichia coli*
ETHAB	European Travel Health Advisory Board
FAIG	Faculty Allocated Internal Grant
FC	Fixed Costs
FIFO	Fly-in Fly-out
GFC	Global Financial Crisis
GP	General Practitioner
GPA	Grade Point Average
GRAT	Group Readiness Assurance Test
Hib	*Haemophilus influenzae* type B
HIV	Human Immunodeficiency Virus
ICVP	International Certificate of Vaccination or Prophylaxis
IHR	International Health Regulations
IPV	Inactivated Poliomyelitis Vaccine
IRAT	Individual Readiness Assurance Test
ISTM	International Society of Travel Medicine
ISTM CTH	International Society of Travel Medicine Certificate of Knowledge in Travel Health

JCU	James Cook University
JCU HREC	James Cook University Human Research and Ethics Committee
KAP	Knowledge, Attitudes and Practices
KP	Kaiser Permanente
LBL	Lecture-based Learning
MAQ	Multiple Answer Question
MAS	Minor Ailment Scheme
MASTA	Medical Advisory Services for Travellers Abroad
MCQ	Multiple Choice Question
MenCCV	Meningococcal type C Vaccine
MIMS	Monthly Index of Medical Specialties
MMR	Measles, Mumps and Rubella Vaccine
MP	Medical Practitioner
MUR	Medicines Use Review
MVA	Motor Vehicle Accident
NaTHNaC	National Travel Health Network and Centre
NHS	National Health Service (UK)
NIPS	National Immunisation Program Schedule
NSAID	Non-steroidal Anti-inflammatory Drug
NZ	New Zealand
OTC	Over the Counter
PBL	Problem-based Learning
PCI	Pharmaceutical Care Issue
PCN	Pharmaceutical Care Need
PCP	Primary Care Provider
PGD	Patient Group Direction
PHCT	Primary Healthcare Team
PIL	Patient Information Leaflet
PNG	Papua New Guinea
POM	Prescription Only Medicine (UK)
PPE	Personal Protective Equipment
PPR	Potential Pharmaceutical Risk
PSA	Pharmaceutical Society of Australia
PTC	Pharmacist-run Travel Clinic
QCPP	Quality Care Pharmacy Program
SAE	Stamped Addressed Envelope
SARS	Severe Acute Respiratory Syndrome
SAT	Security Awareness Training
SBET	Standby Emergency Treatment
SDL	Self-directed Learning
SMOG	Simple Measure of Gobbledygook

SPF	Sun Protection Factor
STI	Sexually Transmitted Infection
TA	Travel Agent
TBL	Team-based Learning
TD	Traveller's Diarrhoea
TDM	Therapeutic Drug Monitoring
THAS	Travel Health Advisory Service
THREC	Travel Health Related Education and Care
TRAT	Team Readiness Assurance Test
UK	United Kingdom of Great Britain and Northern Ireland
UNWTO	United Nations World Tourism Organization
USA	United States of America
VC	Variable Costs
VFR	Traveller Visiting Friends and Relatives
VTE	Venous Thromboembolism
VZV	Varicella Vaccine
WBL	Web-based Learning
7vPCV	Pneumococcal Conjugate Vaccine
23vPPV	Pneumococcal Polysaccharide Vaccine

APPENDICES

See Volume II for all appendices listed in this volume.

NON-THESIS COMPONENTS

To meet the academic requirements of the Doctor of Public Health degree the following non-thesis components were also completed during this candidature:

TM5512:03 Travel Medicine **(Completed Semester 2 2008)**

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Prepared: PSA Essential CPE: Travel Health. June 2009. ISBN 978-0-646-51329-4 (Appendix 3.5)

TM6014:09 Extended Doctoral Attachment **(Completed Semester 1 2010)**

Visits to a number of hospitals, travel health clinics and universities in the UK and USA between September-December 2010 to compare their practices with current Australian practice

TM6015:06 Doctoral Conference Presentations **(Completed Semester 1 2011)**

Four oral conference presentations were completed during this candidature:

- The “100 years of Tropical Medicine Conference (AIMS-ACTM), Townsville, Australia. 2010. (The Pharmaceutical Care Risks of International Travellers)
- ANZAME Conference, Townsville, Australia. 2010. (A Comparison of TBL and WBL in a Level 4 BPharm Elective)
- Pharmacy Womens’ Congress, Cairns, Australia. 2011. (Skin Cancer – Identification and Primary Prevention)
- Pharmacy Australia Congress (PAC 11), Melbourne, Australia. 2011. (Development and Evaluation of a Travel Health Advisory Service operating from an Australian Community Pharmacy)

LIST OF PUBLICATIONS

The candidate published or presented the following based on work included in this thesis:

Publications:

Heslop IM, Bellingan M, Speare R, Glass BD. Pharmaceutical Care Model to Assess the Medication-related Risks of Travel. International Journal of Clinical Pharmacy. 2014; 36(6): 1196-1204.

Heslop I. The Pharmaceutical Care Risks of International Travellers. Annals of the ACTM. 2010; 11(2): 48.

Conference Presentations (Oral):

Heslop IM, Richardson C, Bellingan M, Speare R, Glass BD. Development and Evaluation of a Travel Health Advisory Service operating from an Australian Community Pharmacy. Pharmacy Australia Congress (PAC 11), Melbourne, Australia.

Heslop IM, Bellingan M, Speare R, Glass BD. A comparison of team-based learning and online learning in a level 4 Bachelor of Pharmacy subject. ANZAME Conference 2010. Townsville, Australia

Heslop IM, Bellingan M, Speare R, Glass BD. The Pharmaceutical Care Risks of International Travellers. Australian Institute of Medical Scientists and Australasian College of Tropical Medicine. 100 years of Tropical Medicine Conference 2010. Townsville, Australia

Conference Presentations (Poster):

Heslop IM, Bellingan M, Speare R, Glass BD. The current role of Australian pharmacists in the provision of travel health services. Pharmacy Australia Congress (PAC 11), Melbourne, Australia.

Heslop IM, Bellingan M, Speare R, Glass BD. A review of the current role of pharmacists in the provision of travel health services in Australia. 12th Conference of the International Society of Travel Medicine 2011. Boston. USA.

Heslop IM, Bellingan M, Speare R, Glass BD. Assessing the Pharmaceutical Care Risks of International Travellers Leaving North Queensland. APSA Annual Conference 2009, Hobart. Australia. ISBN: 978-0-646-52257-92009

The candidate published the following during their doctoral candidature. The material is not part of the research presented in Volume I of the thesis, but is included in the appendices in Volume II:

Publications:

Heslop I. Essential CPE: Travel Health June 2009. Melbourne: Pharmaceutical Society of Australia, 2009. (ISBN 978-0-646-51329-4)
(Submitted to meet the requirements of TM6018:06 Doctoral Project I) (Appendix 3.5)

Heslop I. Health Promotion: Travel Health. Australian Pharmacist. 2012; Feb: 120-126. (Appendix 7.1)

Chapter 1 Introduction

1.1 Definitions of Travel Medicine and Travel Health

The modern, scientific study of *Travel Medicine* or *Emporiatrics* really began in the Great Colonial Age of the Nineteenth Century, when researchers began to systematically study the tropical diseases encountered by Europeans travelling to Africa, Asia and the Americas. However, it was the relatively recent development and growth of large scale, affordable air transport and the resultant phenomenon of mass tourism that has provided the greatest impetus for travel medicine to become a medical specialty in its own right[1-4]. Trends that have also made a contribution towards the growth of the specialty include increasing numbers of travellers from developed countries visiting increasingly more exotic locations, the increasingly adventurous nature of their activities while overseas, and the emergence of budget airlines, which have further reduced the cost of travel[3].

In recent years, the focus of travel medicine has broadened, and thus practitioners working in the field need to have an up-to-date knowledge of a wide range of topics including epidemiology, preventative medicine, infectious diseases and tropical medicine[2 4]. In recent years, a knowledge of migrant and refugee health and the impact of the global spread of diseases, disease vectors and pests have also become important for travel medicine practitioners[1 2].

A proposed definition for the speciality and what it aims to achieve is:

> *"Travel medicine seeks to prevent illnesses and injuries occurring to travellers going abroad and manages problems arising in travellers coming back or coming from abroad. It is also concerned about the impact of tourism on health and advocates for improved health and safety services for tourists"*[5]

The term '*Travel Health*', as opposed to travel medicine, is now often used to reflect the increasingly multidisciplinary nature of travel health services and this is the term that will be used throughout this thesis[1].

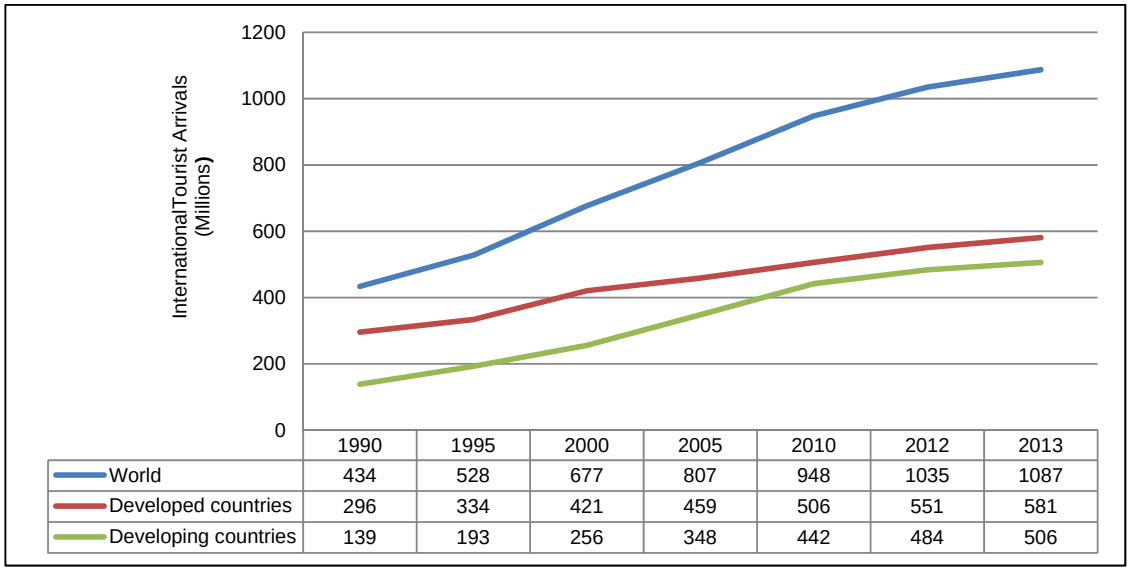
1.2 Current Trends in International Travel

The United Nations World Tourism Organization (UNWTO) produces statistics on global tourism trends and the impact of tourism on the global economy. In recent decades several trends have been reported, including a general growth in travel and tourism and changes in the types of traveller, destinations and reason for travel[6].

1.2.1 Growth of travel and tourism

It is now a well-recognised phenomenon that each year increasing numbers of people are travelling overseas from their country of origin[1-3 6]. Figure 1.1 summarises UNWTO data and shows an overall steady growth in global international tourist arrivals between 1990 and 2013 and that the arrivals to developing countries (average annual growth in international tourist arrivals between 2005-2013 of 4.8%[6]) are growing at a faster rate than arrivals to developed countries (average annual growth in international tourist arrivals between 2005-2013 of 3.0%[6]). This is despite some minor year on year

fluctuations caused by major global events[6-12]. Since the 1970s, Australia has also seen a trend of steady growth in the number of short-term arrivals, with 578,700 short-term visitor arrivals to Australia in the month of September in 2014[13] compared to only 281,000 in a similar period in 1975[14].



	1990	1995	2000	2005	2010	2012	2013
World	434	528	677	807	948	1035	1087
Developed countries	296	334	421	459	506	551	581
Developing countries	139	193	256	348	442	484	506

Figure 1-1 Global international tourist arrivals 1990-2013[6]

1.2.2 Choice of destination

Their choice of destination is a major determinant in the assessment of the actual travel risk of travellers, with some destinations carrying greater inherent risks than others. However, it is also recognised that all destinations carry some level of inherent risk[1 15]. Europe, traditionally considered as a region of relatively low inherent risk to the traveller, has been the world's leading tourism destination for several years followed by the Asia and Pacific region [6 9 12 15]. Increasing numbers of people travelling to higher risk destinations, at relatively short notice, with little or no prior planning, will be at greater risk of travel-related health issues and potentially could have greater health care needs during and after their journey[3]. In addition, it has been noted that the travellers' perception of risk when travelling to exotic locations is reducing and that increasing numbers of travellers are travelling overseas without travel insurance[3]. This presents a major current and future challenge to the travel health industry[3].

1.2.3 Reason for travel and types of tourism

In addition to their destination, a number of traveller-related factors may also influence the overall travel risk associated with a particular journey. These include: the traveller's level of pre-travel preparation, their age, presence of pre-existing chronic diseases, physiological state (e.g. pregnancy) and their level of overall health and fitness. Moreover, two traveller-related factors that may significantly affect overall travel risk are the traveller's reason for travel and their type of travel[15]. Figure 1.2 shows that people travel for a variety of reasons, with the majority (52%) travelling for leisure (recreation or holidays). Air travel is the most common mode of transport (53%) for international travellers[6].

Each type of traveller presents different challenges to travel health professionals. Travellers who are visiting friends and relatives (VFRs) are a particularly important group for countries with relatively large migrant populations, such as Australia. This is because, when overseas, VFRs spend a great deal of time in close proximity to the local population, are often very complacent, and/or have a poor perception of the health risks associated with their destination. Furthermore, they tend not to always accept all of the pre-travel recommendations of travel health professionals and assume, often wrongly, that they have a high level of inherent immunity to some local or tropical diseases at their destination, which is also their country of origin[1 9 12 16 17].

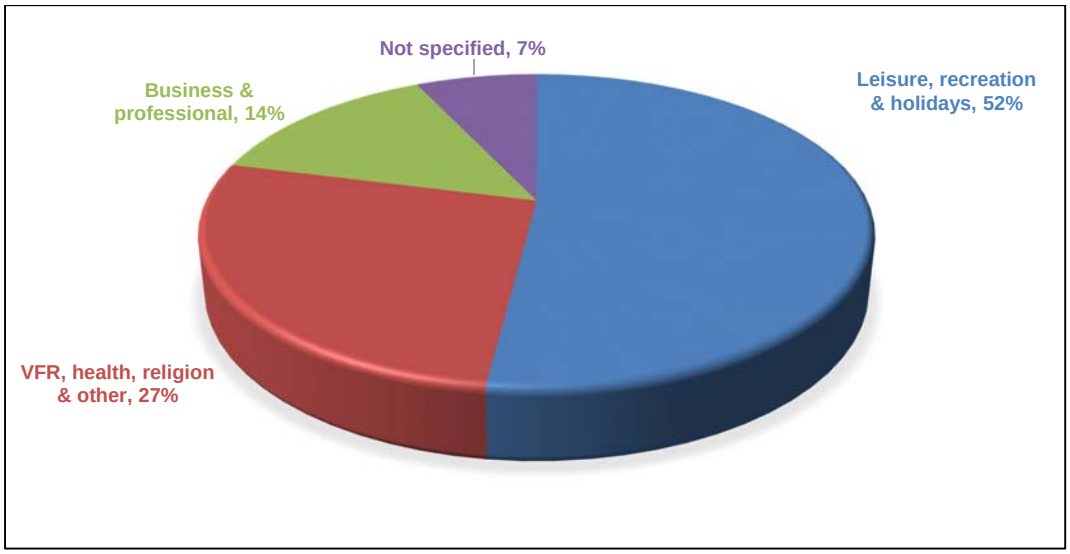


Figure 1-2 International inbound tourism by purpose of visit 2013[6]

Recent data also suggest that leisure travellers are visiting more exotic locations[6]. However, this trend is not only isolated to young, healthy, adventure-type travellers, because increasingly older travellers, and travellers from other risk groups, are also choosing to travel to these locations[3]. All travellers tend to take greater risks whilst overseas, with older travellers also having a greater inherent risk to travel-related health issues because they may also have pre-existing chronic disorders and/or are taking chronic medications[1 15 18-20].

1.3 Health Risks Associated with International Travel

Travellers are at greater risk of morbidity and mortality during an international journey than they are at home[21], especially when visiting developing countries[18 21 22]. The risks associated with international travel can be divided into 3 broad categories; trauma, routine illnesses and exotic illnesses[18]. Travel-related factors which can influence the traveller's overall risk of travel-related disease are the actual destination itself, the level of disease endemicity in the area being visited, the season of travel, the duration of their stay abroad, the reason for travel, the risks associated with the activities they choose, and some individual characteristics of the traveller themselves. Between 65-75% of visitors to developing countries will experience at least one health problem while they are overseas, but usually for most travellers the health problems experienced can be classified as minor and not life-threatening[18 21 23].

1.3.1 Common causes of mortality in international travellers

Two important factors that influence mortality rates in travellers are the destination itself and the activities carried out by the traveller whilst at that destination[21]. Although a major focus for travel health professionals is the prevention and treatment of infectious diseases, only 1-4% of deaths are actually caused by infectious diseases, with the most common cause of mortality in international travellers being accidents, trauma or cardiovascular disease[1 2 18 21 24]. A study examining the cause of death of Australian travellers overseas found that 35% of traveller deaths were due to ischaemic heart disease, about 50% were due to 'natural causes' and trauma accounted for about 25% of deaths[25]

Steffen[21] reported that malaria is the most common infectious cause of death in travellers, and approximately 10,000 cases of imported malaria are reported in developed countries every year. Malarial fatalities are usually caused by infections with *Plasmodium falciparum* and the case fatality rate is between 0-3.6%[21].

1.3.2 Common causes of morbidity in international travellers

1.3.2.1 Gastrointestinal disorders

"Traveller's diarrhoea" (TD) is the most common travel-related health problem encountered by international travellers, with reports of between 25-90% of travellers experiencing symptoms in the first two weeks of travel[1 3 21 26-29]. The risk of TD varies depending on a wide variety of recognised risk factors such as: the level of hygiene, traveller's behaviours and concurrent treatment with medications that increase gastric pH. However, the most significant risk factors are the consumption and drinking of unclean food and water[26 30]. Although TD is omnipresent, the incidence is often higher in, or when, conditions match those of developing countries[21 31]. Therefore, the education of all travellers regarding the prevention and self-management of diarrhoeal diseases is an important intervention by all providers of travel health services[1 3 21 26-29 32-34].

For most travellers, TD is a short, self-limiting problem that resolves within 3-5 days[1 32]. Nevertheless, it may still have implications, as up to 25% of travellers will experience some disruption to their journey or may have to alter their travel plans[32 35]. A small number of cases of TD may have a non-infective cause such as a change in diet or increased alcohol consumption, but it is believed that the majority of cases are infective in origin and 30-60% are caused by bacteria, with Enterotoxigenic *Escherischia coli* (ETEC) being the most commonly identified bacterial pathogen[1 3 26 28 32]. Most simple cases of TD can be self-managed by the maintenance of hydration (especially important in the young and elderly[1 28 32]) and by controlling symptoms with the appropriate use of antimotility agents, such as Loperamide, which are available over the counter (OTC) from most pharmacies[32 34]. Prophylactic antibiotics are rarely recommended[3 28 32 36], however a stand-by course of antibiotics may be issued for use when required by travellers visiting more remote locations[1 32 36].

1.3.2.2 Respiratory infections

After TD, respiratory tract infections are the second most commonly reported, travel-related health condition, with 13% of short-term travellers reporting symptoms of the common cold during their

journey[1 21]. As with TD, infections are often mild, viral and self-limiting[18 24 37]. Nevertheless, some travel health professionals may issue moderate spectrum antibiotics to travellers who are potentially at high risk of respiratory infections or who are preparing for long journeys to relatively remote locations[18]. Cases of more serious, respiratory infections such as tuberculosis are relatively rare in short-term travellers, occurring more commonly in long-term travellers living in close proximity with the local population[24].

1.3.2.3 Malaria

Malaria and other tropical diseases are major concerns for travellers visiting endemic areas. If travellers return to a country where the clinical knowledge of tropical medicine is generally poor, the patient could be poorly managed[2]. As discussed by Begg[24], malaria is a relatively important disease for travellers because of its prevalence, severity and, depending on the causative pathogen, its high potential for fatalities. The risk of infection with malaria (and other insect-borne diseases) is influenced by a variety of factors including: the number and type of vectors, the relative densities of infected vectors, prevalence of infected humans in the region being visited, the standard of the local accommodation (including the quality of housing, water management and the level of vector control), vector resistance to insecticides, the season, the length of stay in the endemic region and then factors relating to the traveller such as, the precautions being taken and whether they are pregnant[21 38]. Approximately 700 cases of malaria are imported into Australia each year (mainly from Papua New Guinea and the Solomon Islands)[2]. Fortunately, only 25% of the cases are the potentially fatal malaria caused by *Plasmodium falciparum*[2]. It is important that travellers to endemic areas are given appropriate pre-travel advice, counselled on the need for appropriate chemoprophylaxis and assessed and managed appropriately if they present with fever on their return from the endemic area[2 38].

1.3.2.4 Sexually transmitted diseases

Reports suggest that casual sex is practised by between 4-67% of travellers when overseas, thereby increasing their risk of contracting sexually transmitted infections (STIs) and hepatitis B[18 19 21 24 39-41]. Estimates are that between 14-25% of all European cases of gonorrhoea and syphilis are imported and that UK residents are 300 times more likely to be infected with HIV whilst abroad than at home[21]. Therefore, it is now recognised that travellers would benefit from advice about safe sex, condom use, emergency contraception and hepatitis B infection[41].

1.3.2.5 Vaccine-preventable conditions

Other significant infectious diseases for consideration by travellers are the vaccine-preventable conditions[21]. The vaccines given to travellers are usually divided into one of three groups: vaccines that travellers must legally receive before travel to certain destinations (e.g. yellow fever vaccine, meningococcal vaccine for Hajj pilgrims [3 42 43]), vaccines that travellers routinely receive, and vaccines that are recommended only for specific destinations[42].

Most vaccines that travellers routinely receive are included in the standard national childhood immunisation policy of many developed countries. In the case of Australia, this is the National Immunisation Program Schedule (NIPS)[44 45] and two issues have been discussed with these vaccines.

Firstly, in the general population, increasing numbers of adults have not received the full standard immunisation schedule during childhood. Secondly, many adult travellers will have completed primary immunisation courses of childhood vaccines, but not received the recommended boosters[46]. As a result, with increasing numbers of travellers, and in particular increasing numbers of older travellers travelling to more exotic locations, there is the potential that larger numbers of unimmunised or under immunised travellers may be at higher risk of acquiring diseases such as measles or polio and their associated complications[47-51]. Therefore, during the traveller's initial pre-travel consultation and risk assessment, it is important to take a full vaccination history from the traveller to determine what vaccinations may have been administered in the past and to determine whether boosters of these routine vaccinations should be administered before their journey[18].

1.3.2.6 Non-infective health issues for travellers

Finally, common non-infective health issues for travellers may include problems such as stress, anxiety, motion sickness, jet lag and in-flight emergencies. Jet lag is a term used to describe the symptoms of psychological and physiological desynchronisation caused by travellers crossing multiple time zones in a short period of time and is usually managed with non-pharmacological measures[1 52]. In-flight emergencies occur in approximately one per 11,000 passengers and are generally involve either fainting, gastrointestinal, cardiac, neurological or respiratory problems[21].

1.4 Service Models for Travel Health and the Roles of Service Providers

Modern travellers have ready access to pre-travel health advice from an ever increasing range of information sources[53]. Despite this, large numbers of travellers still do not obtain pre-travel health advice, with studies consistently demonstrating that only 36-52% of international travellers obtain travel health advice before their journey[54-59]. Before the 1990s, international travellers relied heavily on general practitioners (GPs) and the travel industry for pre-travel health advice[53 60]. Since then, the growth of the internet and other information sources, such as specialist travel clinics, has meant that prospective travellers have a greater choice in available services [53 60]. This has resulted in some discussion about the relative merits of services offered by each of these travel health providers[1 2].

1.4.1 General Practitioners

Despite the development of travel medicine as an independent specialty and the growth in the number of specialist travel clinics, GPs or primary care physicians still play a major role in the provision of travel health services in many countries[2 53]. This is certainly the case in Australia, where there are still relatively few, full-time, specialist travel clinics outside the state capitals[2 61]. Moreover, a similar situation also exists in more populous countries such as Germany and the UK[62 63], where it is reported that between 55-70% of German travellers to tropical countries visited their GP for pre-travel advice and immunisations, and that 85% of UK GPs perform travel health consultations[62-64]. It is reported that the most common travel health services provided by GPs include the provision of immunisations (95% of GPs surveyed), malarial chemoprophylaxis (94% of GPs surveyed) or exposure prophylaxis (41% of GPs surveyed)[62]. However, the number of travel health consultations by GPs varies considerably and

is dependent on a number of factors such as: the practice location, the age of the doctor, the training of the doctor and finally, the availability of travel health information systems in the practice[62].

Although some travellers may prefer to visit their GP for travel-related health advice, it has been questioned whether GPs should give travel health advice and whether they are actually competent to deliver this information[53 62-66]. Some criticisms of GP-delivered travel health services include:

- Reports of some GPs giving advice which is inaccurate or divergent from recommended guidelines. For example, in a study examining the travel health advice given by Swiss and German GPs, Hatz et al[64] noted that although 96% and 89% of the Swiss and German GPs surveyed gave advice to travellers, only 45% and 25% of Swiss GPs and 22% and 9% of German GPs made the correct recommendations for malaria chemoprophylaxis to two common tourist destinations (Kenya and Thailand) respectively[64].
- GPs have been found to overestimate the risks associated with travel, which has often led to the unnecessary prescribing of immunisations and antimalarial chemoprophylaxis[65].
- GPs that are isolated and/or perform infrequent consultations to travellers may have difficulty in keeping abreast of major disease outbreaks and epidemics and the rapidly changing field of infectious disease and travel medicine[62 67].
- A lack of appropriate qualifications and training. Ropers et al[62] noted that 85.6% of doctors in their study would like more training on malaria prophylaxis and immunisation.
- Some GPs only give a limited range pre-travel health advice. Ropers et al[62] found that over 50% of the GPs surveyed did not give pre-travel advice about the risk and prevention of STIs to travellers, even though they are very prevalent at some destinations.
- Some GPs do not offer a full range of vaccination services[68]. In Australia, it was found that only 11.3% of the GPs had a yellow fever vaccination licence[61].
- Some GPs are reluctant to refer travellers to other doctors or centres. In Australia it was found that more than 75% of GPs who responded in a study would never refer their patient to another GP with a special interest in travel medicine or to a specialist or another agency, but half of the GPs said that they would sometimes refer patients to a travel clinic[61 66]

1.4.2 Travel clinics

Specialist travel clinics have become more common since the early 1990s, and being a relatively new concept, they vary in size, the services offered and the types of staff or professions operating the clinic[53 60]. The services offered vary between clinics that only administer vaccines, to clinics which also perform comprehensive health risk assessments, supply medication and give extensive health advice[69]. Jong[69] suggested a classification system for travel clinics based on the services they offer. She suggested that there are four levels of clinic, each providing different levels of service and staffed by different health professionals (table 1.1).

Table 1-1 Categorisation of travel clinics as suggested by Jong[69]

Type of Travel Clinic	Services Provided	Clinical Staff*
Travel Immunisation Clinic	Travel immunisations	RN
Travel Health Clinic	Travel immunisations	RN
	Travel health advice	RN/NP/MD
	Prescriptions of travel medications, letters and travel documents	NP/MD
Travel Medicine Clinic	All services listed above plus:	
	Letters and travel documents	NP/MD
	Counsel special needs patients	NP/MD
	Physical examinations and forms	NP/MD
Travel and Tropical Medicine Clinic	All services listed above plus:	
	Diagnosis and treatment of illness in returned travellers, immigrants and refugees	NP/MD
*Clinical staff adapted from the USA equivalents stated by Jong[69] RN = Registered Nurse, NP = Nurse Practitioner, MD = Medical Doctor		

In 1996, Hill and Behrens[70] carried out a worldwide survey of travel clinics for the International Society of Travel Medicine (ISTM). They surveyed 341 clinics in the USA (57%), Europe (6%), the UK and Eire (6%), Australia and New Zealand (5%) and the rest of the world (6%), and found a wide variation in size and the level of services offered[70]. Most travel clinics provided a range of immunisations and advice, and advice was given to travellers about the prevention of malaria, insect bites and traveller's diarrhoea in most (97%) cases. It was also found that as well as providing travel health services, 37% of the clinics also sold other travel-related items to the public, and that 38% had a pharmacist associated with the clinic[70]. Finally, they also found that many of the staff working in travel clinics had undergone additional specialisation training in the area of travel health [70].

However, as with studies examining GP-delivered travel health services, some issues have been highlighted relating to services provided by some travel clinics:

- Although many travel clinics provide counselling on topics such as malaria and TD, counselling on other topics such as personal safety, prevention of STDs and travel insurance can be variable[70].
- It is thought that nurses will increasingly operate and manage travel clinics (and also services operating in GP clinics) without a doctor being present[70].
- Many clinics are relatively small[16] however, some clinics provide services to some travellers by telephone[70].
- Although studies have found that the appropriateness of the advice and vaccinations given by travel clinics is generally good. As with studies into GP-delivered services, some advice given by a small number of clinics diverged from standard guidelines[68].

1.4.3 Pharmacists

Pharmacists have traditionally provided free advice and information to potential international travellers on an *ad hoc* basis for many years. However, since the mid-1990s pharmacists are increasingly becoming involved in the provision of more formal travel health services utilising a variety of service models. As discussed by Kodkani et al[71], most travellers will visit a pharmacy sometime during their preparations for an overseas journey. This may be for a number of reasons:

- To collect medications and/or vaccines prescribed by their doctor or to buy non-prescription medications or first aid items[71].
- To check with a pharmacist whether it is necessary or worthwhile for them to visit a doctor or travel clinic prior to their journey[71].
- To take advantage of location, opening hours, free advice and to purchase travel supplies[72 73].

Therefore, pharmacy-run travel services present as an attractive option for travellers who are reluctant to visit a GP or travel clinic, and in some countries pharmacists are an important and accessible source of advice for travellers, particularly when other sources of information such as travel clinics are not available in the locality[1 53 71 72 74 75]. In many current healthcare models, pharmacists are more likely to deal with travellers visiting relatively low-risk destinations to discuss conditions such as diarrhoea, travel sickness and sunburn that are preventable or may be managed with non-prescription medications[74].

The number of publications describing the roles of pharmacists in the provision of travel health services is relatively low and mainly involves descriptions of services[72-74 76-80] or evaluations of the quality of the advice given by pharmacists[71 78 81]. In addition, the size of these studies and the number of pharmacists or service users interviewed or surveyed in these studies is generally low, which limits their usefulness. That said, from these studies, it can be seen that pharmacists working in the area of travel health are involved in:

- Information services responding to traveller questions about the need for vaccinations, antimalarials and insect bite prevention measures for their journey, supported with the provision of printed or electronic information materials and leaflets[74-77].
- The supply of a range of travel-related products, often as a “one-stop shop”[72]. Many pharmacists supply items such as mosquito nets and coils, water purifying tablets and importantly first aid kits for travellers, and some pharmacists have extended this further and prepare highly specialised and individualised first aid kits for expeditions or adventure travellers to remote areas[1 72 74 82].
- Pharmacy-run immunisation services. These services were first developed in the USA, and became relatively common in the late 1980s and early 1990s[73 80 83]. In time, the range of vaccines offered by these services was increased to include common travel vaccines in some countries (notably the USA and UK), which then allowed the development of full pharmacist-run travel clinics. A few large pharmacy chains in the UK have extended these community pharmacy travel clinic models and are now offering online travel health clinics[84 85]

- Pharmacist-run travel clinics. There are several different service delivery models reported in the literature[76 77 79 80 86 87].

Examples of pharmacist-run travel clinics include the Clinical Pharmacy International Travel Clinic (CPITC) operated by the American health insurer Kaiser Permanente (KP) in Denver, Colorado, which is an example of a pharmacist-run telepharmacy service in a managed-care situation[76 77]. It offers travel health advice to KP members and has been operating since 1991. The service is manned completely by trained clinical pharmacists and is supported with a pharmacy technician and has access to an infectious diseases physician for specialist advice, although the specialist is rarely used. Travellers are very satisfied with the service and significant cost savings have been made by reducing the unnecessary prescribing of vaccines and medications[76 77].

A community pharmacy-run travel health service was evaluated in a pilot study by Hind et al[80] in Scotland. The service was developed from a highly successful pharmacy influenza immunisation scheme[80 83], and a needs assessment study of the general public in the Grampian region found that 75% of respondents agreed or strongly agreed that pharmacies would be a convenient location for travel health services and that 70% agreed that community pharmacies could provide a 'one-stop shop' for travel health services [73 80]. The pharmacists attended a two-day course on travel health and immunisation techniques and then started to offer the service from their pharmacies[80]. In the service evaluation, Hind et al[80] found that 80% of the travellers questioned thought that the service provided value for money and that 98% would happily use the service again.

Durham et al[78] reported a more recent retrospective, chart review study comparing a pharmacist-run travel clinic (PTC) with the services offered by primary care providers (PCP) at a university student health centre in the USA. It was noted that when indicated, students assessed by the PTC were more likely to be prescribed appropriate antimalarial chemoprophylaxis and appropriate antibiotics for the management of traveller's diarrhoea than those assessed by PCPs[78]. PCPs were also more likely to prescribe inappropriate antibiotics and antimalarial chemoprophylaxis that was divergent from standard therapeutic guidelines[78]. They concluded that because of their specialist training, the PTC provided a more consistent evidence-based service than PCPs, and because travel health is now a specialised and dynamic area, that service providers should have adequate time, resources and expertise to give the best possible service[78].

A study examining the quality of advice given by pharmacists in Switzerland[71] used a telephone interview and then a follow-up postal questionnaire to examine the travel advice given by Swiss pharmacists[53 66 71]. It was found that although 56% of the pharmacists gave advice to travellers on a regular basis, the workload was low (2-3 travellers per month)[71]. The general knowledge of pharmacists about major health risks to travellers was good, however some inaccuracies and issues were noted, notably in the management of traveller's diarrhoea and the use of appropriate precautions for sun protection[71]. Likewise, Kodkani et al[71], using a similar methodology to that used by Hatz et al[64], also found some deficiencies in pharmacists' knowledge of the recommended vaccines and antimalarial agents for common tropical holiday destinations.

The quality of travel advice given to international travellers by a total of 231 pharmacists was evaluated in Portugal[81]. Again the study found that most of the responding Portuguese pharmacists only advised small numbers of travellers and most (93.2%) did not have any additional training in travel health. The study found gaps in the pharmacists' knowledge of travel health and inaccuracies were found in the advice given by the pharmacists[81], and it was concluded that the pharmacists in the study required more training in the area of travel health[81]. Most of the responding pharmacists did however agree they would like more training or information to use in their practice[81].

Finally, Toovey[88] performed a covert study assessing the malaria chemoprophylaxis knowledge and practices of community pharmacists in South Africa. It was found that pharmacists were willing to give advice to travellers on malaria chemoprophylaxis. However, unlike the findings of Durham et al[78], it was reported that the South African pharmacists a slight tendency to overprescribe antimalarials. Toovey[88] did not appear to consider this to be a major concern, arguing that although, overprescribing may result in a slight increase in the number of unwanted adverse reactions from the antimalarials, that because the test travellers in the survey were visiting areas where falciparum malaria dominated, that it may be the preferred outcome[88]. It was also found that the pharmacists' knowledge of the contraindications and effectiveness of antimalarial chemoprophylaxis could be improved[88]. Finally, the South African pharmacists also appeared less than willing to consult external resources and to refer travellers to travel clinics[88].

1.4.4 Travel agents

Increasingly travellers are making their own travel arrangements by booking flights and holidays online. Nevertheless, a significant number of travellers still use travel agents when planning and booking their holidays and other journeys[66]. It is suggested in the literature that travel agents are still an important source of initial travel health advice for travellers, or an important source of referral to travel clinics[53]. However, in practice this has rarely been found to be the case[53 68]. Furthermore there have also been some concerns over the quality of health information given by travel agents and that there are few specific or appropriate information sources for travel agents to use. Travel agents have also expressed concerns themselves about whether they have the knowledge or experience to advise travellers on health matters[66 89]. However, some travel agents are keen to be involved and have a more active role in the provision of travel health advice to their clients[66]. Increased computerisation in the travel industry and greater access to the internet means that appropriate and reputable information is now more readily available to advise clients[66]. Computerised algorithms could also be devised to help determine which clients should be referred to more specialised information providers than the travel agent, such as travel clinics[66]. Specialty travel agents also exist which target particular groups of travellers such as climbers or divers, and these travel agents may be able to give more specific advice to their clientele, based on their own past experiences, or better referral pathways could be developed between these travel agents and local travel clinics or more specialised travel health providers[66].

1.5 Motivations for the Study

In summary, both globally and locally in Australia, increasing numbers of people are travelling overseas each year, with the UNWTO predicting continued long term growth and estimating that

annual global international tourist arrivals will reach 1.8 billion by 2030[6]. Compared to previous decades, travellers are increasingly visiting more unusual and exotic destinations. Increasing numbers of higher risk travellers, such as children, the elderly, and the immunodeficient are also travelling overseas. Despite these trends, a significant concern is that although travel health services are more available and accessible than ever before, for a variety of reasons persistently large numbers of travellers still do not obtain any pre-travel health advice or take precautions to prevent travel-related health problems before they travel. As a result there is a concern that a relatively large portion of the Australian population is potentially placing themselves at risk of travel-related health problems. The literature also states that the overall incidence of travel-related health problems is high, although fortunately, many common conditions are either preventable by following standard advice and precautions or manageable using common OTC medications available from pharmacies.

A variety of models for travel health services exist that are operated by a range of different health professionals and offer a range of different services. It appears from the published literature that there are perceived benefits and limitations or problems with all models. Currently, due to their accessibility, it appears that pharmacists have a greater role in the provision of travel health services in other countries and it is suggested that, as with the other professions providing travel health services, that if they are appropriately trained, use appropriate information resources, follow evidence-based practices and have adequate time and expertise that pharmacists can deliver a high quality and useful service for the travelling public.

The lack of information in the literature as to the current and future roles of Australian pharmacists in the area of travel health is a gap this study hopes to correct at least in part.

1.6 Overall Thesis Hypothesis and Aim

The hypothesis to be addressed in this research is that:

> ***Australian pharmacists are currently underutilised and could have a greater role in the provision of travel health services***

The overall aim of the thesis is to investigate the current roles performed by Australian pharmacists in travel health and to design, develop and evaluate a potential care model for an Australian pharmacy-run travel health service.

1.7 Thesis Outline

This thesis presents the research carried out during the candidature and consists of seven chapters (Table 1.2):

Table 1-2 Thesis outline

Volume I	**Chapter 1**	**Introduction.** This chapter defines the topic of travel health and introduces some of the more common travel-related health risks faced by travellers. It also describes some of the advantages and limitations of some delivery models for travel health services, and then leads into the main motivation for the study, which in turn is then followed by the overall hypothesis and general aim.
	Chapter 2	**An Assessment of the Knowledge of the Health and Pharmaceutical Care Risks of International Travellers Leaving an Australian Airport.** This chapter evaluates a sample of international travellers leaving Cairns International Airport for potential pharmaceutical risks (PPRs) and pharmaceutical care issues (PCIs). A cross-sectional survey using semi-structured interviews, including a systematic medication history, followed by the application of a systematic pharmaceutical care model to evaluate each traveller for PPRs and PCIs was used.
	Chapter 3	**Australian Pharmacists Perceptions, Knowledge and Understanding of Current and Future Roles in Travel Health.** This chapter evaluates whether a sample of Australian pharmacists consider travel health to be an appropriate current or future role for pharmacists and if so, what they consider to be the barriers to and the most appropriate level of involvement. A cross-sectional survey using a self-completion questionnaire distributed by both electronic and postal means was used.
	Chapter 4	**Medical Practitioners and Travel Agents Perceptions of the Role of Pharmacists in Travel Health.** This chapter compares the perceptions of a sample of Queensland medical practitioners and travel agents about the current a future roles of pharmacists in the provision of travel health services. A self-completion postal questionnaire was sent to a sample of Queensland medical practitioners and travel agents.
	Chapter 5	**Comparison of Team-based and Web-based Learning in a BPharm Travel Health Elective Subject.** This chapter evaluates an elective subject that introduced final year BPharm students to the common principles of Travel Health. A mixed methodology using, pre and post subject self-completion surveys, focus groups and a comparison of academic performance and academic workloads was used to compare the TBL and WBL delivery modes.
	Chapter 6	**Development, Implementation and Evaluation of a Travel Health Advisory Service Operated from a Community Pharmacy in North Queensland.** This chapter describes the development, implementation and evaluation of a pharmacy-run travel health advisory service that complies with the current legal and professional restrictions and practises at the time of the study. The service was evaluated using mixed methods, including the views and perceptions of the service users and pharmacists, and evaluation of financial viability.
	Chapter 7	**Conclusions and Recommendations.** In this chapter, the main outcomes of the projects are highlighted in order to address the main hypothesis and aims of the thesis.
Volume II	**Appendices**	These contain copies of all surveys, questionnaires, information leaflets, consent forms, ethics approvals and additional information.

Chapter 2 An Assessment of the Knowledge of the Health and Pharmaceutical Care Risks of International Travellers Leaving an Australian Airport

2.1 Introduction

A number of studies have investigated the knowledge, attitudes and practices (KAP) of travellers towards the risks associated with travel. Common areas of investigation include how travellers prepare for their journey and their level of knowledge and understanding of the health risks associated with their journey or destination[54-59 90-94]. In particular, some studies have also focussed on whether travellers obtain health advice as part of their pre-travel preparations, whether there are recognised indicators or predictors of advice-seeking or non-advice-seeking behaviour and, if pre-travel health advice is obtained, which sources of information are used, why they were selected and what advice was given[54-59 90-94]. In the same way, studies have also investigated why some travellers do not obtain pre-travel health advice[54-59 90-94]. Finally, studies have also examined other pre-travel preparations made by travellers such as obtaining vaccinations, the use of chemoprophylaxis for malaria and other infectious diseases and the carrying first aids kits and medications for the self-treatment of travel-related diseases[54-59 90-94].

2.1.1 Review of key KAP studies performed in airports

Provost and Soto[91] surveyed 2,242 French-speaking tourists from Quebec, visiting Mexico and the Dominican Republic, to identify common predictors of pre-travel health consultation. Multivariate analysis showed that the recommendation of a travel agent was the most important predictor of pre-travel health consultation, especially if the traveller was less than 45 years or age, or if they had never previously had a pre-travel health consultation[91]. Other identified predictors of consultation included: travelling overseas for the first time or with children, if the traveller had pre-travel health consultations previously, if the traveller deemed immunisation to be an effective method of disease prevention, and the traveller's perception of the level of health risk at the destination[91]. Only 20% of participants had visited a travel clinic before their journey, with the most common reason for attendance being that the traveller wished to prevent an infectious disease or a perceived risk of potential infection at the destination[91]. Whereas, common reasons for not attending a travel clinic included: the traveller simply felt it was unnecessary, there was no perception of risk at their destination, that they were in good health, they didn't know travel clinics existed, that they travelled frequently or were familiar with the area being visited[91]. Interestingly, multivariate analysis also showed that the factor with the strongest association with non-consultation at a travel clinic was if the traveller had previously received information about the risks of travel-related problems from a pharmacist [91]. Provost and Soto[90] also tested the knowledge of travellers regarding the route of transmission, risk and severity of three common travel-related infectious diseases; diarrhoea and hepatitis A and B. Whereas travellers had an adequate knowledge of the routes of transmission and risks associated with diarrhoea, their knowledge of the routes of transmission of hepatitis was much poorer and they tended to underestimate the risk of hepatitis at their destination[90].

The European Travel Health Advisory Board (ETHAB) study was one of the largest and more significant studies examining the KAP of travellers visiting developing countries. A cross-sectional pilot study was initially performed at three large European airports (Heathrow, Charles de Galle and Munich) with the main aim of evaluating the KAP of travellers to see if, and where, travellers obtained pre-travel health advice and to examine the precautions they took to prevent infectious diseases while overseas[54]. 609 travellers were surveyed and 40% of the travellers did not obtain pre-travel health advice. However, of those who did obtain pre-travel health advice, the commonest sources of information used were general practitioners (GPs) (72%), travel clinics (26%), pharmacists (24%), family and friends (22%), travel agents (20%) and the internet (15%)[54]. As the pilot questionnaire was found to be long, and did not accurately assess the traveller's malaria risk or vaccination status, the questionnaire was divided into two questionnaires; one which focussed on malaria prevention and treatment (Q-Mal), and one which focussed on vaccine-preventable travel-related diseases (Q-Vac) [55]. These questionnaires where then utilised in large airport studies in Europe [55], Australasia [56], South Africa [57], the USA [58] and more recently in Japan [59].

After the pilot study, and once the questionnaires had been adapted, a full study with 5,465 participants was then carried out by ETHAB at nine major European airports [55]. All travellers were European residents flying to developing countries from Belgium, Germany, Greece, Italy, the Netherlands, Spain, Sweden, Switzerland and the UK, and the researchers found that although 73.3% of the travellers had obtained general tourist information about their destination, only 52.1% had sought pre-travel health advice[55]. Many of the those who did not obtain pre-travel health advice said that they did not obtain advice because they either knew what to do, and so did not need advice (40.9%) or, were not aware that they should have obtained pre-travel health advice (20.2%), or felt that there were no risks associated with their destination (18.7%)[55]. Travellers visiting friends and relatives (VFRs) were the worst group for obtaining pre-travel health advice, as only 31.4% of VFRs in the study obtained pre-travel health advice compared to 60.9% of tourist or leisure travellers, and 82.5% of people who were travelling for religious reasons[55]. The higher compliance rate for pilgrims is thought to be mainly due country-specific legal requirements for entry to be vaccinated against certain infectious diseases, when on massed pilgrimage. The researchers concluded that the results highlight the need for educational initiatives to make some groups of travellers, such as the elderly, VFRs and business travellers, more aware of the risks of travel[55].

The study also examined when, in relation to the time of travel, the travellers obtained travel health advice. This is an important consideration as full immunisation for some disease states can require a course of vaccinations over a period of time. It was found that of those travellers who obtained pre-travel health advice, only 43.8% obtained advice four or more weeks before travelling whereas, 16.1% obtained advice less than a week before travel[55]. Again, GPs (57.4%) were the most common source of information used followed by travel clinics (35.3%), travel agents (30%), family and friends (27.8%), the internet (24%) books and brochures (22.5%) and finally, pharmacists (20.1%)[55]. The study also examined the travellers' views regarding the reliability of the information sources, and the information from medical sources was viewed as more reliable, with pharmacists being scored relatively low for reliability with travel clinics being classed as more reliable than general practitioner and (in order)

company doctors, the internet, family and friends, pharmacists, travel agents and finally, books and brochures[55].

Both questionnaires (Q-Mal and Q-Vac) asked travellers to rate the risk of common infectious diseases at their destination. The researchers found that between a quarter and a third of travellers were unaware of the risks[55] and that 10-15% of travellers did not attempt to answer the question[55]. The majority of travellers completing the Q-Vac questionnaire (83.4%) thought that vaccines gave essential protection against disease, and 38.7% thought them to be safe. However, over a third of travellers (38.4%) had at least one negative attitude towards them[55] and reported negative attitudes towards vaccines included side effects (18.4%), that they are expensive (16.6%) and are painful (6.4%)[55]. Some travellers completing the Q-Vac questionnaire even thought that vaccines were not necessary (4.4%) or offered little protection (3.5%)[55]. The researchers noted that travellers from Heathrow (London) or Munich airports were more critical of vaccines than those from Athens or Madrid[55]. The Q-Vac questionnaire also asked travellers about their vaccination status and the researchers then applied strict criteria to determine whether the traveller was protected against certain infectious diseases[55]. With regard to hepatitis A, they reported that 22% of the travellers were protected, 9.6% might be protected and 44.4% were not protected at all, and that VFRs were the least protected group (10.9% compared to 18.5% of business travellers and 25.6% of tourists)[55]. This is an important finding as VFRs come into closer contact with the local population and therefore may be at greater risk of contracting some conditions. With regard to hepatitis B, it was reported that 18.1% of the travellers were protected, 13.3% were possibly protected and 68.7% were not protected[55].

From the results of the Q-Mal questionnaire, the ETHAB researchers concluded that many travellers to malarial areas had an inaccurate perception of the risk of malaria at their destination[55]. They found that a quarter of travellers visiting countries with an endemic malarial risk were unable to classify the risk at their destination, that a quarter of travellers to countries with a high malarial risk had an inaccurate perception of the risk in the country, and that half of the travellers to countries without any malarial risk were unnecessarily concerned[55]. With regard to the use of antimalarial medications, the study found that 83.8% of travellers to high risk destinations were carrying antimalarial medications, compared to 21.7% of travellers to low risk destinations and 12.2% of travellers to destinations with no malarial risk[55]. It was found that 63.7% of travellers carrying antimalarials intended to use them for chemoprophylaxis, 16.8% for standby emergency treatment (SBET) and 12.3% for both chemoprophylaxis and SBET[55]. The most common antimalarial agent being carried was Mefloquine (39.5%), followed by Atovaquone/Proguanil (Malarone®) (24%)[55]. The vast majority of travellers had been advised which agent to use by medical practitioners (general practitioners (45%) or travel clinics (42.4%), and only 8.7% of the travellers had been advised by pharmacists[55]. This was attributed to the availability of antimalarials on prescription in many European countries. Some travellers visiting malarial areas were not taking antimalarial chemoprophylaxis, the most common reasons given by the travellers for this were that they preferred not to take tablets while they were healthy (19.7%), although 26.7% of respondents stated that they did not have a particular reason[55]. The study also examined the other measures taken by travellers to prevent malaria, 78.2% stated they would use insect repellents

in the evening, 58.2% would use insecticides in their rooms and 67.2% stated they would sleep with windows and doors closed among other measures[55].

Finally, the ETHAB study also investigated the types of medical supplies or First Aid kits being carried by the travellers. They found that aspirin, for prophylaxis of venous thromboembolism (VTE) (54.7%), insect repellent (49.1%), antidiarrhoeal medications (47.7%), insecticide spray (30.2%), antibiotics (25.4%), mosquito nets (12%), rehydration salts (8.7%) and sterile needle and syringe kits (6.9%) were the most commonly carried items[55].

Wilder-Smith and colleagues carried out a similar study at five Australasian airports (Singapore, Kuala Lumpur, Taipeh, Melbourne and Seoul)[56]. A total of 2,101 travellers participated in the study with 82% and 17% being of Asian ethnicity and Western ethnicity respectively[56]. When compared to the ETHAB study, the researchers found that a lower number of travellers (31%) sought pre-travel health advice, and that only 60% obtained general travel advice prior to travel[56]. General advice was obtained from travel agents (49%), the internet (45%) and family and friends (40%)[56]. Only 4% of travellers visited a travel medicine specialist before travel[56], and none obtained pre-travel health advice from a pharmacist. This is in contrast to the results from the ETHAB study, but matches the findings of a study performed by Leggat[95], who evaluated the influence of a travel health information evening to hostellers in Australia. He also noted that whereas hostellers used a variety of information sources before travel, none used pharmacists[95]. However, pharmacists are highlighted as a potential source of travel health information in many other references[71 74 75 95], thereby perhaps demonstrating a difference in the perceived roles of pharmacists in Australasian countries compared with European countries. Wilder-Smith and colleagues also noted that only 26% of Asian travellers obtained pre-travel health advice, only 40% of travellers to malaria endemic areas carried chemoprophylaxis, and fewer than 5% of travellers were vaccinated prior to their journey[56]. The researchers concluded that at the time of the study the Asia-Pacific region was one of the fastest growing markets in tourism and that their study showed that many Asian travellers are poorly prepared, required education on the need to obtain pre-travel health advice and, if appropriate, vaccinations and chemoprophylaxis for malaria [56].

More recent KAP studies performed in Asian countries have reported findings similar to that of Wilder-Smith and colleagues. In 2006, Yoo et al[92] carried out a study at Incheon International Airport, South Korea using a questionnaire based on the ETHAB and Australasian studies to examine the KAP of Korean travellers to India, and how they intended to prevent malaria while at their destination[92]. It was a relatively small study with only 188 participants. Whereas, 72% of the travellers had sought general information about the destination, most commonly from the internet (43%), travel guidebooks (22%), co-workers (13%) and travel agents (12%)[92], again only a small number (23.9%) sought pre-travel health information, and most had used mainly the internet for pre-travel health information with only 5% of travellers going to their doctor for health advice and none visiting a travel health specialist[92]. Yoo et al[92] also found that only 23% of the Korean travellers had sought any information about malaria before their journey and 47% of the travellers were unaware of the risk of malaria in India. Only 55% of the travellers were carrying some form of malarial prevention with 32% carrying long-sleeved shirts and long trousers and 19% had mosquito coils to use in their rooms. However, only 26% of the

travellers were carrying insect repellent with them and only 7% had some form of chemoprophylaxis and 45% of the travellers had no form of malarial prevention[92].

The ETHAB questionnaire has also been used in a more recent study of Japanese travellers[59]. Namikawa et al[59] used a translated ETHAB questionnaire, which was distributed to travellers to developing countries (including Turkey and Mexico) by tour operators or mailed to individual travellers by travel agents in 2007 and 2008[59]. Again it was noted that, although 87.4% of the travellers obtained general travel advice about their destination before their journey, only 38.7% of the travellers obtained pre-travel health advice[59]. Of those who obtained pre-travel health advice, the majority used the internet as their main information source and only 2% used a medical travel health specialist [59]. The researchers concluded that Japanese travellers, like those of other Asian countries, have a very poor understanding of the risks of infectious diseases such as hepatitis A, hepatitis B and typhoid fever, with greater than 50% of the travellers being either unaware of the risks of these diseases or thought that the was no risk of them at their destination[59]. Japanese travellers also need greater education about the benefits of vaccination as they found that only 50.7% of the travellers thought that vaccines offered sufficient protection from infectious diseases and only 13.6% considered vaccines to be safe[59]. Less than 10% of the travellers involved in the study had received a vaccination for this journey[59].

Increasingly more Asian travellers are travelling overseas and in the future, with the liberalisation and development of the Chinese economy, there are likely to be even greater numbers of Chinese travellers travelling overseas for leisure and education. Namikawa et al[59] concluded that there is an increased need for specialist travel health services in Asian countries and that healthcare workers should be encouraged to specialise and expand into this field[59]. However, education initiatives are also required to increase the awareness of travellers on the importance of pre-travel health screens and the need of obtaining pre-travel health advice of the risks at their destination[59 92]. It was also concluded that it is important to address the misconceptions that Japanese travellers have about immunisation and vaccines and that healthcare workers should develop educational programs highlighting the importance of immunisation[59].

As well as using the ETHAB questionnaires in studies in Europe and Australasia, the questionnaires were also used in studies performed in Africa and the USA. Toovey et al[57] performed a study using the ETHAB questionnaires at Johnannesburg International Airport in 2003. The study participants were residents of developed, non-malarial countries travelling to higher risk destinations, and 219 and 200 travellers completed the Q-Mal and the Q-Vac questionnaires respectively [57]. When compared to the European study, most of the participants were residents of South Africa, the USA or the UK, (although the whole cohort contained residents of 32 other countries), and the researchers noted that the participants were generally affluent, experienced travellers with a relatively higher number of business travellers (37%), and a lower number of backpacker travellers (12%)[57]. The researchers noted that the KAP of the travellers about vaccine-preventable diseases and HIV/AIDS was poor and that their KAP in relation to malaria could be improved in some areas. They found the latter point disconcerting as 70% of the participants had previously travelled to a developing country and 55% of the travellers had spent more than a month planning their journey[57]. Although 80% of the participants rated the risk of malaria to be high at their destination, 26% of the travellers to malarial areas were found not to be

carrying antimalarials and 19% were found to be carrying an inappropriate antimalarial regimen, although the travellers appeared compliant with the standard recommendations for mosquito bite prevention[57]. The researchers were also alarmed that although the travellers appeared aware of the risk of malaria at their destination, a third of the travellers were still prepared to leave for their destination even though they believed that an appropriate treatment for malaria was not or may not be available at the destination should they become infected[57]. Toovey et al[57] were also concerned that 23% of the travellers were unaware of the risk of HIV/AIDS in the region and that compliance with WHO vaccination guidelines was poor. They also found that whereas only 9% of travellers to Yellow Fever endemic areas were not vaccinated, 22% of travellers to Yellow Fever non-endemic areas had also been vaccinated[57].

Hamer and Connor[58] also performed a similar study at the John F. Kennedy International Airport in New York, USA. A total of 404 travellers participated, 203 completing Q-Mal questionnaires and 201 completing Q-Vac questionnaires. In this study many of the travellers were travelling to either Latin America (37%) or Asia (35%) and again, the researchers found that although relatively high numbers of travellers had obtained general information about their journey (62%) lower numbers of travellers (36%) had sought pre-travel health advice[58]. American travellers also used similar sources of general travel information (family and friends 53%, travel agents 50%, the internet 40% and literature 19%) and similar sources of travel health information as European travellers (primary care providers 60%, family and friends 30%, the internet 19%, occupational health or company doctor 12%, travel health specialist 10%)[58]. Again, only a small number of travellers visited travel health specialists and pharmacists were not listed. Also, as with the other studies, although a relatively high number of travellers (73%) knew they were visiting high risk malarial areas the number of travellers carrying antimalarials was low (46%), and few travellers were vaccinated prior to their journey[58].

Although Spanish travellers leaving Madrid International Airport participated in the European study[55], the study was carried out in December, a time when Spanish travellers tend to be travelling to visit friends and relatives as opposed to travelling for tourism and leisure[93]. As a result, Lopez-Velez and Bayas noted that only 25% of the participants in the ETHAB study from Madrid were travelling for tourism or leisure, which was not comparable with the other study centres (e.g. 97.2% and 93% of ETHAB participants from the Milan and Stockholm airports were tourists)[93]. They hypothesised that a large proportion of the VFR travellers interviewed at Madrid in the ETHAB study (73.3% of those interviewed) may have been migrants to Spain returning to tropical countries and therefore may have different KAP than Spanish tourists[93]. Lopez-Velez and Bayas therefore performed another study in Spain at two international airports (Madrid and Barcelona) between June and August 2004. A Spanish language questionnaire was designed with questions focussing on the nature of their journey, the pre-travel health advice sought by the traveller and the traveller's KAP in relation to vaccinations and malaria[93]. A total of 1,212 interviews were performed on Spanish travellers going to a variety of tropical destinations in South America (52.4%), South East Asia (20.7%), Sub Saharan Africa (14.9%), the Indian subcontinent (11.5%) and the Pacific (0.5%)[93]. Most of the participants (81.6%) were travelling for leisure and a relatively high number (83%) of the travellers had obtained pre-travel health advice before their journey which compares to 86% in the South African study, 52% in the European

study, 36% in the US study and 31% in the Australasian study[93]. Other key findings noted were that a third of travellers could not name a disease risk associated with tropical countries and that 36% of travellers to Sub Saharan Africa were not carrying malarial chemoprophylaxis[93]. The researchers also found that 95% of the travellers were carrying some form of medication and the most common items found in travel first aid kits were analgesics, antidiarrhoeals, antiseptics and Band-Aids, which the researchers attributed to the influence of Spanish pharmacists who had ran several education campaigns from Spanish pharmacies[93].

Finally, a study performed at Sydney and Bangkok airports in 2007 using cross-sectional surveys, also reported that less than half of participants (49.2%) obtained pre-travel health advice before their journey and, just over a third of participants (35.3%) obtained pre-travel health advice from a health professional[96]. Most participants who obtained pre-travel health advice from a health professional (79.5%) visited a general practitioner and only 4.2% of participants visited a travel clinic or travel specialist[96]. Pharmacists were not explicitly mentioned, although a small number of participants visited health professionals other than a GP or travel clinic[96]. Other sources of pre-travel health information used included the internet (19.2%) and travel agents (13.5%). The researchers found that overall vaccination rates were low, with only 11.9% of participants reporting that they had received one or more vaccines for their journey, and that vaccine uptake varied with region of residence and from where they had sought pre-travel health advice[96]. Participants leaving Bangkok were more likely to report vaccination (18.4%) than those leaving Sydney (11.1%), and those participants who had visited a travel clinic or specialist were more likely to report pre-travel vaccination (58.3% of participants who visited a travel clinic) than those who had visited a GP (20.3% of participants who visited a GP)[96]. They also noted that Asian travellers are less likely to obtain pre-travel health advice and vaccinations than Australian or other Western travellers and that migrant Australians are less likely to obtain pre-travel health advice than Australian-born travellers[96].

2.1.2 Review of assessment methods for potential pharmaceutical risks (PPRs) and pharmaceutical care issues (PCIs)

In an attempt to standardise the quality of care provided by clinical pharmacy services and to help identify patients of greatest clinical need, various pharmaceutical care models have been developed to assess the pharmaceutical care needs of patients and to plan their care[97-104]. Although historically these models have been used mainly in hospital-based clinical pharmacy services, some have also been developed for use in clinical pharmacy services in other settings[98-102]. A standardised approach is recommended, and most models of care generally involve an initial assessment stage, during which each patient is assessed for potential pharmaceutical risks and standard pharmaceutical care issues. A potential pharmaceutical risk (PPR) is a patient-related factor or drug-related factor that may adversely affect the therapeutic outcome of a patient[97]. Examples of PPRs would include factors such as increasing age, organ dysfunction, polypharmacy, or the use of a medication with a narrow therapeutic index, as factors such as these may potentially increase the risk of adverse drug reactions (ADRs), drug interactions and/or worsen the therapeutic outcome of the patient. Patients with multiple PPRs would be considered to have a higher overall PPR than those with a single PPR and the identification of PPRs in a patient can be used to prioritise finite care resources towards those patients

in the greatest need. A pharmaceutical care issue (PCI) is an aspect of a pharmaceutical need which is addressed by a clinical pharmacist in the planning and provision of individualised pharmaceutical care to a patient[97]. Examples of PCIs would include issues such as potential drug interactions or ADRs, omissions or duplications in therapy, or the identification of adherence issues or that perhaps patient education about their medication is required. This initial assessment to identify PPRs and PCIs is then usually followed by a planning stage, in which an individualised pharmaceutical care plan is prepared for the patient by the clinical pharmacist providing pharmaceutical care. The care plan is then implemented and the patient's care is further monitored and tailored until they are eventually discharged from the hospital. Krska et al[97] , Krska et al[98] and McGuire et al[99] examined the possible use of the same pharmaceutical care planning processes for patients in non-hospital settings, and advocated that similar assessment and planning models could be used by non-hospital pharmacists to systematically assess patients for PPRs and PCIs in other care settings and then to plan the pharmaceutical care of these patients. As mentioned above, this model of care has been applied in a wide range of clinical settings. However, it appears that there are no published reports of the application of a pharmaceutical care model to assess international travellers for PPRs and PCIs, despite the potential that the management of chronic diseases could be adversely affected by some travel-related health issues and vice versa, that some medications used to manage some chronic diseases could increase the risks of some travel-related health issues. Likewise, there are no reports of the incorporation of a formal medication-related risk assessment in the routine pre-travel health checks of travellers. Therefore, this study is an exploratory study to evaluate whether such a technique, if applied to the pre-travel assessment of travellers, could identify potential medication-related travel risks and whether such assessments should be routinely performed prior to travel.

2.2 Contribution

The candidate's estimated overall contribution to this study was 100%. All of the initial literature searches and the design and development of the interview schedule were performed by the candidate. As were all of the interviews at Cairns International Airport and the subsequent data entry and analysis.

2.3 Research Questions and Aims

The research questions for this chapter are:

> ***Do travellers leaving an Australian international airport understand the health risks associated with travel?***
>
> ***On examination of the medications and medication histories of a sample of travellers, is there a need for a pharmaceutical care model for travel health?***

The main objectives of this chapter are to investigate:

1. Whether international travellers leaving North Queensland obtain pre-travel health advice prior to their journey and if so, to further investigate;

a. the relationship between the characteristics of the traveller, their journey and their choice to obtain pre-travel health advice.

b. the sources of information used by the travellers and when, in relation to their date of departure, did they obtain pre-travel health advice.

c. the reasons why travellers choose particular sources of pre-travel health information and not others.

d. the type of travel-related health advice given to travellers prior to their journey and,

e. if appropriate, why travellers did not consider using a pharmacist as a source of pre-travel health advice?

2. The reasons why some international travellers leaving North Queensland may not obtain any pre-travel health advice before their journey.

3. The precautions taken (if any) by international travellers leaving North Queensland to prevent travel-related health problems during their journey and in particular;

    a. the types of vaccinations administered to travellers before their journey.

    b. whether travellers carry appropriate malarial chemoprophylaxis and/or use other preventative measures when visiting endemic areas.

4. The level of knowledge of a group of international travellers leaving North Queensland relating to common travel-related health problems and in particular;

    a. whether travellers know either the cause of common travel-related disorders, or how they are transmitted.

    b. whether travellers are aware of the comparable risk of common travel-related disorders at their destination compared to Australia.

    c. whether the travellers are taking preventative measures to prevent common travel-related disorders while overseas and

    d. how the travellers would treat or deal with common travel-related conditions if they occurred.

5. What the travellers consider are the major health risks associated with their destination.

6. The number and types of medications carried by international travellers leaving North Queensland, both medications for chronic conditions and medications and first aid items for possible travel-related health issues if they occur at their destination and finally,

7. The medication histories of each of the international travellers and to apply a pharmaceutical care model to perform a systematic review to assess each interviewee for potential pharmaceutical risks (PPRs) and pharmaceutical care issues (PCIs), both in their current medication regimen for pre-existing chronic medical problems, and between this regimen and any prophylactic medications that the traveller may be taking to prevent travel-related health issues or could potentially take for the management of a common travel-related health issue.

2.4 Methods and Processes

A cross-sectional survey using semi-structured interviews with a standard interview schedule was administered, during September and October 2008, to adults travelling from Cairns International Airport (CIA).

2.4.1 Inclusion criteria

Participants had to be at least 18 years of age, travelling to an overseas destination from CIA and gave informed verbal consent to be interviewed. Exclusion criteria were an inability to understand and reply to questions in English and a lack of time to complete the interview if the participant was called to board their aircraft while being interviewed.

2.4.2 Study site

This study was performed in the international departure lounge of CIA. At the time of the study, CIA was Australia's leading regional airport and seventh busiest international airport with direct international flights leaving for destinations in Japan, New Zealand, Hong Kong, Indonesia, Guam and Papua New Guinea, and indirect flights to Singapore and other international destinations[105]. CIA was chosen as the main study site due to its proximity to James Cook University. Approval to enter the secure, restricted-entry area of the departure lounge to interview travellers was granted by Cairns Ports Ltd after a review of the final interview schedule and after the candidate had completed the necessary training and security checks.

2.4.3 Design and testing of the interview schedule

A standard interview schedule was designed to collect sufficient data to answer the research questions and meet the objectives of the study. To ensure the validity and reliability of the study and interview schedule, to reduce bias and to allow comparison with other KAP studies some questions were based on questions utilised in the surveys and questionnaires of the ETHAB studies and related studies. Likewise, the pharmaceutical care model utilised to assess each traveller for PCIs and PPRs was adapted from a process that has been utilised by many pharmacists worldwide for over 15 years. However, two compromises were required, firstly between asking a sufficient, but not excessive, number of questions and secondly, as the interviews were being carried out in an open area, it was assumed that a lack of privacy could be an issue. Therefore, some topics and questions were not included in the interview schedule, and the lack of privacy was also taken into consideration when analysing the responses given by interviewees to some questions. However, interviewees were also reminded on multiple occasions during their interview that they had the right to refuse to answer, or even to cease the interview and withdraw from the study, if they found any question or topic to be too intrusive.

2.4.3.1 Format of the interview schedule

The final interview schedule (Appendix 2.1) consisted of a combination of 29 open answer or multiple choice questions divided into 5 main sections. These were:

2.4.3.1.1 Section A (Demographic and predictor data)

Section A consisted of 8 main questions to collect standard demographic data and information that could be used to characterise the traveller and their destination. This was used to categorise each interviewee and the information they gave, but also to investigate the relationship, if any, between traveller-related, destination-related and socioeconomic factors and the pre-travel health advice-seeking behaviour of interviewees.

2.4.3.1.2 Section B (Obtaining travel-related health advice)

Section B consisted of 5 main questions focussing on whether interviewees had obtained pre-travel health advice. If so, further questions focussed on the interviewee's choice of information source and the actual advice received. If the interviewee did not obtain pre-travel health advice, further questions examined the interviewee's reasoning behind their decision. If appropriate, interviewees were also questioned why they had not considered approaching a pharmacist to obtain pre-travel health advice.

2.4.3.1.3 Section C (Vaccination and immunisation history of the traveller)

Section C of the interview schedule was intended to aid the investigator in the collection of a full vaccination history from each interviewee. Each interviewee was questioned about the previous vaccines that they had received and, in particular, vaccines that may have been administered for their current journey.

2.4.3.1.4 Section D (Knowledge of travel-related health risks)

Section D of the interview schedule examined the knowledge, attitudes and practices (KAP) of the travellers of travel-related health conditions using a similar method to that described in the ETHAB European Airport Study[55]. Interviewees were firstly questioned about a series of travel-related health conditions chosen because they were either relatively common, clinically significant, or were either preventable by following simple measures and/or managed using remedies that are readily available without prescription from pharmacies. The disease states chosen were Traveller's Diarrhoea, Hepatitis A and B, Jet Lag, Malaria, Travel (Motion) Sickness, Skin Cancer and Sunburn, and Deep Vein Thrombosis. Questions varied slightly between the disease states, although most focussed on the causes, routes of transmission, relative risk, and if appropriate, potential methods of prevention and treatment of each condition. Finally, the interviewee was asked what they thought were the major health risks associated with their destination.

2.4.3.1.5 Section E (Medication history of the traveller)

The final section of the interview schedule was designed to allow a systematic medication history to be taken from each interviewee. The interview schedule contained a standardised checklist to ensure that the investigator obtained as much information as possible about the medications being carried by the traveller, both medications to manage potential travel-related conditions and medications for chronic disease states. Interviewees were also questioned about their history of allergies and adverse drug reactions, the quantity of medications being carried, whether they were appropriately labelled and whether they are carrying documentation about their medications, such as a doctor's letter or repeat

prescription. Finally, the interviewees were asked what they would do if they lost or ran out of their medication while overseas.

2.4.3.2 Testing of the interview schedule

2.4.3.2.1 Testing prior to data collection

It was felt that the interviews should only exceed 10-15 minutes in length in exceptional circumstances, for example when interviewees had very complex drug regimens, and even in these situations, the interview should not exceed 15-20 minutes. Therefore, after the interview schedule was finalised, it was pre-tested on five adult volunteers, which did not exceed 10 minutes. Moreover, the volunteers were also asked whether they fully understood all of the questions and only minor alterations in wording were made.

2.4.3.2.2 Pilot of interview schedule during data collection

The final pre-testing of the interview schedule occurred early in the data collection phase. The first 10 interviewees were used as a pilot to test that the interview length was appropriate and whether all of questions were understood. After the first 10 travellers were interviewed the following changes were made to the interview schedule:

1. As partially expected, most interviewees were found to be poor historians regarding their vaccination history. Therefore when asking question 14, greater emphasis was placed on obtaining as many details as possible about the vaccinations the interviewees had received for their current journey rather than a full history of all of their previous childhood vaccinations.
2. Question 23 was found to be confusing and too long for some interviewees. Therefore, this was reduced to asking the interviewee just to list what they thought were the major health risks associated with their destination.
3. Initially it was intended (with the interviewee's consent) to audiotape the interviews. However, due to the nature of the location and the poor sound quality of the resultant tapes, this was abandoned and responses were recorded manually.

2.4.4 Study process

The study incorporated a two-stage process. The first stage involved the collection of raw data using a series of semi-structured interviews of travellers in the international departure lounge at CIA. The second stage was a systematic review and analysis of the interviewees' responses and the application of a pharmaceutical care model to the medication history of each traveller to systematically assess each traveller for PPRs and PCIs.

2.4.4.1 Stage 1: Data collection with semi-structured interviews

The researcher visited the departure lounge of the international terminal at CIA to interview travellers over a total of 17 days in three blocks in September–October 2008. Chairs in the departure lounge were positioned in fixed clusters, and to reduce selection bias a systematic random sampling technique was used, whereby the investigator moved around the chair clusters in a fixed pattern and

approached one traveller in each cluster. The traveller was asked if they would be willing to participate, and if verbal consent was given the aims and objectives of the study were then verbally explained to the traveller, as were the method of data collection and the traveller's right either not to participate or to withdraw at any time during the interview. The traveller was then given a participant information sheet (Appendix 2.2) to read that had been approved by the JCU HREC (Approval Number H3060) and if verbal consent was obtained, the interview was then conducted. If the traveller refused to participate, the investigator moved to the next seat cluster and so on.
To maintain anonymity and confidentiality, each completed interview schedule was given a consecutive interview number and as soon as possible after the interview, the data was transferred onto a central spreadsheet and stored in a manner compliant with the requirements of the JCU HREC.

2.4.4.2 Stage 2: Data analysis and application of the pharmaceutical care model to assess for potential pharmaceutical risks (PPRs) and pharmaceutical care issues (PCIs)

2.4.4.2.1 Data collection, collation and analysis

Once the interviews were completed, the answers from each interviewee for sections A to E of the interview schedule were collated into Microsoft® Excel® spreadsheets and the IBM® SPSS Statistics Package® (Version 22). Responses to multiple-choice and multiple-answer type questions were collated and simple descriptive statistics were applied. Using the IBM® SPSS Statistics Package® (Version 22), Chi-square tests for independence (with Yates Continuity Correction) were also performed to examine the relationship (if any), between the pre-travel health advice seeking behaviour of the interviewees and the various demographic predictors present in the sample. Responses to open answer questions were firstly collated and coded using a conceptual framework. Then an interpretive thematic analysis was performed to identify and report on patterns within the data using the methods and techniques described by the authors Braun and Clarke[106], Liamputtong and Serry[107] and Liamputtong[108].

2.4.4.2.2 Identification of PPRs and PCIs used in the study

A list of standard PPRs and PCIs were identified and collated from published examples of pharmaceutical care models used in both hospital-based and community-based clinical pharmacy services[97-104]. A brain-storming exercise involving three clinical pharmacists was then performed to identify a list of additional travel-specific PCIs, and these two lists were combined to be used in the pharmaceutical care model for this study.
Table 2.1 lists both the standard and travel-specific PPRs and PCIs for which the medication history of each traveller was assessed. The standard PPRs and PCIs used in clinical assessment of hospital and community patients are highlighted in yellow. Whereas, those highlighted in blue (PCI 12a to PCI 12i) are the travel-specific PPRs and PCIs identified specifically for use in this study.
However, it has to be recognised that this list of PPRs and PCIs were derived from pharmaceutical care models designed to assess hospital patients and hospital pharmacists have greater access to a wider range of patient information resources, such as medical notes and admission letters, to help them to assess the patient. In this study, the researcher only had access to the information given to them by the interviewee in an airport departure lounge plus, in some instances, a visual sighting of the

Table 2-1 List of PPRs and PCIs used in this study

Abbrev	PPR or PCI	Abbrev	PPR or PCI
Age	Travellers aged 61 years or over	PCI 10	Untreated indication
Chr Med	Travellers taking chronic medications	PCI 11	Patient education required
No Chr Med	Travellers not taking chronic medications	PCI 12a	Medications recently started (general)
Crit Med	Travellers taking medications with a critical dose or route	PCI 12a(M)	Medications recently started (antimalarials)
PCI 0	Travellers with no PCIs (other than age, regular medications or antimalarials)	PCI 12b	Medications with potential storage problems whilst overseas
PCI 1	Inappropriate dosage regimen	PCI 12c	Carrying inadequate supplies of medication for the journey
PCI 2	Inappropriate duration of therapy	PCI 12d	Carrying excessive supplies of medication for the journey
PCI 3	Potential drug-disease interaction	PCI 12e	Medications which are potentially prohibited at their destination
PCI 4	Potential drug-drug interaction	PCI 12f	Visiting a malarial area without chemoprophylaxis
PCI 5	Potential adverse drug reaction	PCI 12g	Visiting a malarial area without chemoprophylaxis (Port Moresby)
PCI 6	Medications requiring therapeutic drug monitoring	PCI 12h	Medications which could potentially increase the risk of common travel-related health disorders
PCI 7	Potential or actual adherence problems	PCI 12i	Medications or Diseases upon which common travel-related disorders could have a major impact
PCI 8	Discrepancy between the prescribed dose and the actual dose used by the traveller	PCI 13	Any other potential pharmaceutical care issue
PCI 9	Duplication of therapy		

Key

	Standard PPRs and PCIs		Travel-specific PPRs and PCIs

medications the interviewee was carrying with them. Therefore, it was recognised that it may be difficult for the investigator to fully assess each interviewee for all PCIs in the list. For example, it may be difficult to assess a traveller for PCI 7 (Potential or actual adherence problems) and PCI 10 (Untreated indications) on just the information provided with an interview and without access to the traveller's full medical records. However, to be consistent with recognised methods of assessing patients for PCIs and PPRs, it was decided to still include these PCIs in the assessment of the travellers in this study.

2.4.4.2.3 Application of a pharmaceutical care model to assess each interviewee for PPRs and PCIs

A pharmaceutical care model was then devised whereby the data and medication history obtained from each interview was individually and systematically tested for each PPR and PCI identified and listed in table 2.1. This involved a comparison of the interview data and medication history with a series of standard, readily available and recognised drug information and travel health information resources. The full pharmaceutical care model was summarised in a flowchart (Figure 2.1) and a

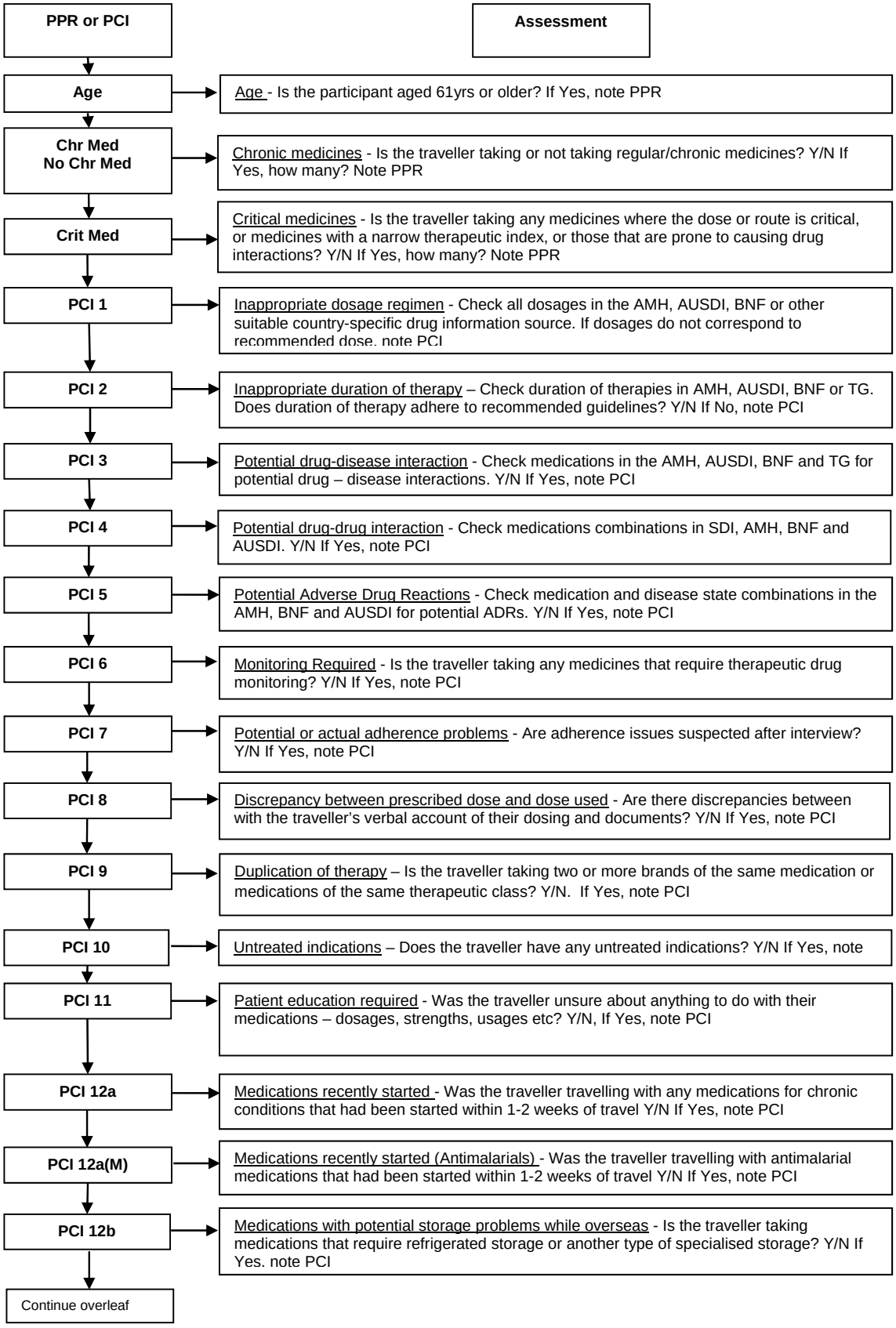


Figure 2-1 Pharmaceutical care model used to assess each interviewee for PPRs and PCIs

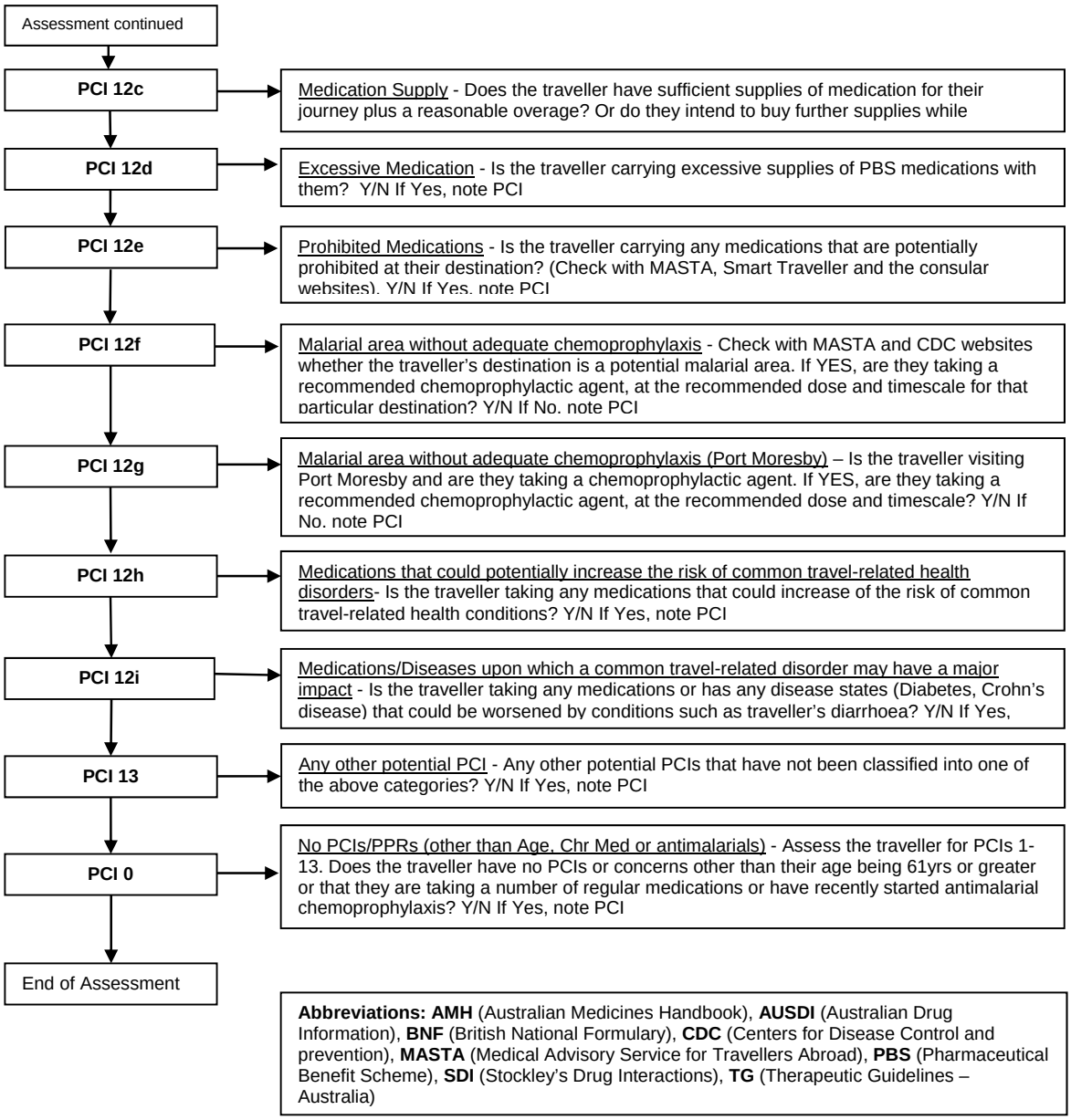


Fig 2.1 Pharmaceutical care model used to assess each interviewee for PPRs and PCIs (Continued)

standard checklist (Appendix 2.3) was designed and used in combination with the flowchart to assess the interview data and record the findings of the assessment as it was performed. The analysis was performed by the investigator. The findings were then again collated in Microsoft® Excel® spreadsheets. The use of the flowchart and checklist ensured that no steps were accidently missed in the assessment process, that the data from each interview was consistently assessed and that no potential PCIs or PPRs were inadvertently missed in the assessment process. As shown in figure 2.1, at least two standard drug information or travel health information references were used when assessing PCIs involving issues such as potential drug interactions, adverse drug reactions or other therapeutic-related issues.

2.4.4.2.4 Independent peer review and validation of PPR and PCI assessment findings

To reduce bias in the PPR and PCI assessment process, the findings of the assessment for each interviewee were then peer reviewed by another independent and accredited clinical pharmacist. The findings of the original assessment were reviewed by the independent pharmacist. Any differences of opinion between the two assessments were discussed and moderated between the investigator and the independent pharmacist. However, if differences of opinion were unresolved after these discussions, then the assessment of the independent pharmacist was given priority over that of the investigator.

2.4.5 Ethical and other approvals

The study was conducted under ethical approval H3060 granted by the James Cook University Human Research and Ethics Committee (JCU HREC) (Appendix 1). Approval was also sought and granted from the Cairns Port Authority to perform the project at Cairns Airport.

2.4.6 Financial support

This study was supported by internal funding from the Discipline of Pharmacy, James Cook University.

2.5 Results and Discussion

A total of 218 interviews were completed over a total of 17 days in three blocks (18th Sept – 24th Sept, 26th Sept – 2nd Oct and 17th Oct – 22nd Oct 2008). 77 travellers refused to participate, 86 travellers were excluded or had their interview suspended due to poor English comprehension or speaking skills and finally, 39 travellers were not included as it was found that they were actually in transit to another Australian destination, or it became necessary to suspend their interview if they were called to their departure gate. The number of travellers interviewed, refused to participate, or were excluded each day varied depending on a number of factors such as, the level of activity and the presence of other researchers in the terminal, and the number of Australian or English-speaking travellers relative to the number of non-English speaking travellers in the terminal. In particular, it was noted that many Japanese travellers or nationals from some Asian countries were found to be reluctant or refused to participate, or if they did participate they then often had difficulty understanding and answering the questions and so were ultimately withdrawn. However, between 9 and 18 interviews were completed each day, which represented between 0.9% - 1.8% of the travellers leaving the international terminal on each respective date. It was also noted that a relatively large portion of the sample (38.1%, 83/218) consisted of travellers visiting Papua New Guinea (PNG). This was due to the combined effect of having only one interviewer present in the departure lounge at any one time, the timing of flights to PNG and the size of the aircraft relative to the timings and size of aircraft used for flights to other destinations.

2.5.1 Demographic data

The information obtained from section A of the interview schedule from each interview was collated into Microsoft® Excel® spreadsheets and the IBM® SPSS Statistics Package® (Version 22) and was used to categorise both the interviewees and their destinations. Table 2.2 sumarises the demographic

Table 2-2 Summary of demographic and socioeconomic data of the interviewees

		Total Interviewees		Interviewees travelling to PNG		Interviewees travelling to destinations other than PNG	
		No.	%(n=218)	No.	%(n=83)	No.	%(n=135)
Gender	Male	147	67.4%	63	75.9%	84	62.2%
	Female	71	32.6%	20	24.1%	51	37.8%
Age	18-30yrs	36	16.5%	12	14.5%	24	17.8%
	31-40yrs	36	16.5%	11	13.3%	25	18.5%
	41-50yrs	43	19.7%	19	22.9%	24	17.8%
	51-60yrs	59	27.1%	28	33.7%	31	23.0%
	61-70yrs	36	16.5%	11	13.3%	25	18.5%
	71yrs or >	8	3.7%	2	2.4%	6	4.4%
Nationality	Australia	112	51.4 %	55	66.3%	57	42.2%
	UK	34	15.6%	2	2.4%	32	23.7%
	New Zealand	33	15.1%	7	8.4%	26	19.3%
	PNG	12	5.5%	12	14.5%	0	0.0%
	Other	27	12.4%	7	8.4%	20	14.8%
Country of residence	Australia	104	47.7%	47	56.6%	57	42.2%
	UK	30	13.8%	0	0.0%	30	22.2%
	New Zealand	29	13.3%	5	6.0%	24	17.8%
	PNG	28	12.8%	28	33.7%	0	0.0%
	Other	27	12.4%	3	3.6%	24	17.8%
Highest level of education	Postgrad degree	53	24.3%	20	24.1%	33	24.4%
	Bachelor degree	58	26.6%	22	26.5%	36	26.7%
	Trade cert/diploma	59	27.1%	23	27.7%	36	26.7%
	Grade 12	38	17.4%	13	15.7%	25	18.5%
	Grade 10	10	4.6%	5	6.0%	5	3.7%
Employment status	Full-time	170	78.0%	71	85.5%	99	73.3%
	Part-time	21	9.6%	8	9.6%	13	9.6%
	Retired	26	11.9%	3	3.6%	23	17.0%
	Unemployed	1	0.5%	1	1.2%	0	0.0%

		Total (n=218)		PNG (n=83)		Other Dests (n=135)	
Approximate earnings ($AUD)	<40,000	41	18.8%	17	20.5%	24	17.8%
	40-60,000	31	14.2%	8	9.6%	23	17.0%
	60-80,000	25	11.5%	7	8.4%	18	13.3%
	80-100,000	23	10.6%	6	7.2%	17	12.6%
	100-120,000	13	6.0%	7	8.4%	6	4.4%
	>120,000	49	22.5%	26	31.3%	23	17.0%
	Prefer not to say	36	16.5%	12	14.5%	24	17.8%
Occupation (ASCO major)		Professional (37.2%)		Professional (47%)		Professional (31.1%)	
Destination – Global region	Oceania	114	52.3%	83	100.0%	31	23.0%
	W. Europe	42	19.3%			42	31.1%
	N. Asia	34	15.6%			34	25.2%
	SE Asia	18	8.3%			18	13.3%
	N. America	5	2.3%			5	3.7%
	Others	5	2.3%			5	3.7%
Destination - Type	Capital city	75	34.4%	38	45.8%	37	27.4%
	Other metro	76	34.9%	11	13.3%	65	48.1%
	Rural/remote	53	24.3%	31	37.3%	22	16.3%
	Multiple dest	14	6.4%	3	3.6%	11	8.1%
Average length of stay (days)		43.9 days		72.5 days		23.6 days	
Reason for travel	Leisure	109	50.0%	8	9.6%	101	74.8%
	Business	79	36.2%	60	72.3%	19	14.1%
	VFR	16	7.3%	3	3.6%	13	9.6%
	Education	10	4.6%	8	9.6%	2	1.5%
	Other	4	1.9%	4	4.8%	0	0.0%
Number of people in travelling party		Alone (46.3%) 2 people (44.0%)		Alone (71.1%)		2 people (58.5%)	
Average time to plan journey		14.7 weeks		6.9 weeks		36.3 weeks	
Greater than 5 international journeys in the previous 3 yrs		47.7%		66.3%		36.3%	
Most common global region visited in the previous 3 yrs		Oceania (36.7%)		Oceania (63.9%)		W. Europe (23%)	
Have travel insurance policy		79.4%		71.1%		84.4%	
Previously travel-related illness in the previous 3yrs		26.6%		33.7%		22.2%	

data of the overall sample and also that of the two subgroups within the sample i.e. the interviewees in the sample travelling to PNG and interviewees in the sample travelling to destinations other than PNG. Chi-square tests for independence (with Yates Continuity Correction) using the IBM® SPSS Statistics Package® (Version 22) were also performed to examine the significance of any differences between the 2 subgroups and these are discussed below where significant.

2.5.1.1 Traveller-related demographics

Using the data presented in table 2.2, the overall sample is composed predominantly of male (67.4%, 147/218), middle-aged (46.8%, 102/218 being aged between 41-60 years), Australian (51.4%, 112/218) travellers. The sample is also predominantly well-educated and well-paid, with most being in full time employment and working in professional occupations.

At the time of the study, the Australian Bureau of Statistics (ABS) reported that the number of female, short-term departures from Australia are generally slightly greater than the number of young males, although the trend is reversed in older travellers[109]. The number of young travellers in this sample is relatively low (only 16.5% (36/218) of the sample was below the age of 30 years). However, the proportion of male interviewees was still much higher than expected and the trend was even more evident in the PNG subgroup. Possible explanations are firstly, the relative size of the PNG subgroup, many of whom were travelling for business and employed in more male-dominated professions, and secondly, when the male investigator approached groups in the departure lounge, social conventions appeared to mean that it was more likely for an adult male in the group to volunteer to be interviewed rather than a female member.

Likewise, in 2010, the ABS stated that over 50% of short-term resident departures from Australia were in the 30-54 year age group[109], whereas in this sample only 36.2% (79/218) were in the 31-50 year age group, and two thirds of the interviewees (67%, 146/218) were aged 41 years or older. Again, these trends were more evident in the PNG subgroup with 72.3% (60/83) of interviewees being aged 41 years or older. Possible explanations again include the reasons for travel. The majority of travellers travelling to destinations other than PNG were travelling for leisure (74.8%, 101/135), whereas the majority of travellers in the PNG subgroup (72.3%, 60/83) were travelling for business and the difference was found to be significant (X^2 =84.8, df=1, p=0.000, phi= -0.633). Most expatriate workers in PNG are employed in professional positions in the government, education or mining industries. These positions generally require experienced workers, and as such, they are more likely to be in an older age group. However, the proportion of travellers aged 61 or older was lower in the PNG subgroup than the subgroup travelling to other destinations (15.7% (13/83) and 22.9% (31/135) respectively). This was mainly because many expatriates working in PNG, work in remote areas and/or work long hours. Therefore, it is unlikely they would wish to continue working in such positions close to their retirement age. Whereas, the majority of travellers travelling to other destinations are travelling for leisure and retirees will want to travel to more leisure-oriented destinations in their retirement.

A total of 17 nationalities were represented in the sample, however as shown in table 2.2, 87.6% (191/218) of the interviewees were citizens of only four countries (Australia, UK, NZ and PNG) and the

majority of the interviewees (51.4%, 112/218) were Australian citizens. Surprisingly, for an airport servicing many Japanese destinations, only 0.5% (1/218) of the interviewees were Japanese citizens. The use of a Japanese-speaking interviewer however may have improved response rates with these travellers. A significantly greater number of the Australian citizens were travelling to PNG (66.3%, 55/83) than to other destinations (42.2%, 57/135) (X^2 =11.0, df=1, p=0.001, phi= 0.23). A total of 87.6% (191/218) of the interviewees were also resident in Australia, UK, NZ and PNG, however it is evident from table 2.2 that a number of the interviewees from Australia, UK and NZ reside in PNG.

The 104 interviewees resident in Australia were asked to state their post code, which using the Australia Post postcode on-line database[110], was used to identify their state or territory of residence. Interviewees resident in Queensland were further subcategorised as being residents of North, Central or South Queensland based on the location of their postcode relative to Queensland Health Service Districts[111]. Results show that nearly three quarters of the Australian resident interviewees (72.1%, 75/104) were resident in Queensland, and in particular North Queensland (54.8%, 57/104), and this trend is even more evident if we examine those interviewees travelling to destinations other than PNG, where 85.9% (116/135) of interviewees in this subgroup were resident in Queensland. This demonstrates, as expected, that CIA is an important international exit point for the North Queensland population, to a lesser extent the greater Queensland population, and also as an entry and exit point for tourists visiting North Queensland itself.

Interviewees were asked about their education, occupation and earnings to examine whether socioeconomic factors could predict whether travellers are more likely to seek pre-travel health advice. At the time of the study the Australian Bureau of Statistics stated that only 24.1% of Australians aged 25-64 years were educated to Bachelor degree level or above[112], and that that the seasonally-adjusted, average annual income of a full-time, adult Australian worker earning ordinary time earnings was $60,658[113]. Table 2.2 shows that the sample was relatively well educated with just over half (50.9%, 111/218) of the total interviewees having a bachelor-level or postgraduate degree and over a quarter (27.1%, 59/218) a trade certificate or diploma-level qualification. It also shows only minor differences in the educational levels of the two subgroups in the sample. Table 2.2 also demonstrates that just over half (50.6%, 110/218) of the interviewees said that their income exceeded $60,000 per year, and a large number (22.5%, 49/218) of the interviewees earned more than $120,000 per year. Interviewees in the PNG subgroup were slightly better paid with 55.3% (46/83) stating their earnings to be $60,000 per year or more, and 31.3% (26/83) stating their earnings to be more than $120,000 per year (compared to 17% (23/135) in the subgroup of interviewees travelling to destinations other than PNG). The middle income range of the interviewees was $80,000 - $100,000 per year, and $100,000 - $120,000 per year for interviewees in the PNG subgroup.

Due to the costs associated with international travel, it was unsurprising that a high proportion of the sample (78%, 170/218) stated they were in full time employment, and because a greater number of people were travelling for work-related reasons, an even higher percentage of the PNG subgroup (85.5%, 71/83) were in full-time employment and only 3.6% (3/83) classified themselves as retired. The largest number of retirees was in the subgroup travelling to destinations other than PNG (17%, 23/135).

The occupations of the interviewees were categorised and grouped using the Australian Standard for the Classification of Occupations (ASCO) which is a skill-based classification system for all occupations in the Australian workforce[114]. The majority of the interviewees (86.7%, 189/218) in the sample have occupations that are classifiable into either ASCO major groups 1 to 4 (Managers, Professionals, Associate professionals or Tradespersons), with the most common ASCO major group being professionals (37.2%, 81/218) followed by managers and administrators (19.7%, 43/218). Due to the number and range of individual professions within the sample it was difficult to find any significant differences between the two subgroups.

2.5.1.2 Destination and journey-related demographics

The traveller's destination is a major factor in the determination of their overall travel-health risk. It was found that most interviewees were flying to only one destination, with only 6.4% (14/218) flying to multiple destinations. Destinations were categorised into global regions (visitors to multiple destinations were categorised into the region they planned to spend the greatest amount of time) and these are summarised in table 2.2. It can be seen that the majority of interviewees (87.2% 190/218) were visiting destinations in Oceania, Western Europe or North Asia and when individual countries were examined, it was found that nearly three quarters of the interviewees (72.1%, 157/218) were visiting one of only four destinations (PNG (38.1%, 83/218), Japan (13.3%, 29/218), New Zealand (12.4%, 27/218) and the UK (8.3%, 18/218)). The remaining interviewees visiting one of another 21 countries. Just over half of the interviewees (53.7%, 117/218) were visiting countries that would be considered to be developed countries. In comparison, in 2010, the ABS reported the top 5 destinations for short term travellers leaving Australia were (in order) New Zealand, Indonesia, the USA, the UK and Thailand, which reflects the niche role of CIA[109].

The majority of the interviewees (69.3%, 151/218) in the sample were visiting either a capital city or another major metropolitan area, with only just under a quarter of interviewees (24.3%, 53/218) visiting rural or remote areas. As a generalisation, travellers visiting major metropolitan areas in developed countries are usually considered to have a relatively lower risk of travel-related health problems than travellers visiting rural or remote areas in developing countries thereby inferring that many of the interviewees could be classified as being relatively low risk travellers[18]. The interviewees travelling to PNG had a slightly bimodal distribution with relatively large and almost similar numbers of interviewees visiting either the capital city (Port Moresby) (45.8%, 38/83) or rural/remote areas (37.3%, 31/83), and relatively low numbers visiting other major metropolitan areas(13.3%, 11/83). This is due to two factors. Firstly, many are travelling for work-related reasons predominantly in administrative positions in the capital city, or in the mining industry in rural areas. Secondly, it also reflects the social geography of PNG, with few large metropolitan centres outside Port Moresby. In comparison, nearly half (48.1%, 65/135) of the interviewees travelling to destinations other than PNG planned to visit major metropolitan centres other than a capital city. The respective number of interviewees in the two subgroups staying in capital cities and metropolitan areas versus rural, remote or multiple destinations was significantly different with the PNG subgroup more likely to stay in rural or remote areas (X^2 =5.8, df=1, p=0.016, phi= -0.174).

Half of the interviewees (50%, 109/218) were travelling for leisure and just over a third (36.2%, 79/218) were travelling for business reasons, with the remainder travelling for other miscellaneous reasons. In the two subgroups. the majority of travellers travelling to destinations other than PNG were travelling for leisure (74.8%, 101/135) whereas the majority of travellers in the PNG subgroup (72.3%, 60/83) are travelling for business and the difference was significant (X^2 =84.8, df=1, p=0.000, phi= -0.633).

Most interviewees were travelling alone (46.3%, 101/218) or in pairs (44%, 96/218) with few (9.7%, 21/218) travelling in groups of more than 2 people and only 10 interviewees (4.6%) were travelling with children. Interviewees in the PNG subgroup were significantly more likely to be travelling alone than in a group when compared to interviewees in the other subgroup (X^2 =31.4, df=1, p=0.000, phi= 0.389) and this unsurprising as the majority of the PNG subgroup (71.1%, 155/218) were travelling for work-related reasons. It may have been assumed that larger family groups would have been more common in a sample of people travelling predominantly for leisure reasons, however the majority of interviewees travelling to destinations other than PNG (58.5%, 79/135) were travelling in pairs. A possible explanation for these trends were that most of the data collection period occurred during school term-time which resulted in couples, business travellers and retirees being more prevalent in the sample.

It is recommended that travellers should obtain pre-travel health advice at least 6-8 weeks before travelling[115 116] and it was found that many interviewees appeared to have planned their journey well in advance, taking an average of 14.7 weeks (range 0.5 days to 3 years). Those travelling to destinations other than PNG took the longest to plan their journey, taking an average of 19.5 weeks to plan and with only 31.1% (42/135) and 11.9% (16/135) of the interviewees in this subgroup taking less than 5 weeks and 1 week respectively. This was because the majority of these interviewees were travelling for leisure which requires advance planning unless a traveller is taking advantage of short term discounts on flights and/or accommodation. By comparison the interviewees travelling to PNG, mainly for work-related reasons took less time to plan (average time to plan 6.9 weeks and with 69.9% (58/83) and 25.7% (21/83) of the interviewees in this subgroup taking 5 weeks and 1 week respectively). Reasons for this include Fly-in Fly-out (FIFO) mine workers often travel on a frequent basis to the same destination and travel arrangements will be made at short notice by their employer.

The interviewees were a relatively well-travelled group, as nearly half (47.7%, 104/218) had taken more than 5 overseas journeys in the previous 3 years. The PNG subgroup in particular travelled very frequently as nearly two thirds of interviewees in this subgroup (66.3%, 55/83) reported they had taken more than 5 overseas journeys in the last 3 years. This is not too surprising, as many companies in PNG employ expatriates in FIFO positions who therefore travel frequently between their home and workplace. The subgroup of interviewees travelling to destinations other than PNG can also be described as well-travelled because just over 70% of these interviewees had taken at least one overseas journey each year in the previous 3 years. The top 5 global regions visited by the interviewees were Oceania, Western Europe, North Asia, South East Asia and North America matching the sequence of global regions being visited for this journey.

It has been reported that as travellers visit more exotic locations, their perception of risk decreases and increasing numbers of travellers are travelling without travel insurance[3]. This can have serious consequences for the traveller if they become ill while overseas. Overall, 79.4% (173/218) of the sample had some level of travel health insurance prior to travel. Insurance rates were highest in the subgroup travelling to destinations other than PNG (84.4%, 114/218) and were significantly higher (X^2 =4.8, df=1, p=0.028, phi= -0.16) than those in the PNG subgroup (71.1%, 59/83). However, many in the PNG subgroup explained that their employer took responsibility for their healthcare and therefore travel insurance was not required.

2.5.1.3 History of previous travel-related disease

Interviewees were asked if they had experienced travel-related illness whilst overseas in the previous 3 years and 26.6% (58/218) reported having at least one bout of travel-related illness during previous overseas journeys in that time period. This was similar to the findings of both Freedman et al[117], and Steffen et al[21], who reported that between 22% and 64% of travellers to developing countries self-reported health problems. A total of 71 episodes of travel-related illness were reported by these 58 interviewees. The interviewees were asked to self-rate the severity of the travel-related illness on a scale of 1 to 5, with 1 being a minor illness and 5 being considered very severe. It was found that the majority of the reported cases (71.8%, 51/71) of travel-related illness were self-rated as mild to moderate (scale 1-3) by the interviewees. Only 28.1% (26/71) of episodes were self-rated as severe (scale 4-5), and the overall average self-rating of the travel-related illness episodes was 2.6.

All of the travel-related conditions reported by the interviewees were grouped and categorised, and the results are summarised in table 2.3. The majority of the episodes (80.3%, 57/71) are potentially infective in origin, with only 14 episodes (19.7%) being non-infective in origin. However, most of the infective episodes were again self-rated as being relatively mild (average self-rating of 2.5). Diarrhoeal diseases were by far the most common travel-related illness reported by the interviewees, with a total of 29 episodes of diarrhoea (40.8% of the reported travel-related illnesses) being reported and an average severity score of 2.5 (range 1 to 4). This corresponds with the findings and comments of other studies as traveller's diarrhoea is reported to be the commonest travel-related health condition with an incidence rate of between 30% and 70%[18 21 28 34 35 117-120].

Over half of the previous episodes of travel-related illness (53.5%, 38/71) experienced by the interviewees were self-treated with non-prescription medications, either carried by the traveller or obtained locally from a pharmacy. It has been estimated and reported in various sources that approximately 8% of travellers require medical care during or after travel, approximately 0.3% require hospital admission and that approximately 0.05% may have to be air-evacuated home[18 21 117 121]. It is also reported that 1 in 100,000 travellers may die during their journey[18]. In comparison, nearly a quarter (23.9%, 17/71) of the prior episodes of travel-related illness reported by the interviewees required medical treatment, 9.9% (7/71) required hospital treatment and 4.2% (3/71) required medical evacuation. However, the number of interviewees is relatively low in this study.

Table 2-3 Previous travel-related illnesses experienced by the interviewees in the preceding 3 years

(Shaded boxes indicate cases that are potentially infective in origin)

Travel-related illness	No. of cases (% of total cases, n=71)	Average severity rating (1=mild to 5= very severe)	Range of reported severity	Treatment	
				Actual treatment used by Interviewees	Number of cases (%)
Diarrhoeal conditions	29 (40.8%)	2.5	1 to 4	Self-treatment with fluids and/or antidiarrhoeal medications carried with them from their home country	18 (62.1%)
				Visited local pharmacist for advice and OTC treatment	3 (10.3%)
				Visited a medical practitioner for antibiotics or other treatment	4 (13.8%)
				Obtained treatment at a local Hospital	2 (6.9%)
				No treatment	2 (6.9%)
Common Cold and Influenza	7(9.9%)	1.4	1 to 2	Self-treatment with OTC medication	5 (71.4%)
				No treatment	2 (28.6%)
Other respiratory tract infections	4 (5.6%)	2.75	2 to 5	Obtained OTC medications from a local pharmacy	2 (50%)
				Visited a local medical practitioner	2 (50%)
Eye infections	4 (5.6%)	2.25	1 to 5	Went to local medical centre	1 (25%)
				Visited local pharmacist for OTC medications	2 (50%)
				No treatment	1 (25%)
Malaria	4 (5.6%)	3.25	2 to 5	Treated by mine medical staff	3 (75%)
				Aerial evacuation back to Australia	1 (25%)
Skin & soft tissue infections	3 (4.2%)	3.7	3 to 4	Treated in hospital	2 (66.7%)
				Aerial evacuation back to Australia	1 (33.3%)
Other miscellaneous infections	6 (8.5%)	2.8	1 to 4	Obtained OTC medications from a local pharmacy	2 (33.3%)
				Visited a local medical practitioner	3 (50%)
				Treated in hospital	1 (16.7%)
Musculoskeletal conditions	6 (8.5%)	3.2	2 to 5	Self-treatment with OTC medications	4 (66.6%)
				Visited a local medical practitioner	1 (16.7%)
				No treatment	1 (16.7)
Accidents	3 (4.2%)	2.7	2 to 5	Treated in hospital	2 (66.7%)
				Aerial evacuation back to Australia	1 (33.3%)
Dental issues	2 (2.8%)	2.5	2 to 3	Visited a local dentist	2 (100%)
Dyspepsia	1 (1.4%)	1	1	Self-treatment	1 (100%)
Mild allergy	1 (1.4%)	1	1	Visited a local medical practitioner	1 (100%)
Jet lag	1 (1.4%)	1	1	Used sleeping tablets obtained from a medical practitioner at home	1 (100%)

2.5.2 Travel health advice seeking behaviour of interviewees

2.5.2.1 Correlation between advice seeking behaviour and demographic predictors

Only 41.7% (91/218) of the interviewees obtained pre-travel health advice before their journey. Using the IBM® SPSS Statistics Package® (Version 22), Chi-square tests for independence (with Yates Continuity Correction) were performed to examine the relationship (if any) between advice seeking behaviour of the interviewees and the various demographic predictors in the sample. It was noted that some traveller-related factors and some destination-related factors appeared to have an influence on whether the interviewee obtained pre-travel health advice, although in some situations the influence was not significant. The results are summarised in table 2.4.

It was found that significantly more female interviewees sought pre-travel health advice than male interviewees, that interviewees younger than 40 years of age were significantly more likely to obtain pre-travel health advice than interviewees aged 40 years or older, and that interviewees who earned less than $60,000AUD per year were more likely to obtain pre-travel health advice than those who earned more than $60,000 per year. However, no significant associations were evident in this study between the highest level of education of the interviewee or the interviewee's nationality and advice-seeking behaviour. Likewise, Provost and Soto[91] also found that younger travellers (less than 45 years of age) are more likely to obtain pre-travel health advice than older travellers and that there was no association between the traveller's highest level of education and advice-seeking behaviour. However, in contrast to this study, Provost and Soto also found no significant associations between gender or income and advice-seeking behaviour[91].

Other significant associations identified from this study are that interviewees travelling in groups are more likely to obtain pre-travel health advice than those travelling alone, those travelling for leisure are more likely to obtain pre-travel health advice than those travelling for work-related reasons and those travelling to rural and remote regions are more likely to obtain pre-travel health advice than those travelling to metropolitan areas. Finally, interviewees travelling to global regions other than Oceania are more likely to obtain pre-travel health advice than those travelling to Oceania (mainly PNG and New Zealand). Provost and Soto did not examine the association between these predictors and advice-seeking behaviour. However, they did note that for younger travellers not staying in a hotel was significantly associated with obtaining pre-travel health advice, as was travelling with children[91]. In this study, the number of interviewees travelling with children was relatively low and so the association between the actual composition of travelling parties and advice-seeking behaviour was not tested beyond the number of people in the party.

Finally in this study no significant associations existed between whether an interviewee had a previous travel-related illness or whether the interviewee had travel health insurance and advice-seeking behaviour. In contrast, Provost and Soto noted a significant association between whether a traveller had health problems in previous journeys and the traveller obtaining pre-travel health advice[91].

Table 2-4 Correlation between obtaining pre-travel health advice with predictors of travel-seeking behaviour

(a) Significant associations between predictors and travel-seeking behaviour

Variable	% of each variable that obtained pre-travel advice	n (218)	X^2	df	p	phi
Are female interviewees are more likely to obtain pre-travel health advice than female?						
Female	57.7%	71				
Male	34.0%	147	10.1	1	0.001	-0.22
Are interviewees younger than 40 years of age more likely to obtain pre-travel health advice than those aged over 40?						
Under 40 years of age	54.2%	72				
Over 40 years of age	35.6%	146	6.08	1	0.014	0.18
Are interviewees who earn less than $60,000AUDpa more likely to obtain pre-travel health advice than those earning more than $60,000AUDpa?						
<$60,000AUDpa	55.6%	72				
>$60,000AUDpa	32.7%	110	8.4	1	0.004	0.23
Are interviewees who travel in groups of 2 or more people more likely to obtain pre-travel health advice than those who travel alone?						
Travel in groups of 2 or more people	52.1%	117				
Travel alone	29.7%	101	10.3	1	0.001	-0.23
Are interviewees who travel for leisure more likely to obtain pre-travel health advice than those who travel for work-related reasons?						
Travelling for leisure	55.0%	109				
Travelling for work	28.4%	109	14.8	1	0.00	0.27
Are interviewees who travel to other regions more likely to obtain pre-travel health advice than those who travel to Oceania?						
Other global regions	53.8%	104				
Oceania	30.7%	114	11.1	1	0.001	-0.234
Are interviewees who travel to rural or multiple destinations more likely to obtain pre-travel health advice than those who travel to capitals or other metropolitan areas?						
Rural or multiple destinations	53.7%	151				
Capital cities or other metro areas	36.4%	67	5.0	1	0.025	-0.162

(b) Non-significant associations between predictors and travel-seeking behaviours

Variable	% of each variable that obtained pre-travel advice	n (218)	X^2	df	p	phi
Are citizens of other countries more likely to obtain pre-travel health advice than Australians?						
Citizens of other countries	46.2%	106				
Australians	37.5%	112	1.4	1	0.243	-0.09
Are university graduates (bachelor level and postgraduates) more likely to obtain pre-travel health advice than non-university educated interviewees (tradespersons, diploma and grade 10 and 12 graduates)?						
University graduates	42.3%	111				
Non-university education	41.1%	107	0.002	1	0.964	-0.01
Are interviewees who had a travel-related illness in the preceding 3 years more likely to obtain pre-travel health advice than those who did not?						
Preceding travel-related illness	41.4%	58				
No travel-related illness	41.9%	160	0.000	1	1.0	-0.004
Are interviewees who have travel health insurance more likely to obtain pre-travel health advice than those who did not?						
Have travel health insurance	45.1%	173				
No travel health insurance	28.8%	45	3.2	1	0.073	0.133

2.5.2.2 Sources of pre-travel health advice

91 (41.7%) interviewees obtained pre-travel health advice prior to their journey, and of these 68% (62/91) used only one information source with the remainder using multiple information sources (range 2-4 sources). The five most common sources of information used by the interviewees were GPs (59.3%, 54/91) followed by the internet (37.4%, 34/91), family and friends (13.2%, 12/91), travel agents (8.8%, 8/91) and their employer (8.8%, 8/91). Only small numbers of interviewees used a specialist travel clinic (4.4%, 4/91) or pharmacists (2.2%, 2/91) to obtain pre-travel health advice. This is comparable with the findings of other studies, who also found that GPs are either the most common source or one of the most common sources of pre-travel health advice used by travellers and that pharmacists are rarely used [55 57 95]. Surprisingly, although PNG is a developing country, fewer interviewees in the PNG subgroup (36.1%, 30/83) obtained pre-travel health advice compared with the interviewees travelling to other destinations (45.2%, 61/135). Finally, it is recommended that travellers should obtain pre-travel health advice at least 6-8 weeks before travel to ensure there is adequate time to administer vaccinations before departure[115 116]. 50.5% (46/91) of those who obtained pre-travel

health advice obtained it 6 or more weeks before travelling. The average time advice was received was 8.16 weeks before departure (range 2 days to 2 years).

2.5.2.3 Reasons for choosing particular sources of pre-travel health advice

The interviewees who obtained pre-travel health advice were asked to state the reasons why they had chosen to use those particular sources of information. Their comments were firstly collated and coded using a conceptual framework, and then an interpretive thematic analysis was performed to identify and report on any patterns within the data using the methods and techniques described by the authors Braun and Clarke[106], Liamputtong and Serry[107] and Liamputtong[108]. Most interviewees gave a series of short statements and it was found that the comments of each interviewee could be categorised into one of five major themes which are summarised in order of prevalence in table 2.5.

Table 2-5 Thematic analysis of the reasons given by interviewees for their choice of source of pre-travel health information

Major theme	Explanation	Number (Percentage) of interviewees (n=91)	Example comments
Convenience or Ease of Access	The Interviewee selected the information source as it was the most convenient or was the easiest to access	43 (47.3%)	Interviewee 12 (Internet, Travel agent): *"Convenience, I don't have a regular GP"* Interviewee 27 (Internet, GP, Family and Friends): *"Easiest and fastest way to obtain information"* Interviewee 60 (Internet): *"Ease and convenience"* Interviewee 72 (Books, Internet, GP): *"Needed to be aware of the issues and these were easy to use"* Interviewee 120 (Internet): *"Easier… uses less time"*
Level of Knowledge	The interviewee felt that the travel health service provider had a superior, more up to date or more specialised knowledge, or other providers had insufficient knowledge compared to that health provider, or that the interviewee had sufficient self-knowledge	26 (28.6%)	Interviewee 24(Company/Employer): *"They live in PNG and so have local knowledge"* Interviewee 30 (GP, Family and Friends): *"They are very knowledgeable about travel health"* Interviewee 39 (Internet, Travel Clinic, GP, Travel agent): *"…going to India and so I wanted a range of specialist advice"* Interviewee 107 (GP): *"They know all of the health issues"* Interviewee 182 (Family and Friends): *"I have my own knowledge as a doctor and dentist, and my friends gave me the inside knowledge of the local disease patterns"*

Required to or advised to use that source of information	The interviewee felt that it was essential that they use that particular source of information because they thought it was the only service that could provide that particular service (e.g. vaccines or prescription medications) or that it was a requirement of their employer to use that information source or there was a legislative requirement to use that particular service provider (e.g. Yellow Fever vaccine)	16 (17.2%)	Interviewee 5 (GP, Internet): *" It was a requirement of the university, also I needed a prescription and vaccines – a one-stop shop"* Interviewee 48 (GP): *"I had to get prescriptions"* Interviewee 61(Company/Employer): *"I had to attend"* Interviewee 102 (Internet, GP): *"…advised to use NHS Direct"* Interviewee 142 (GP): *"The shipping company paid for the medical"* Interviewee 152 (GP): *"He can write prescriptions"*
Trust or Confidence	Either the interviewee had a great deal of trust in that particular source of information or wanted to compare the information given by a range or sources due to a lack of trust in one of the sources due to conflicting advice.	4 (4.4%)	Interviewee 9 (GP): *"I trust my GP's advice"* Interviewee 11 (Travel Agent): *"I have used them before and value their advice"* Interviewee 29 (GP, Family and Friends): *"More confident in the advice given"*
Personal Preference	The interviewee's choice was based purely on personal preference with no other reason given.	2 (2.2%)	Interviewee 94 (GP, Internet): *"I prefer to visit a doctor before travelling"*

Convenience and ease of access of the service was the most predominant theme, particularly among members of the PNG subgroup and interviewees who had chosen to use online information resources. Interestingly, convenience, ease of access and the availability of qualified and experienced staff are often used as justifications for the development of extended community pharmacy services, and also patients also often complain of the difficulty in obtaining appointments with their GP[72 73 80]. However, in this study, although convenience and ease of access was considered important to the interviewees, few interviewees had used a pharmacist to obtain pre-travel health advice and many had used their GP. The perceived level of knowledge of their chosen information source(s) or how it compared with other sources of information was the second most prevalent theme and it appeared equally important to all subgroups of interviewees.

More minor themes were that a number of interviewees (particularly members of the PNG subgroup) were mandated to use a particular source of advice by their employer or that some services were only available from a particular information source of information, and finally, a small number of interviewees chose a particular source because they had greater trust or confidence in that particular source or that it was simply a matter of personal preference.

2.5.2.4 Reasons why some interviewees do not obtain pre-travel health advice

The interviewees who did not obtain pre-travel health advice were specifically asked why they did not seek or obtain pre-travel health advice before their journey. Their comments were collated and as before, a thematic analysis was applied to identify patterns within the data and the results are summarised in table 2.6.

Table 2-6 Thematic analysis of the reasons given by interviewees for not obtaining pre-travel health advice prior to their journey

Major theme	Explanation	Number (Percentage) of interviewees (n=127)	Example comments
Visited the destination before	The interviewee had travelled to the destination at least once before and therefore felt that they knew the risks associated with the destination and/or the precautions that are required	59 (46.5%)	Interviewee 3: *"I've visited PNG before and so know the risks involved"* Interviewee 64*: "... was given an information pack from the company for my first trip. Looked into everything for the first journey"* Interviewee 73: *"...been there loads of times and know the risks involved"* Interviewee 103: "*I've travelled to Japan before. I knew what injections were required"* Interviewee 194 "*I've been to Australia five times before and was staying with family and friends. I was very comfortable about where I was staying"*
Assumed not necessary	The interviewee just assumed that it was not necessary to obtain pre-travel health advice or that no medical checks were required or assumed they knew the risks involved	23 (18.1%)	Interviewee 16: *"Didn't think it was necessary"* Interviewee 89: *"Didn't need any (advice)"* Interviewee 90: "*Just knew it was OK"* Interviewee 111: "*Didn't really think about it"* Interviewee 150: *"I know all the risks..."*
Presumed travelling to a safe and/or low risk destination	The interviewee stated that they felt they were travelling to a safe destination and therefore that there would be no health risks at the destination	20 (15.7%)	Interviewee 2: *"...travelling to Japan, I assumed there are no health problems "* Interviewee 18: *"....going to a western country, I assumed the risks were low and the country is clean"* Interviewee 36: *"I felt quite safe coming to Australia from PNG"* Interviewee 126: *"Australia is quite a civilised destination"* Interviewee 218: *"I assumed Australia and Singapore to be on a similar par to the UK....no problems and the infrastructure is of a similar standard to take care of any issues."*
Travel frequently	The interview stated that they were frequent international travellers to various destinations and therefore did not need to obtain pre-travel health advice as they had followed the precautions required for previous visits	11 (8.7%)	Interviewee 15: *"..my last journey was to India and I had all of the vaccinations then, and I still have the medical kit I got for India"* (Interviewee was travelling to Japan when interviewed) Interviewee 42: *"...travel so often, I know it all by heart"* Interviewee 65: *"I've already had all of the vaccinations as I recently travelled to Africa"* (Interviewee was travelling to France when interviewed)

Work in the health field	The interviewee was a practising healthcare profession and did not obtain additional pre-travel health advice	5 (3.9%)	Interviewee 43: *"I have a nursing background and know what to do"* Interviewee 91: *"I'm a doctor myself and travel so often"* Interviewee 204: *"I work in the health industry and know how to treat common minor issues"*
Returning home	The interviewee was returning home and therefore felt that they did not need pre-travel health advice.	4 (3.1%)	Interviewee 14: *"Returning home, don't expect any health problems"* Interviewee 144: *"I'm going home to Austria"*
Did not wish to see or distrusted health professionals	The interviewee either actively chose not to visit a health professional or had a distrust of health professionals	3 (1.4%)	Interviewee 34: *"I'm sick of seeing doctors"* Interview 145: "*Trust my own instincts. I have distrust of medical people"*
Insufficient time before travel	The interviewee stated there was insufficient time between the decision to travel and the date of travel to obtain pre-travel health advice	2 (0.9%)	Interviewee 52: *"the notice was too short, I'm going to a mine site"* Interviewee 154*: "the timeframe before flying, less than a day, meant I couldn't get advice"*

The most prevalent theme, particular among the PNG subgroup, was that the interviewee did not obtain pre-travel health advice because they had visited the destination before and therefore, as a result, felt that they were fully aware of any risks associated with their particular destination. This is to be expected as many of the interviewees in the PNG subgroup were FIFO workers, flying to and from PNG on a frequent basis, although the theme was also commonly expressed by the leisure travellers visiting other destinations. The next three most prevalent themes (that they assumed that pre-travel health advice was not necessary, that they thought they were visiting a safe destination or that they travel frequently) were expressed relatively more commonly by leisure travellers visiting other destinations than PNG. This is an important finding as it demonstrates that many leisure travellers simply assume their destination is safe and that pre-travel health information is not required, even though travel-related health issues can potentially occur at all destinations. Only a relatively small number of interviewees expressed comments that were categorised into one of the remaining four themes which are that they either work in a health field themselves, or that they are returning home, or that they actually distrust health professionals or that there was insufficient time to obtain health advice before travel.

2.5.2.5 Reasons why interviewees did not use pharmacists as a source of pre-travel health advice

Only 2.2% (2/91) of the interviewees who obtained pre-travel health advice, obtained that advice from a community pharmacist. Those interviewees that did not were asked why they had not considered using a pharmacist as one of their sources of information. Their comments and responses were again analysed with a thematic analysis to identify and report on patterns within the data. Ten major themes were found and these are summarised in order of prevalence in table 2.7.

Table 2-7 Thematic analysis of the reasons given by interviewees for not using pharmacists as a source of pre-travel health advice before their journey

Major theme	Explanation	Number (Percentage) of interviewees (n=89)	Example comments
Didn't know that travel health services were offered from pharmacies	The interviewee explicitly stated that they did not know that pharmacists offered travel health services.	23 (19.8%)	Interviewee 29: "*Did not know that pharmacists offered this service, didn't even consider going to a pharmacy".* Interviewee 37: *"Didn't know they offered the service".*
Preferred to, or it was more convenient to, use another source of pre-travel health information	The interviewee mentioned that they preferred to use another source of pre-travel health information or that is was more convenient to do so.	22 (19.0%)	Interviewee 62*: "No need to (visit a pharmacy), the company has a large medical department and will perform examinations if necessary".* Interviewee 66: "*I asked friends who had travelled to the same destination, they knew what to do. It is easier to look up on the internet. Perhaps if I was older I'd ask a pharmacist".* Interviewee 92: *"would use the internet instead of using a pharmacist".* Interviewee 100: *"I go to a nurse or GP for advice. Wouldn't occur to me to ask a pharmacist in the UK".*
Only a limited range of services offered by community pharmacists	The interviewee mentioned that they went to other information sources due to the limited range of products or services available from pharmacies e.g. prescription medications and/or vaccines are only available from pharmacies after they have been to see a doctor and have a prescription	20 (17.2%)	Interviewee 1*: "knew I would need a vaccine".* Interviewee 57: "*Needed some prescriptions as well, so went to my doctor".* Interviewee 96: *"Knew I needed a script or vaccination, therefore would have to go to a doctor as well".* Interviewee 148: *"can't get shots from a pharmacy".* Interviewee 152: *"Pharmacists can't prescribe or give injections".*
Lack of trust in the pharmacist or perceived lack of knowledge	The interviewee appeared to have a lack of trust in the advice or services available from pharmacies or felt that pharmacists had insufficient knowledge or training in the field	15 (12.9%)	Interviewee 8: *".less trust and the level of training"*. Interviewee 56*: "I thought the information from a travel guide would be more complete than what a pharmacist would give"* Interviewee 93*: "They don't really know about travel health. They give good advice, but the doctor will ring up the correct association".* Interviewee 107: *"the pharmacist knows about medications not diseases so I wouldn't go to a pharmacist".* Interviewee 155: *"Doctors are updated on a regular basis (weekly or daily) about travel-related issues. Pharmacists are less knowledgeable"* Interviewee 191: *"I trust my GP more"*

Perceived pharmacist disinterest and lack of communication with pharmacists	The interviewee felt that either the pharmacists appeared disinterested in providing travel health and other extended clinical services or they perceived barriers to communicating with the pharmacist	11 (9.5%)	Interviewee 31: *"Pharmacists seem more interested in sales than advice. They don't seem to have my best interests at heart".* Interviewee 101: *"I don't speak to the pharmacist, just the counter assistant. The pharmacist always seems too harassed".* Interviewee 102: *"I don't have a personal relationship with the pharmacist where I currently live. The Pharmacist always seems "cheesed off" if they have to speak to me".* Interviewee 109: *"Not so easy to ask a pharmacist in Germany".* Interviewee 128*: "...also often find that pharmacists don't want to talk to you anyway".* Interviewee 212: "*In the UK you don't really get advice from a lot of pharmacists, it is just really starting to come in and not everywhere".*
Happy to use the pharmacist for other services but not for travel health	The interviewee commented that they were happy to use the pharmacy for other services but not travel health services	11 (9.5%)	Interviewee 39: *"Pharmacists in Spain do give good advice but I wouldn't think of them for that sort of advice".* Interviewee 138: *"Would use a pharmacist for symptoms of illness but not for travel advice"* Interviewee 162: *"Pharmacists are good for domestic issues, but you go to a doctor for more serious issues..."* Interviewee 198: *"Happy to use pharmacists for other advice but not travel".*
No specific reason given	The interviewee stated that they did not use a pharmacy for pre-travel advice but did not state a specific reason other than they just did not consider using a pharmacy	10 (8.6%)	Interviewee 110: *"...no specific reason..."* Interviewee 186: *"...didn't really think about it ..."*
Lack of privacy or confidentiality	The interviewee stated that they did not use a pharmacy because of a perception that there is a lack of confidentiality in the pharmacy.	2 (1.7%)	Interviewee 106: *"I feel more confident talking to a GP, confidentiality is assured..."* Interviewee 118*: "I'd already discussed my health issues with a doctor, there's no privacy in the pharmacy".*
Lack of time	The interviewee stated that there was insufficient time before travelling to allow them to visit a pharmacy	1 (0.9%)	Interviewee 120: *"...didn't have time"*
Advised to go elsewhere	The interviewee was advised to obtain their pre-travel health check and advice from another source	1 (0.9%)	Interviewee 192: *"I was told to go to a doctor for advice, so visited a doctor not a pharmacist".*

The three most prevalent themes were because they were either unaware that pharmacists actually offered travel health services, or that interviewees preferred to use, or found it more convenient to use,

other sources of information, or that pharmacies could only offer a limited range of travel health services. Nearly 1 in 5 interviewees who did not use pharmacists as a source of pre-travel health information made comments that could be categorised into one of these three categories. Anecdotally, it is true that many Australian community pharmacies do not currently overtly offer or advertise travel health services. Therefore, it was expected that a number of Australian interviewees would state that they were unaware of pharmacy-run travel health services. However, as discussed earlier, it was more surprising that many interviewees stated that they used other sources of pre-travel health advice because they were more convenient or accessible, as pharmacy-run services are often promoted as being very convenient or accessible when compared to medical services[72-74 78 80 122 123], and yet this does not appear to be the perception of some of the interviewees in this study. However, it appears that many of the interviewees who expressed these comments were actually comparing pharmacy services with online information services. The third most prevalent reason, (that pharmacies only offer a limited range of services), appeared particularly important to interviewees in the PNG subgroup and many in this subgroup also felt that pharmacists were less knowledgeable. This is understandable as many in the PNG subgroup are FIFO workers visiting a tropical environment and therefore were more likely to prefer to visit a practitioner who can offer a more complete “one-stop-shop” model of care and it may also be mandated by their employer to visit a particular practitioner. There is also probably a perception that due to the nature of their destination that they require more specialised care. As Australian pharmacists are limited in their ability to supply some medications and vaccines without a prescription from another practitioner, they are currently unable to provide such a comprehensive service. The two most prevalent reasons for not using a pharmacist for pre-travel health advice by interviewees travelling mainly for leisure (i.e. those travelling to destinations other than PNG) were the lack of convenience and that they did not know that the services were actually offered, which demonstrates a need for the better promotion of advanced or cognitive services from pharmacies as they are developed and implemented.

As shown in table 2.7, relatively low numbers of interviewees expressed comments that could be categorised into the remaining six themes, although two interesting trends are seen. Firstly, a small number of interviewees (all travelling to destinations other than PNG) commented that they did not use a pharmacist for pre-travel health advice because they felt that it was either difficult to communicate with the pharmacist, or that the pharmacist appeared somewhat disinterested. This is a very disappointing finding as in recent years pharmacists and the professional bodies have endeavoured to develop and promote advanced clinical and cognitive services from pharmacies. However, it must be remembered that the interviewees in this study came from a range of countries, and as the models of pharmacy practice vary between countries this may have affected the findings. Secondly, only two interviewees stated any concerns regarding a lack of confidentiality when using a pharmacy for travel health advice. This is a concern that is often raised by competing health professions regarding the development of cognitive services in pharmacies[123]. However, it appears to be less of a concern for the actual users of such services.

2.5.2.6 Pre-travel health advice topics given to the interviewees prior to travel

The primary, and sometimes only, pre-travel health concern of many travellers are whether vaccinations are required, and whether there is a risk of malaria is at their planned destination [1]. Reports have also suggested that these are also the two most common topics about which health care providers counsel travellers before travel[18 62]. Therefore, it is not surprising that when questioned, these were also found to be the first and second most prevalent topics about which interviewees have received counselling (table 2.8), and that, although overall the interviewees received information about a wide range of topics, few received information on topics other than vaccination requirements and malaria prevention.

Therefore, these findings confirm the need for greater information and for more thorough and comprehensive counselling for travellers about a wider range of topics.

Table 2-8 Pre-travel health information received by all interviewees

Topic	Percentage of interviewees who received information (n=91)
Vaccinations required or recommended for journey	74.7
Malaria chemoprophylaxis and prevention	31.9
Food and water precautions	18.7
Health alerts and general travel advice	11.0
Prophylaxis and treatment of other conditions	9.9
Medication (Supply and travelling with medications)	6.6
DVT prophylaxis	6.6
Medication (Letters and documentation)	5.5
Prevention of insect bites	5.5
Medical check-up	3.3
Security or safety issues at destination	2.2
Sunburn	1.1
First aid kit or medical kit	1.1
Visa requirements	1.1
Foot care in the tropics	1.1
Clarifying conflicting advice	1.1
Travelling while pregnant	1.1
Travelling after recent surgery	1.1
Safe sex and use of condoms etc	1.1

2.5.3 Vaccination history of the interviewees

Many of the interviewees were poor historians when asked about their vaccination history. Whereas, most interviewees gave confident and definite answers when asked whether they had, or had not, received well-known vaccinations such as tetanus (95% of interviewees knew they had definitely received the vaccine in the past, 3.7% knew they definitely had not, and only 1.4% were unsure), fewer interviewees could give confident and definite answers when asked about less well-known vaccines such as diphtheria (61% knew they had definitely received the vaccine, 21.6% knew they definitely had not and 17.4% were unsure). Even though in the standard immunisation schedule of many countries, tetanus, diphtheria and pertussis vaccines are usually co-administered in childhood. Also, it was found that unless the vaccine had been recently administered for their current journey, very few interviewees could give full details of the vaccination course administered, with many interviewees stating that they were vaccinated "as a child" or could not remember the exact details as "it was a long time ago". Only 2 of the interviewees mentioned that they carried a formal vaccination record with them when travelling and could show it to the interviewer. The data obtained from the interviewees is summarised in table 2.9.

Table 2-9 Summary of the vaccination status of the interviewees

Vaccination	Was the interviewee vaccinated? (n=218)			Vaccinated specifically for this journey? Yes (% n=218)
	Yes (%)	No (%)	Unsure (%)	
Tetanus	95.0	3.7	1.4	2.8
Diphtheria	61.0	21.6	17.4	1.4
Poliomyelitis	83.0	11.0	6.0	0.5
Tuberculosis or BCG	64.2	22.5	13.3	0.9
Influenza	33.0	62.8	4.1	0.5
Hepatitis A	53.2	36.7	10.1	6.4
Hepatitis B	63.3	28.0	8.7	3.7
Japanese encephalitis	7.3	88.5	4.1	0.0
Meningococcal A & C	11.5	80.7	7.8	0.5
Rabies	11.5	83.9	4.6	0.5
Tick borne encephalitis	0.5	94.5	5.0	0.0
Typhoid fever	47.7	44.0	8.3	8.3
Yellow fever	24.8	67.9	7.3	0.9

In the ETHAB Study, Van Herck et al[55] questioned travellers about their vaccination status and applied strict criteria to categorise whether travellers were protected or not protected against hepatitis A and B based on the number of doses received, whether they were vaccinated for their current journey and/or their previous immune status. They found that protection rates were low, with only 22.0% of travellers

in the study being considered as being protected from hepatitis A, 9.6% being considered as possibly protected, and 44.4% being considered as not protected. They also found that protection rates varied for different types of travellers, being lowest with VFRs (10.9%) when compared with business travellers (18.5%) and tourists (25.6%)[55].

In this study, 53.2% (16/218) of interviewees stated that they had previously been vaccinated against hepatitis A. However, as with many of the vaccinations discussed with the interviewees, few interviewees could give the exact details of the vaccination regimen they had received in the past. Therefore, an estimation of the protection status of the interviewees against hepatitis A or any of the other common vaccine-preventable travel-related diseases similar to that carried out by Van Herck et al was not attempted.

Seasonal influenza is a relatively common condition reported by travellers, and annual vaccination is recommended by many travel health organisations for frequent travellers and/or for certain at risk groups in the population[3 124]. It was found that just under a third of the interviewees in this study stated that they had been vaccinated against influenza before their journey. As influenza vaccination involves a single annual injection, it could be assumed that those interviewees who could remember being vaccinated in the preceding year could be classified as being “protected” against influenza. Although in reality, it must be remembered that influenza vaccine is not totally effective in that it only offers some protection against the most common strains expected that influenza season. However, it must also be noted that although influenza vaccination only involves the administration of a single injection, 4.1% of interviewees were still unsure and could not recall whether they had been immunised in the preceding 12 months.

2.5.4 Knowledge, attitudes and practices (KAP) of the interviewees regarding some common travel-related disorders

Section D of the interview schedule assessed the KAP of the interviewees regarding a series of travel-related disorders. Eight disorders were chosen and were categorised into one of two groups. Firstly, traveller’s diarrhoea, DVT and relatively minor travel-related disorders (motion sickness, jet lag, sunburn or skin cancer risk) and secondly, more serious travel-related disorders (Malaria and hepatitis A and B).

2.5.4.1 Perceived KAP of interviewees regarding traveller’s diarrhoea, DVT and relatively minor travel-related conditions

2.5.4.1.1 Traveller’s diarrhoea (TD)

51.8% (113/218) of interviewees had experienced TD on previous journeys and the majority of interviewees (85.8%, 187/218) demonstrated good knowledge and understanding of the common routes of transmission of TD. 22.9% (50/218) of interviewees could also describe a number of other plausible causes of diarrhoea, such as changes in diet and alcohol intake while overseas and some medications. Only 3 interviewees (1.4%) reported that they did not know how TD is transmitted. This concurs with the findings of Provost and Soto[90], who examined the KAP of travellers leaving Quebec about some travel-related infectious diseases and also found that, unlike some other infectious

diseases, the majority of respondents (93%) were aware of the routes of transmission of TD. Likewise, Johnson et al[125] in a study examining the knowledge of Canadian travellers about the prevention and treatment of TD found that almost all participants were aware that TD was caused by bacteria, although fewer participants (43.7%) were aware that viruses can also cause TD.

When asked to estimate the risk of TD at their destination, similar numbers of interviewees were expecting the risk of TD to be either similar (45.4%, 99/218), or higher (44.0%, 96/218) at their destination, and 6.4% (14/218) of the interviewees were expecting the risk to be lower than in Australia. A small number of interviewees (4.1%, 9/218) did not know the comparable risk of TD at their destination compared to Australia.

The interviewees were asked what precautionary measures they intended to take or follow to prevent diarrhoea while travelling and their responses are summarised in table 2.10.

Table 2-10 Summary of the precautions that interviewees intend to take to prevent diarrhoea on their current journey (n=218). (Interviewees could suggest more than one precaution)

Precaution	Percentage of interviewees who reported they would be taking the precaution (n=218)
Not intending to take any precautions to prevent diarrhoea	32.1%
Take greater care in the selection of food or water or where to eat or drink than they would at home	29.8%
Intending to drink bottled water	24.8%
Intended to ensure follow strict personal hygiene e.g. regular hand washing and/or the use of alcoholic hand rub	18.3%
Intending to follow standard recommendations and guidelines on food and water hygiene and the selection of appropriate and safe food and drink	10.1%
Be careful or avoid using the local (tap) water supply	7.3%
Boil local (tap) water before drinking	6.0%
Is carrying a treatment for diarrhoea and will use it if diarrhoea occurs but will not take other precautions	2.8%
Will use water purifying tablets or equivalent to sterilise drinking water	2.3%
Did not know how to prevent diarrhoea	1.4%
Will not drink alcohol while overseas	0.5%

Although many interviewees had previously experienced TD and were well informed about its potential causes, table 2.10 shows that the interviewees did not appear to be either as knowledgeable about how to prevent diarrhoea, or as willing or inclined to follow recommended precautionary measures to reduce the risk of diarrhoea on their journey. Nearly a third of the interviewees (32.1%, 70/218) reported that they did not intend to take any special precautions while overseas to reduce the risk of diarrhoea. Taking greater care in the selection of food and drink and places to eat (29.8%, 65/218),

the drinking of bottled water (24.8%, 54/218), and attempting to have strict personal hygiene in regard to hand washing (18.3%, 40/218) were the most common precautionary measures that interviewees intended to follow. However, the number of interviewees who said that they would be using these methods was surprisingly low, and when asked, relatively few of the interviewees mentioned that they would be taking more than one precautionary measure to reduce diarrhoeal risk. (Average number of precautionary measures being followed was 1.5 per interviewee). Only 1 in 10 interviewees said that they intended to follow the standard recommended restrictions on the most appropriate foods to eat and drink to reduce the risk of diarrhoea and only 7.3% (16/218) of the interviewees said that they would be careful or avoid using the local tap water, with even fewer saying they would either boil water before drinking it or use some form of water purifying method. Likewise, in the ETHAB study, participants also appeared to be equally reluctant to take precautionary measures to prevent TD because only 26% of respondents planned to restrict their intake of items of food and drink that could be potentially contaminated[55].

Whereas, interviewees did not appear too willing to take precautionary measures to prevent diarrhoea, they appeared a little more knowledgeable about the recommended treatments for diarrhoea. When asked about how they would manage a bout of diarrhoea if it occurred, many interviewees discussed management plans that broadly complied with recognised management guidelines. The majority of the interviewees (56.4%, 123/218) would initially self-treat the diarrhoea either with antidiarhoeal medications (such as Loperamide), rehydration solutions (41.7%, 91/218) (although not always required for healthy individuals) or both and then only contact a local doctor (16.5%, 36/218) or pharmacist (12.4%, 27/218) for advice or treatment if the symptoms persisted. Only 3.2% (7/218) of the interviewees said that they would use antibiotics that they are carrying with them and 3.2% (7/218) did not know what they would do. The other responses are summarised in table 2.11.

Table 2-11 Summary of the methods of management or treatments that interviewees intended to use if they contracted diarrhoea on their current journey (n=218, interviewees could suggest more than one method of management)

Method of management or treatment	Percentage of interviewees who reported they would be taking precaution (n=218)
Use an antidiarrhoeal agent	56.4%
Allow the diarrhoea to run its natural course, while maintaining level of hydration with fluid and electrolytes	41.7%
See a local doctor if the diarrhoea persisted	16.5%
Visit a local pharmacist for advice or an OTC remedy if the diarrhoea persisted	12.4%
Did not know what they would do	3.2%
Use antibiotics (from their medical kit)	3.2%
Ask at their hotel who is the best person in the locality to contact	0.5%

Therefore it can be concluded that generally the interviewees were knowledgeable about the causes and how to manage traveller's diarrhoea, but appeared less inclined to follow, or less knowledgeable about, standard precautionary measures that could potentially reduce the risk of diarrhoea.

2.5.4.1.2 Deep vein thrombosis (DVT)

Long distance travel, combined with other risk factors, can increase the risk of venous thromboembolism (VTE), leading to the possible development of DVT and the risk of progression to pulmonary embolism (PE) and is sometimes referred to as "Economy Class Syndrome" [126]. 78.4% (183/218) of interviewees were aware of the terms DVT or economy class syndrome and 97.1% of these interviewees could describe in their own words that the syndrome was due to the development of intravascular clots and knew some of the potential causes and risk factors. 64.2% (140/218) of the interviewees also stated that they were taking one or more precautionary measures to attempt to reduce their DVT risk during their journey and these are summarised in table 2.12.

Table 2-12 Summary of the precautions that interviewees being taken by the interviewees to prevent DVT on their current journey (n=218. Interviewees could suggest more than one precaution)

Precaution	Percentage of interviewees who reported they would be taking precaution (n=218)
Perform exercises, stretches and/or try to move around the cabin during their flight	56.0%
Wear compression stockings	9.6%
Take low dose aspirin	8.3%
Ensure they drink plenty of non-alcoholic or caffeine-free fluids during their flight and maintain adequate hydration	5.5%
Reduce or stop alcohol consumption during flight	2.3%
Travel business or first class (as there was more room	1.8%
Reduce caffeine intake	0.5%
Using a Low Molecular Weight Heparin	0.5%
Interviewee already taking warfarin	0.5%
Take ibuprofen	0.5%
Take shoes off during flight	0.5%
Break-up long haul flight with stopovers	0.5%
No precautionary measures	35.8%

Although many interviewees were aware of the risks of VTE, few considered themselves to be at great risk as 35.8% (78/218) were taking no precautions and 56.0% (122/218) were simply intending to move around the cabin as much as possible during their flight and/or perform stretches or exercises. Table 2.11 shows that only relatively small numbers of interviewees intended on following the other strategies recommended for DVT prevention for all travellers such as avoiding dehydration, restricting their alcohol and caffeine intake and avoiding the stowage of hand luggage or other materials at their feet which could restrict movement etc[127]. Few interviewees were taking active measures to prevent DVT with only 9.6% (21/218) wearing compression stockings and only a very small percentage using low molecular weight heparins (0.5%, 1/218) or other anticoagulants (0.5%, 1/218).

The interviewees also appeared to have some misconceptions as 8.3% (18/218) taking low-dose aspirin as an antiplatelet agent, which is no longer recommended for the prevention of travel-related DVT[127 128], and one interviewee said they were using Ibuprofen for the same indication although it is not licensed as an antiplatelet agent. Finally, four interviewees (1.8%) mentioned that they would be at a lower risk of DVT because they were flying business or first class and would therefore have more room to move, however, there appears to be no evidence to suggest that this would be the case.

2.5.4.1.3 Jet lag

Jet lag is a transient condition that often occurs when air travellers cross 3 or more time zones in one journey and is caused by a de-synchronisation of the circadian rhythms and internal controls for sleep and wakefulness with the external environment[1 129]. Few medications are recommended for the management of jet lag other than the short-term use of short-acting hypnotics to help promote a normal sleeping pattern when the traveller arrives at their destination[1 129] Melatonin has also been recommended by some clinicians although its use is still controversial and it is not readily available in all countries[1 129]. Therefore, recommendations for the prevention and management of the effects of jet lag revolve around non-pharmacological advice and measures to promote a more regular and restful sleep pattern for the traveller as soon as possible after reaching their destination[1 129].

Less than half of the interviewees (45.4%, 99/218) in the study had experienced jet lag on previous journeys, and only 19 interviewees (8.7%) said that they take medications to either prevent or manage the condition and these are summarised in table 2.13.

Table 2-13 Summary of the medications taken by the interviewees to prevent or treat jet lag (n=19, some specified more than one remedy)

Medication/Remedy	Number of Interviewees
A “homoeopathic remedy” (unspecified)	3
A “herbal remedy” (unspecified)	3
Alcohol	2
Temazepam	2
A “sleeping tablet” (unspecified)	2
An “over the counter remedy” (unspecified)	2
A “tablet” (unspecified)	2
Melatonin	2
Paracetamol	1
Promethazine	1

Many of the 19 interviewees were unsure of the generic or brand name of their medication and if the interviewees had known more about their medication then it is likely that range of medications in table 2.13 would have been narrower. For example, melatonin is only registered for use in jet lag in Australia as a homoeopathic medication. Three interviewees stated they were using a homoeopathic remedy, some may have used a homoeopathic melatonin product. With the exception of Temazepam and “a sleeping tablet”, most of the medications and remedies mentioned by the interviewees were potentially available over the counter from pharmacies in the interviewee’s country of origin. Only two interviewees specified that they were taking Melatonin, one was an Australian national and one a US

national, and both had obtained supplies overseas. The interviewees were also asked if they were taking any other measures to prevent or manage jet lag and these are summarised in table 2.14.

Table 2-14 Summary of measures (other than medications) being taken by the interviewees to prevent or treat jet lag (n=218)

Precaution	Percentage of interviewees who reported they would be taking precaution (n=218)
No specific measures	64.7%
Adjust sleep pattern to coincide with destination time zone when on the aircraft and then at destination	16.1%
Drink plenty of fluid and keep hydrated on the flight	6.7%
Set watch to destination time when flight is boarded	5.5%
Stay awake at destination and adjust bedtime to the new time zone	3.2%
Avoid alcohol or do not drink too much alcohol	1.8%
Sleep only when tired on the aircraft (not at the bedtime of the destination)	1.4%
Split the long journey up into smaller flights i.e. have stopovers	1.4%
Do some exercise when they get to their destination	0.5%

The majority of interviewees (65%, 142/218) stated they were not taking measures to reduce the effect of jet lag after their journey. However, 63.8% (139/218) of the interviewees were travelling to PNG, Japan and New Zealand and therefore, in many cases, were not crossing more than three time zones to reach their destination. Therefore, the risk of jet lag would be relatively low in this sample. Table 2.14 shows that many of the standard recommendations used by travellers to reduce the effects of jet lag were known across the whole sample[129]. However, few either knew or followed more measures than simply setting their watch when boarding the aircraft to the local time at their destination, trying to follow the time schedule of their destination, and maintaining good hydration during their flight and few interviewees followed multiple recommendations or measures.

2.5.4.1.4 Motion sickness

Given adequate stimulus, most travellers will experience the symptoms of motion sickness however, some travellers have a greater susceptibility to motion sickness than others[130]. Only 14.7% (32/218) of the interviewees said that they had previously experienced motion sickness, and although 8.3% (18/218) of interviewees said they took medications to prevent motion sickness, most only used them for specific situations (e.g. 6 interviewees said that they only used antiemetics when travelling by sea). Ginger-containing products and hyoscine-containing product were the most common medications carried for motion sickness followed by prochlorperazine-related products (38.1%, 33.3% and 14.3% of medications carried for motion sickness respectively), although dopamine antagonists are not considered to be effective in motion sickness. However, although the incidence of motion sickness in the sample is low as the interviewees were all adults, the majority of interviewees (71.4%) that use medications to prevent motion sickness can purchase them OTC from pharmacies.

2.5.4.1.5 Sun exposure

Most interviewees considered the relative risk of skin cancer at their destination to be either the same or less than the risk in Australia (16.5% (36/218) of interviewees thought the relative risk of skin cancer was higher, 37.6% (82,218) thought it was the same, 37.6% (82/218) thought lower, and 8.3% (18/218) of the interviewees were unsure). The majority of the interviewees (85.8%, 187/218) said that they do try to protect their skin from sun burn or skin cancer, with the use of sunscreens being the most common precautionary method used by these interviewees (80.2%, 150/187), followed by wearing a hat (40.6%, 76/187), protective clothing (31.0%, 58/187) or staying in the shade and/or trying to avoid strong sunlight as much as possible (20.3%, 38/187).

When prompted and asked directly, a slightly larger number (169/218) of interviewees stated they used sunscreens on a regular basis, with the overwhelming majority of these interviewees (82.8%, 140/169) using sunscreens with a SPF (Sun Protection Factor) of 30+. However, to be effective, it is now recognised that sunscreens need to be applied every few hours, or more frequently when swimming or sweating profusely[131], and only relatively low numbers of these interviewees were found to be applying their sunscreen this frequently, with 6.5% (11/169) applying sunscreen 3-4 times daily and 27.8% (47/169) applying sunscreen more frequently. 34.9% (59/1969) and 10.7% (18/169) only applied sunscreen once or twice daily respectively and 20.1% (34/169) only applied it occasionally when doing specific outdoor activities such as gardening, fishing, golf etc. Therefore, although many interviewees appeared aware of the risks associated with excessive sun exposure and do take some precautions, they rely heavily on the use of sunscreens and although many use sunscreens with a high SPF value, only relatively low numbers of the interviewees applied them as frequently as they should.

2.5.4.2 Perceived KAP of interviewees of hepatitis A and B and malaria

2.5.4.2.1 Hepatitis A and B

Hepatitis A and B are two of the most common vaccine-preventable, travel-related conditions and 53.2% (116/218) and 63.3% (138/218) of the interviewees stated they had been immunised against hepatitis A and B respectively. These immunisation rates appear relatively high when compared with other studies, as Wilder-Smith et al[56] found that only 5% of Australasian travellers were immunised against both hepatitis A and hepatitis B, although this may have been influenced by the ethnic mix of their sample (17% of western and 82% Asian ethnicity). Also, Van Herck et al[55] estimated that 22% and 18% of travellers in the ETHAB study were actually protected against hepatitis A and B respectively.

However, although reported immunisation rates appeared relatively high, the interviewees in this study were less knowledgeable about the potential causes, transmission routes and preventative measures for hepatitis compared to other common travel-related conditions such as TD. Whereas, nearly 90% of the interviewees were aware of the transmission routes of TD, only 25.7% (54/218) knew the transmission route for hepatitis A (exposure to contaminated food and water or direct personal contact), and 50% (109/218) knew the transmission route for hepatitis B (contact with blood and body fluids). In addition, whereas only 1.4% of interviewees were unsure of the transmission routes of TD,

53.7% (117/218) and 44.5% (97/218) were unsure of the transmission route for hepatitis A and B respectively. Interviewees also appeared confused between the transmission routes of the two forms of hepatitis with 14.7% (32/218) of interviewees thinking that hepatitis A is transmitted in the same way as hepatitis B and vice versa 1.8% (4/218) of interviewees thought that hepatitis B was transmitted via exposure to contaminated food and water.

When asked about the comparable risk of hepatitis A and B at their destination just over a third of interviewees stated that the risk of hepatitis at their destination was either similar to (33.5%, 73/218 for hepatitis A and 35.3%, 77/218 for hepatitis B), or higher (35.3%, 77/218 for hepatitis A and 33.9%, 74/218 for hepatitis B), than that of Australia. Greater numbers of interviewees were unaware of the comparative level of risk for hepatitis A (28.0%, 61/218) and hepatitis B (27.5%, 60/218) at their destination, whereas only 4.1% (9/218) of interviewees were unaware of the level of risk of TD at their destination. Wilder-Smith et al[56] also found that 34% and 28% of Australasian travellers were also unsure of the risk of hepatitis A and B respectively in their destination country and Provost and Soto[90] also reported that travellers had a poorer knowledge of the transmission routes and underestimated the risk of hepatitis.

Interviewees were asked if or how they intended to prevent contracting hepatitis on their journey and the results are summarised in table 2.15.

Table 2-15 Summary of the precautions that interviewees intend to take to prevent hepatitis A and B on their current journey (n=218. Interviewees could suggest more than one precaution)

Hepatitis A		Hepatitis B	
Precaution	% interviewees taking precaution	Precaution	% interviewees taking precaution
Does not know how to prevent Hepatitis A	42.2%	Does not know how to prevent Hepatitis B	40.4%
Vaccination	22.5%	Avoid sexual contact of contact with blood and body fluids	25.7%
Personal hygiene measures	18.4%	Vaccination	23.4%
Avoidance of contaminated food and water	17.9%	Personal hygiene measures	11.5%
Avoid sexual contact or contact with blood and body fluids	4.6%	Does not intend to take any precautionary measures	4.1%
Does not intend to take any precautionary measures	2.8%	Avoidance of contaminated food and water	3.2%
Avoid insect bites	0.5%	Avoid insect bites	0.5%

Table 2.15 shows that a large proportion of the interviewees were unaware how hepatitis A (42.2%, 92/218) or hepatitis B (40.4%, 88/218) could be prevented and that just under a quarter of interviewees were aware that vaccination is a key preventative measure for both hepatitis A and B. These results highlight the need for greater education of travellers about the risks associated with, and the prevention of, hepatitis.

2.5.4.2.2 Malaria

Globally, malaria causes over 1 million deaths per year and is recognised as a major international public health concern by bodies such as the World Health Organisation[38]. Malaria is also a major concern to individual travellers visiting tropical destinations, and with immunisations, is believed to be one of the most common reasons why travellers will seek health advice before their journey[1]. Therefore, in this study the interviewees were questioned about their knowledge of the disease and importantly, if travelling to a malaria-endemic area, the precautionary measures they would be using, if any, to prevent contracting the disease.

Firstly, it was necessary to determine which interviewees were travelling to malaria-endemic areas. The risk, vector pattern and level of malaria-endemicity varies from country to country and also from region to region within each country. The actual risk faced by each individual traveller is also affected by a range of traveller-related and itinerary-related factors[38]. These include their exact itinerary, whether they are staying in rural or metropolitan locations, their planned activities or occupation, the standard of their accommodation and a variety of other factors. As a result it is difficult to determine the exact and definitive malarial risk of each traveller[38 132]. Therefore for this study, to define whether the interviewee was travelling to a malaria-endemic area, the information given by each interviewee about their travel itinerary was compared with information taken from the WHO, CDC and MASTA websites for that particular country, and if the interviewee was travelling to a country or a region of a country in which malaria was present, for the purposes of this study, they were categorised as travelling to a potential malarial area[133-135].

Using the above criteria, 43.1% (94/218) of the interviewees were categorised as travelling to potential malaria-endemic areas. However, when questioned only 91 (41.7%) of the interviewees thought that malaria would be a problem at their destination. 124 interviewees (56.9%) did not think malaria would be a problem and 3 interviewees (1.4%) were unsure whether malaria would be a problem at their destination. When the interviewee's perceptions were compared with the study classification, it was found that 5 interviewees categorised as travelling to a potential malaria-endemic area by the study criteria either did not consider it to be, or were not informed that there was a potential malarial risk at their destination, and 3 interviewees categorised as travelling to a non-malarial area by the study criteria thought that there was a malarial risk at their destination and 1 of these 3 interviewees, was taking chemoprophylaxis. The 91 interviewees who thought they were travelling to a malaria-endemic area correctly knew that the risk of malaria at their destination would be greater than that of Australia, as malaria is not considered to be an endemic disease in Australia.

2.5.4.2.2.1 Preventative measures taken for malaria

No preventative measures for malaria are absolutely effective[132]. Therefore, an individualised approach involving the use of a combination of methods is recommended. These include: increasing the awareness of the risk of malaria, education about mosquito bite avoidance, the use of appropriate chemoprophylactic agents, and the education of travellers about the early signs and symptoms of infection so that, in the case of prophylactic failure, medical treatment may be obtained immediately and/or when the use of stand-by emergency treatment with antimalarials is recommended[3 38 132 136-141]. The 91 interviewees who correctly thought they were travelling to a malaria-endemic area were

questioned about the preventative measures they were using and their responses are summarised in figure 2.2.

It can be seen across the whole sample that a wide range of different preventative measures were being applied however, the number of interviewees using multiple measures appeared low (average of 1.9 measures per interviewee) and importantly, that 14.3% (13/91) of the interviewees travelling to malaria endemic areas not intending to use any precautionary measures.

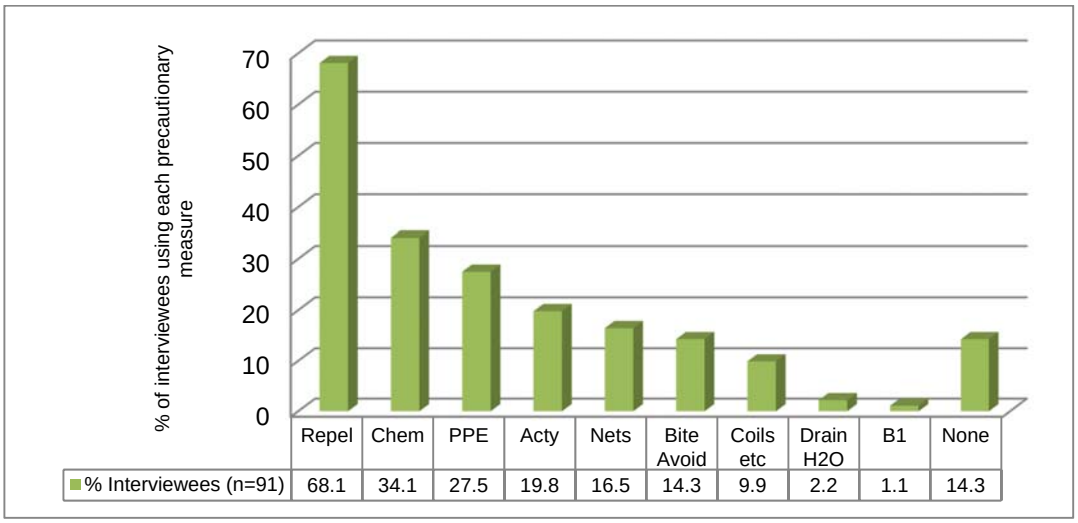


Figure 2-2 Summary of the precautionary measures used to prevent malaria by interviewees (n=91) who assumed thought they were travelling to a malaria-endemic area

Key

Repel – Use of personal insect repellent

Chem – Use of chemoprophylaxis

PPE – Use of clothing, personal protective equipment or keeping "covered up"

Acty – Avoid outdoor activities between dusk and dawn

Nets – Sleep under a mosquito net

Bite avoid – Avoidance of insect bites (using non-specific measures and/or measures not mentioned elsewhere in this table)

Coils etc – Use of mosquito coils and knockdown insecticide sprays in rooms, insect screens on doors and windows and/or being in an air-conditioned room

Drain H_2O – Vector control methods such as draining all containers that may hold water and become a potential breeding site for mosquitoes

B1 – Interviewee takes Thiamine (vitamin B_1) to prevent contracting malaria

None – No measures to prevent malaria are taken by the interviewee

The use of insect repellents and chemoprophylaxis were the two most common precautionary measures taken followed by the wearing of appropriate clothing and the avoidance of outdoor activities when malarial mosquitoes are more likely to bite (between dusk and dawn). However, the number using these methods was low with only 68.1% (62/91) using insect repellent and only 34.1% (31/91) using a course of chemoprophylaxis. The number of interviewees using other methods of bite prevention were even lower. One interviewee (1.1%) also stated that they were taking a vitamin B_1 (Thiamine) supplement to prevent mosquito bites. However, although this is a widely held belief, there is no scientific evidence for the effectiveness of this method of bite prevention[142]. These results are not

unusual as other studies have also reported that travellers often use inadequate mosquito bite protection, which is then also often compounded with irregular usage of chemoprophylaxis. Molle et al[143] assessed the usage of protective measures in 145 Danish travellers to malaria-endemic areas and found that 37% used inadequate mosquito bite protection and that only 32% used chemoprophylaxis correctly. They also noted that 12% did not use any chemoprophylaxis and that the average rate of compliance with chemoprophylaxis was only 50%. Schoepke et al[140] also found that, although two thirds of travellers to East Africa were aware of the benefits of using bite avoidance measures, only 2% of travellers tried to reduce the risk of infection by using a mixture of different personal protection measures. Likewise, Weber et al[138] studied the KAP of 401 Swiss business travellers with regard to malaria and found that, although well informed about the risks of malaria, its mode of transmission and some symptoms, that only 16% of the travellers to high risk African destinations and 31% of travellers to low risk areas followed recommended bite avoidance measures.

2.5.4.2.2.2 Chemoprophylaxis for malaria

Only 34.1% (31/91) of the interviewees who thought they were travelling to a malaria-endemic area were taking chemoprophylaxis. Of these, the majority (58.1%, 18/31) were taking a course of doxycycline followed by atovaquone/proguanil (19.4%, 6/31), chloroquine (12.9%, 4/31) and mefloquine (6.5%, 2/31). One interviewee (3.2%) was unsure which agent they were actually taking. The agent and regimen for each of the 30 interviewees who knew the exact details of their chemoprophylactic regimen was compared with the current CDC and MASTA recommendations for their destination[135 144]. It was found that 86.7% (26/31) were taking one of the recommended agents for their particular destination. Three of the 4 interviewees found not to be taking one of the recommended agents for their destination were PNG citizens returning home, who stated that they used chloroquine to prevent malaria whilst in PNG. Chloroquine-resistance is prevalent in PNG however anecdotally, it is still used by some PNG nationals as it is cheap and readily available without prescription, although its effectiveness is unknown[144].

Ideally antimalarial chemoprophylaxis should be commenced before the traveller enters an endemic area, continued while they are in the endemic area and for a fixed time after leaving the endemic area. The traveller also needs to be fully compliant with the dosage recommendations of the agent during this period[38]. Therefore, interviewees were also asked when they had started, or when will they intended to start, to take their chemoprophylaxis, and when they intended stopping their course in relation to their time in the endemic area. This was then compared to the dosage recommendations from two current and commonly-used drug information texts for the time period of the interview and data analysis (Australian Medicines Handbook[145] and British National Formulary[146]) and also the CDC, MASTA and NaTHNaC recommendations for course length of each agent[3 133-135]. It was found that only 60% (18/30) of the interviewees, who could state the full details of their regimen, were taking a regimen that fully complied with standard dosage recommendations. Of the 40% (12/30) of interviewees who were taking a regimen that did not fully comply with standard recommendations, 2 interviewees were intending to start their regimen later than the standard recommendation, 9 interviewees were intending to finish their regimen earlier than recommended and 1 interviewee was using an incorrect dosage schedule. Finally, only 15 of the 30 interviewees who knew the full details of

their malarial chemoprophylaxis were found to be using both a recommended agent for their destination and the recommended dosage regimen for chemoprophylaxis for that destination. This represents only 16% of the interviewees travelling to malarial endemic areas in this study (n=94).

Compliance problems and issues relating to inappropriate dosing with malarial chemoprophylaxis have been reported in other studies. Weber et al[138] reported that only half of the Swiss business travellers in their study continued to take their antimalarials for the recommended time after leaving the malarial area. Likewise, Molle et al[143] found that just under a third of the Danish travellers in their study followed standard recommendations for chemoprophylaxis, 12% did not use any chemoprophylaxis and that the average compliance rate was 52%. They also found that 7% of the travellers were using agents not recommended for their destination and that 13% were taking an inadequate dosage[143]. Compliance issues are reported in several other studies with rates of non-compliance ranging from 18-48%[141 147-152] and rates appear to be particularly poor with long-term travellers, expatriates, backpackers or those travelling for work-related reasons[139]. High rates of non-compliance have even been reported in the military, with Ollivier et al reporting malarial chemoprophylaxis non-compliance rates of 63.4% and 54.7% when compliance was assessed using drug-plasma concentrations and self-reporting respectively in a battalion of French soldiers returning from Côte d-Ivoire[153].

In this study, the majority of the interviewees who thought they were travelling to malarial endemic areas (60/91 or 65.9%) were not taking chemoprophylaxis. These interviewees were directly asked why they had decided not to take chemoprophylaxis for their journey and the 60 interviewees made a total of 93 statements and comments in response. These comments were firstly coded using a conceptual framework and then an interpretive thematic analysis was performed to identify and report on patterns within the data and the results are summarised in table 2.16.

The comments of the interviewees were categorised into 3 major themes consisting of a total of 13 separate categories. The first major theme involved the interviewees concerns about the actual antimalarial agents themselves and consisted of 5 categories, the two most prevalent of which were partially linked in that, interviewees were concerned about either the actual or potential side effects of the antimalarial agents or the long-term usage of these agents. 20 interviewees expressed concerns about side effects with chemoprophylaxis as they had either experienced side effects when they have previously taken antimalarials or were concerned about potential side effects. The most prevalent concern expressed by 6 interviewees were the unknown effects associated with the long-term or chronic use of these agents (which also links with the next most prevalent category), followed by non-specific “side effects” where 4 interviewees stated that “side effects” were a concern but did not then clarify which actual side effects were the concern. Those interviewees that had experienced side effects in the past with antimalarials mentioned nausea, indigestion or stomach problems (4 interviewees) and dermatological side effects (including photosensitivity reactions) (2 interviewees) as the most common concerns. Whereas, “liver problems” and the potential for blindness with quinine-containing products were also concerns of 2 interviewees respectively.

The effect of side effects or the fear of potential side effects and their effect on compliance has also been reported elsewhere. Chatterjee[148] examined reasons why travellers to India did not take

antimalarials or had poor compliance with antimalarials and found that the most common reason was actually a lack of pre-travel information (34% of cases) followed by an active decision not to take

Table 2-16 Thematic analysis of the reasons given by interviewees for not taking chemoprophylaxis for malaria on their current journey

Major theme	Category	Explanation	Number (Percentage) of comments (n=93)	Example comments
Concerns about the actual antimalarial agents	Concerns with side effects	The interviewee does not take chemoprophylaxis due to either having experienced side effects in the past or has concerns over the potential long term side effects associated with chronic usage.	20 (21.5%)	Side effect concerns: Chronic toxicity (6 interviewees) Non-specific side effects (4 interviewees) Gastrointestinal effects (4 interviewees) Hepatoxicity (2 interviewees) Dermatological effects (2 interviewees) Eyesight damage (2 interviewees)
	Concerns with long-term antimalarial use	The interview either had concerns about the long term usage of chemoprophylaxis or was advised not to use it long-term	10 (10.8%)	Interviewee 107: "..if you take the medicines for too long it isn't good for us" Interviewee 135: *"the advice I was given was not to take them for extended periods".* Interviewee 145: *"I avoid taking long-term chemicals..."* Interviewee 151: *"it's not good for the system to use them long-term".* Interviewee 164: *"not good for you long-term ... poisoning yourself".*
	Concern that chemoprophylaxis masks the signs and symptoms of malaria	The interviewee does not use chemoprophylaxis as they have the impression that it masks the signs and symptoms of malaria and therefore they would not be aware that they had contracted malaria if it occurs	5 (5.4%)	Interviewee 108: *"... it also masks the signs of malaria".* Interviewee 141: *"they don't prevent malaria, just mask it – don't stop you getting it, just suppress it. I'd rather know that I had it".* Interviewee 145: *"... antimalarials mask the symptoms.."*
	Concern about a lack of efficacy	The interviewee did not take chemoprophylaxis because they questioned its efficacy	3 (3.2%)	Interviewee 177: *"antimalarials don't always stop you getting it.."* Interviewee 209: *"they are not fool proof anyway, I mean not 100% effective".*
	Concern that chemoprophylaxis worsens malaria or increases the risk of resistance	The interviewee thought that if they contract malaria after taking chemoprophylaxis that it is a more severe variant or that the chemoprophylaxis makes the infective organism more resistant to treatment	2 (2.2%)	Interviewee 143: *"If you get bitten and catch malaria it is worse if you are taking the tablets. So it is better not to take them in the first place".* Interviewee 145: *"they increase the risk of resistance if you catch the disease"*

Would prefer the malaria risk to be managed another way	Prefers treatment over prevention	The interviewees preferred not to, or were advised not to, take chemoprophylaxis but would obtain treatment if they experienced symptoms of malaria	13 (14.0%)	Interviewee 25: *"In PNG they don't prevent it, just treat it".* Interviewee 33: *"PNG mentality is only get medicines when you are sick, not to prevent disease".* Interviewee 97*: "...advised not to take regular medicines but just to treat the malaria when you get it".* Interviewee 164*: "Better to treat malaria if you get it".* Interviewee 186*: "...if you get malaria there are medicines to cure it".* Interviewee 217: *"... medical centre on the mine site advised not to take (prophylactic) tablets...it is better just to treat any malaria if you catch it".*
	Compliance	Although chemoprophylaxis was available to the interviewee, they chose not to take it or forget to take it	3 (3.2%)	Interviewee 40*: "Paludrine is issued by the company, but I don't use them myself".* Interviewee 41: *"I'm just careless"* Interviewee 91: *"I used to take chloroquine but kept forgetting to take it".*
	Cost	The cost of the chemoprophylaxis was prohibitive	2 (2.2%)	Interviewee 186: *"It is expensive..."* Interviewee 207*: ".... is too expensive, so not as big a priority. Don't take it".*
	Insufficient time to organise or start chemoprophylaxis	The interviewee did not have sufficient time prior to travel to organise a supply of chemoprophylaxis	2 (2.2%)	Interviewee 35: *".... didn't have time to organise it".* Interviewee 51: *"... too late to start treatment".*
Antimalarials are not required	The risk is believed to be low or minimal at destination	The interviewees were visiting areas within a destination country where the risk was low (e.g. Port Moresby in PNG) and although official guidelines may still recommend chemoprophylaxis, many travellers may just use bite avoidance measures as the major source of protection	18 (19.4%)	Interviewee 42: *"Port Moresby is not known as a malarial place".* Interviewee 63: *"Visiting Port Moresby... more of a risk in jungle areas".* Interviewee 108: *"...in Port Moresby most of the time".* Interviewee 169: *"..risk will be lower whilst on board (a ship)"* Interviewee 193: *"Don't live in a jungle area. Stay in Port Moresby, near the beach, so malaria is not an issue".* Interviewee 201: *"...no risk in Port Moresby. Only at risk if I travel outside Port Moresby".*
	The use of vector control or protective clothing and other bite prevention strategies	The interviewee was relying solely on the use of bite prevention methods only	8 (8.6%)	Interviewee 52: *"following advice from the company ... just cover up ... should be OK".* Interviewee 83: *"the mining company fogs the island".* Interviewee 169: *"... will just avoid bites".*

	I am immune to malaria	The interviewee was from or brought up in an endemic area for malaria and therefore had acquired some level of immunity for the disease	5 (5.4%)	Interviewee 26: "*come from a province where there is a lot of malaria and so my natural immune system will protect me."* Interviewee 95: *"from an area with malaria and so I'm immune".* Interviewee 136: *"My immune system has built up by now".* Interviewee 142: *"I'm immune to malaria as I am from PNG. I don't worry about it".*
	I use tonic water	The interviewee thought that quinine in tonic water would protect them from malaria	2 (2.2%)	Interviewee 93: "*You can just drink tonic water which contains quinine".* Interviewee 95: "*I also take quinine in tonic water".*

antimalarials (25% of cases). However, it was noted that 19% of the travellers in the study experienced side effects which affected compliance[148]. The main side effects reported were dizziness, sleep disturbances and malaise in those travellers taking mefloquine, and nausea and headache in those taking chloroquine[148]. Laver et al[147] also examined the main causes of poor compliance with antimalarials in a survey of nearly 600 travellers leaving Zimbabwe and found that the main reason given was forgetfulness (63% of cases), but deliberate omission of doses due to side effects (10% of cases) was also reported and some travellers didn't take antimalarials as they considered the medication to be unnecessary (8% of cases). Finally, In a study of German travellers by Huzly et al[149], side effects were found to be the most prevalent reason for discontinuation of chemoprophylaxis or non-compliance (22.2% of cases) followed by forgetfulness (21.5% of cases) and a lack of perceived risk (17.9% of cases).

The second most prevalent category within this theme was that some interviewees had concerns relating to the long-term use of antimalarials. There was some overlap with the previous category in that some of the interviewees' concerns were partially associated with the side effects associated with long-term medication usage, but the comments placed into this category also suggested a general concern associated with the overall safety or efficacy of using these medications when living in endemic areas for extended periods. This also overlaps with another category in this theme, a perceived lack of efficacy. At least 3 interviewees were aware that antimalarials are not totally effective and specifically highlighted this as a reason why they do not use chemoprophylaxis, although they seemed unaware that the efficacy of chemoprophylaxis can be improved by using it in combination with bite avoidance measures. The remaining categories within this theme were that some interviewees thought that the use of chemoprophylaxis resulted in either masking the signs and symptoms of acute malaria, so if they contracted malaria whilst taking chemoprophylaxis they would be unaware that they had the condition, or that the symptoms of the condition would be more severe or more difficult to treat if they contract malaria while taking chemoprophylaxis. However, there appears to be little evidence to date to validate these misconceptions with most commonly used antimalarials appearing safe for long-term use[139], however long-term travellers and expatriates do

appear reluctant to take long-term chemoprophylaxis[139]. Some authors recommend a more individualised approach to chemoprophylaxis, not just in the choice of the actual agent, but also when determining the need for long-term chemoprophylaxis[139 154]. They suggest that in some situations it may be preferable for expatriates or long-term travellers in low-risk malaria-endemic areas to use bite avoidance measures in combination with stand-by emergency treatment (SBET) with antimalarials, or seasonal chemoprophylaxis in which bite avoidance measures are used all year round and chemoprophylaxis is only taken during the wet and early dry seasons when the malarial risk is highest, as an alternative to continual, long-term chemoprophylaxis[139 154 155]. However, it is recommended that long-term travellers should seek expert advice if considering options such as these, and unfortunately it has been noted that they are often more likely to seek the advice of locals or other expatriates[139 154]. There does appear to be some factual evidence behind the popular misconception that chemoprophylaxis masks the symptoms of malaria in that many antimalarial agents are blood-stage schizonticides[156]. Two species of malarial parasite (P.vivax and P.ovale) have persistent liver stages and parasites can emerge from the liver many months after the initial infection causing relapse[156]. Blood stage schizonticides will not prevent these relapses, they may also mask the symptoms of the first infection with these parasites and as a result delayed onset malaria can occur after many months[156]. Travellers should monitor for symptoms after their return from malaria-endemic areas and seek medical advice if they occur, even if appropriate bite avoidance measures and a full course of chemoprophylaxis had been used on their journey. The use of agents with liver-stage activity should also be considered for terminal prophylaxis or chemoprophylaxis [156].

The second major theme in the interviewee's responses grouped categories suggesting that the interviewees may have an aversion to the use of prophylaxis and would prefer the risk of malaria to be managed in another way. In their responses, 13 interviewees gave comments that were placed in the category of preferring treatment over prevention. In that, they either had an attitude or perception that, in some situations, preventative measures were not necessary and that usually diseases should be treated if they occur as opposed to trying to prevent them. Or, that they expressed the misconception that as effective treatments for malaria were available that it was unnecessary to take chemoprophylaxis as the disease can just be treated if it occurs. Smaller numbers of responses were categorised into categories associated with potential compliance issues in that chemoprophylaxis was available in the past but they had either forgotten or chosen not to use it as directed or that they had insufficient time before travelling to organise or start chemoprophylaxis. Only 2 interviewees expressed concerns that the cost of chemoprophylaxis was prohibitive. Both of these interviewees were residents returning home to PNG and in relatively low-paid occupations. It appears that cost was not a concern for the other interviewees not taking chemoprophylaxis.

The final major theme amongst the interviewees' responses were that some interviewees felt that antimalarials were not required at their destination. Again a number of categories were evident in the responses and the most prevalent theme was that some interviewees considered the risk of malaria at their destination to be low or minimal. Many of the responses in this category were from interviewees visiting Port Moresby, the capital of PNG. However, there was a difference of opinion as to whether visitors to Port Moresby should take antimalarial chemoprophylaxis. At the time of the study the CDC

recommended that travellers to the whole of PNG (including Port Moresby) should use antimalarial chemoprophylaxis, whereas other information sources, such as the MASTA resources, stated that the risk of malaria in Port Moresby was low and therefore recommended that chemoprophylaxis is not generally required for short-term travellers although insect bite avoidance measures were still recommended[133-135]. Therefore, it was not unreasonable that these interviewees chose not to use chemoprophylaxis. Other categories in this theme were that some interviewees were intending to rely solely upon the use of protective clothing, environmental vector control methods and other forms of insect bite avoidance. Five interviewees claimed they had a natural immunity to malaria as they had been raised in malaria-endemic areas and two interviewees thought that drinking tonic water, because of its quinine content, would prevent them from contracting malaria. These responses of the interviewees, with the idea that chemoprophylaxis masks malaria demonstrate some of the many of the myths that circulate about malaria, its cause and the best ways of trying to prevent it. A naturally acquired immunity to malaria can develop in residents of malaria-endemic areas, however the acquisition and retention of this immunity is a complex phenomenon, and is dependent upon many variables such as the level of exposure and age and therefore immunity cannot just be assumed[157]. The use of tonic water for malarial prevention is also an old myth originating from when expatriates originally took quinine in tonic water to mask its bitter taste. In modern times, quinine is added to tonic water solely as a flavouring agent and in much lower concentrations (less than 83ppm[158]) and therefore travellers would have to drink large volumes (in excess of 4L) to receive an effective quinine dose.

As mentioned above, particularly with long-term, expatriate or work-related travellers in relatively low-risk malaria-endemic areas, the use of bite avoidance measures in combination with SBET or seasonal chemoprophylaxis may be an appropriate alternative option to long-term chemoprophylaxis [139 154 155].

2.5.4.3 Interviewees knowledge of major health risks at their destination

All interviewees were asked what they thought would be the major potential health risks associated with their destination and the responses of interviewees travelling to the four most common destinations (PNG, Japan, New Zealand and the UK) were collated, ranked and summarised in table 2.17. The interviewees were aware of many of the common health risks associated with their destinations and interviewees travelling to Japan, NZ and the UK appeared to consider their destination safer than those travelling to PNG as the average number of potential health risks stated per interviewee for travellers to Japan, New Zealand (NZ) and the UK were found to be 0.45, 0.52 and 1.0 respectively, and 2.2 for PNG. Also a relatively large number of the interviewees travelling to Japan, NZ and the UK thought there were no potential health risks at their destination (55.2%, 48.1% and 33.3% of the interviewees travelling to Japan, NZ and the UK respectively), whereas only 3.6% of the interviewees travelling to PNG thought there would be no health risks at their destination.

Japan, NZ and the UK are generally considered to be relatively wealthy, well-developed countries and some similarities are evident between the perceptions of the potential health risks of the interviewees travelling to these destinations. For example, diarrhoeal diseases, motor vehicle accidents and other forms of accidents were reported by all three groups of interviewees. Whereas, the common cold,

influenza or other forms of respiratory tract infections were reported as a potential health risk for travellers to NZ and the UK, and VTE or DVT were considered to be a potential risk by the interviewees travelling to both Japan and the UK. One interviewee travelling to Japan mentioned Japanese encephalitis as a potential risk, although this response may have been prompted by the interviewer asking whether they had been previously vaccinated for the condition. One interviewee travelling to the UK also mentioned foot and mouth disease as a potential risk which may have been prompted by local media reporting of the UK foot-and-mouth outbreak in late 2007.

Table 2-17 The Interviewees' perceptions of the major health risks associated with their destination.

Papua New Guinea		Japan		New Zealand		United Kingdom	
Health Risk	No of Interviewees	Health Risk	No of Interviewees	Health Risk	No of Interviewees	Health Risk	No of Interviewees
Malaria	54	Diarrhoeal diseases	6	MVA/Accidents	6	Cold/Flu and resp infections	8
HIV/AIDS	31	Does not know	3	Crime/Violence	5	DVT/VTE while travelling	3
Diarrhoeal diseases	20	MVA/Accident	2	Cold/Flu and resp infections	3	Cardiovascular disease	2
Tuberculosis	17	DVT/VTE while travelling	2	Sunburn/Skin cancer	3	Cold (Environment)	1
Crime/Violence	13	Heat stroke	1	Diarrhoeal diseases	1	Foot-and-mouth disease	1
Typhoid	10	Japanese Encephalitis	1	None	13	MVA/Accidents	1
Hepatitis	8	None	16			Diarrhoeal diseases	1
MVA/Accidents	4					Blood diseases	1
Does not know	4					None	6
Insect bites	4						
Misc Others	21						
None	3						
Total No of Interviewees travelling to destination	83	Total No of Interviewees travelling to destination	29	Total No of Interviewees travelling to destination	27	Total No of Interviewees travelling to destination	18
Total no of potential risks listed by interviewees who stated risks	182	Total no of potential risks listed by interviewees who stated risks	13	Total no of potential risks listed by interviewees who stated risks	14	Total no of potential risks listed by interviewees who stated risks	18
Average no of potential risks listed per interviewee	2.2	Average no of potential risks listed per interviewee	0.45	Average no of potential risks listed per interviewee	0.52	Average no of potential risks listed per interviewee	1.0

Compared to Japan, NZ and the UK, PNG is a poorer, developing country situated in the tropics. Therefore, potentially there are more inherent potential health risks for the traveller to PNG, such as malaria and other tropical infectious diseases, and this was recognised by the interviewees travelling to PNG themselves, as they listed a much larger range of potential health risks than the interviewees travelling to the other destinations. In particular, the interviewees frequently highlighted infectious diseases such as malaria, HIV/AIDS, diarrhoeal diseases and TB as potential problems, and issues relating to crime and violence were also a concern. Malaria was the most common potential health risk

stated by the interviewees (65% of interviewees travelling to PNG), which again confirms that they were well aware of the risk of malaria at their destination.

2.5.5 Potential pharmaceutical risks (PPRs) and pharmaceutical care issues (PCIs)

From the information obtained from the medication history taken from each interviewee, a review of the medications carried by the interviewees to manage travel-related health problems was performed and the medication history or medications being carried to manage the interviewee's chronic or pre-existing conditions were examined for PPRs and PCIs

2.5.5.1 Medications for travel-related conditions

Each interviewee was interviewed about seven key groups of medications that are often carried by travellers to manage common travel-related conditions, these were anti-diarrhoea medications, antacids or indigestion remedies, analgesics, cough and cold remedies, antihistamines, sunscreens and antibiotics. The interviewees were also questioned about the other medications they may be carrying and if they are carrying one, the contents of their traveller's first aid kit. The results are summarised and discussed below.

2.5.5.1.1 Anti-diarrhoea medications

Although 51.8% (113/218) of the interviewees had experienced traveller's diarrhoea on previous journeys, only 36.2% (79/218) of the interviewees carried one or more antidiarrhoeal preparations with them. Of those that did, the most common antidiarrhoeal agent carried was loperamide (78.5%, 62/79), which is the preferred antidiarrhoeal agent in many treatment guidelines for traveller's diarrhoea[28 34 119]. Fewer interviewees (13.9%, 11/79) were carrying atropine/diphenoxylate preparations and importantly, only 4 interviewees were carrying rehydration solution sachets or salts. As 41.7% (91/218) of interviewees said that they would allow the diarrhoea to run its course whilst maintaining hydration, it can only be assumed that they intended to either rehydrate with water or obtain rehydration salts or alternatives if required at their destination. Seven interviewees also mentioned that they were carrying antiemetics (2 interviewees were carrying prochlorperazine, 2 interviewees were carrying domperidone and 3 interviewees were carrying metoclopramide) and one interviewee was carrying Peptobismol®, which is a bismuth-containing antacid not currently available in Australia but which is available and recommended in the USA for the prevention of TD[28]. Importantly, with the exception of the prochlorperazine, domperidone and metoclopramide, at the time of the study all of the medications discussed in this section are available OTC in pharmacies in the interviewee's country of origin.

2.5.5.1.2 Antacids and indigestion remedies

15.1% (33/218) of the interviewees were carrying a remedy for the management of indigestion, dyspepsia or related symptoms. Most (51.5%, 17/33) were carrying simple proprietary antacid tablets which are convenient for travellers to carry and are available OTC from pharmacies and other retail outlets. The remainder were carrying either a proton pump inhibitor (e.g. omeprazole. esomeprazole, rabeprazole, or pantoprazole carried by 7 interviewees) or a H_2 antagonist (e.g. ranitidine, carried by 2

interviewees). Pantoprazole and ranitidine are readily available OTC, however omeprazole and rabeprazole are not in Australia. 7 interviewees were unable to recall the generic or brand name of their indigestion remedy.

2.5.5.1.3 Analgesics

Analgesics were the most common group of medications carried by the interviewees to manage travel-related conditions with 56.4% (123/218) of the interviewees carrying one or more analgesics (range 1-4 analgesics, average 1.2 analgesics per interviewee). A wide range of different analgesics and proprietary brands were carried, however paracetamol (35.3%, 77/218), ibuprofen (11.9%, 26/218), aspirin (7.8%, 17/218) and proprietary paracetamol combinations (5.5%, 12/218) were the most common analgesics carried. None reported carrying opiate analgesics other than codeine in fixed paracetamol-codeine combinations and, although these combinations varied in strength or quantity, most would be classified as OTC medications (Schedule 2 or 3) if purchased in Australia. Some countries do have restrictions on the importation of narcotics which, in theory, could include codeine, although anecdotally there have been few problems with travellers carrying paracetamol-codeine combination preparations[1 159].

2.5.5.1.4 Antihistamines

Antihistamines are useful medications for travellers to carry as they may be used to treat a wide range of allergy-associated symptoms. Antihistamines are readily available OTC in a range of products including single-active ingredient antihistamine tablets, some compound cough and cold remedies and some topical products such as eye drops and creams. 14.2% (31/218) interviewees were carrying single active ingredient oral antihistamines or a topical antihistamine creams. Antihistamine-containing cold and ‘flu remedies were included in the data in section 2.5.5.1.5. As a wide range of antihistamines are available worldwide, the Australian Medicines Handbook was used to categorise the antihistamines carried as either sedating antihistamines (e.g. chlorpheniramine, dexchlorpheniramine or promethazine) or non-sedating antihistamines (e.g. cetirizine, fexofenadine or loratadine) and it was found that equal numbers (11 interviewees each) were carrying sedating or non-sedating antihistamines. It was unsure which antihistamine was being carried by 7 interviewees as the products were unlabelled or it was unclear which agent they were carrying. One interviewee was carrying both a sedating antihistamine and a non-sedating antihistamine, and one interviewee was carrying a topical antihistamine for use with insect bites. All of the antihistamine products carried by the interviewees were available OTC in pharmacies.

2.5.5.1.5 Cold and ‘flu remedies

15.6% (34/218) of the interviewees were carrying a cold and ’flu remedies. As a wide range of proprietary cold and ‘flu remedies are available worldwide the remedies carried by the interviewees were categorised into one of five possible categories (throat lozenges, pseudoephedrine-containing products, products containing stimulants other than pseudoephedrine, other compound preparations and unsure/unknown). 13 interviewees reported that they were carrying throat lozenges and 8 interviewees declared that they were carrying a cold and ‘flu remedy. A number of interviewees were carrying products that contained pseudoephedrine (8 interviewees), or other stimulants such as

phenylephrine (2 interviewees), which is important as some destinations, such as Japan, have regulations about the carriage of these agents across their borders[1]. 4 interviewees were carrying other proprietary compound preparations that did not contain stimulants. Again, all of the products carried by the interviewees were available OTC in pharmacies.

2.5.5.1.6 Sunscreens

77.5% (169/218) of the interviewees stated that they used sunscreens on a regular basis, with 82.8% of these interviewees using sunscreens with an SPF value of 30 or greater. However, in this section of the interview only 18.8% (41/218) of the interviewees said that they were actually carrying a sunscreen with them. When these interviewees were questioned further, although a similar percentage of these interviewees knew their sunscreen definitely had a SPF value below 30 (6 interviewees or 14.6%) to the previous section of the interview, only 63.4% (26/41) of these interviewees definitely knew their sunscreen had an SPF value of 30 or higher. However, if the sunscreen had been purchased in Australia it is more than to be SPF 30 or higher.

2.5.5.1.7 Antibiotics

Some interviewees were carrying antibiotics and antimalarial agents for the chemoprophylaxis of malaria and, if appropriate, some travellers occasionally also carry other antibiotics for the prophylaxis or treatment of a variety of other conditions, such as severe TD, respiratory tract infections etc. However, this is a relatively uncommon practice for lower-risk travellers visiting mainly metropolitan areas in developed countries[3 18]. Therefore it seemed reasonable that only 11% (24/218) of the interviewees reported they were carrying antibiotics other than antimalarial agents on their journey. The overall range of antibiotics carried by the interviewees was small and it was surprising that amoxycillin (4.6%, 10/218) was the most common antibiotic carried because although it is a moderate-spectrum aminopenicillin, and therefore can be used in the treatment of a wide range of conditions (such as some respiratory tract infections, sinusitis and otitis media), it is not routinely recommended for the management of common travel-related conditions such as traveller's diarrhoea[160]. Cefaclor, Cephalexin, Clarithromycin and Roxithromycin were also carried by a small number of interviewees (1 interviewee each) and are also moderate spectrum agents that again may be used to treat a range of conditions. Ciprofloxacin (3 interviewees) and Norfloxacin (1 interviewee) are commonly recommended for travellers to use in the advent of severe diarrhoea while travelling, although isolates are becoming increasingly resistant to quinolone antibiotics and therefore azithromycin is now also recommended[28]. However, none of the interviewees in this study were carrying azithromycin. As not all interviewees were Australian citizens, some interviewees were carrying agents that are not readily available in Australia. For example one interviewee was carrying nifuroxazide, a nitrofuran antibiotic marketed in France and some eastern European countries for the management of diarrhoea.

2.5.5.1.8 Miscellaneous items

A small number of the interviewees (8.7%, 19/218) were also carrying a wide range of miscellaneous items that did not fit into any of the categories mentioned above, as the numbers of interviewees carrying each item was low (1-2 interviewees per item), no specific trends can be seen.

2.5.5.1.9 First aid kits

Finally, the interviewees were asked if they are carrying a first aid kit with them in their luggage and if so, the type of kit they were carrying and/or the main items present in the kit. 30.3% (66/218) of the interviewees were carrying some form of first aid kit, although the complexity and contents of the kit varied. The first aid kit that was carried by the majority (81.8%, 54/66) could be described as simple or fairly rudimentary, being either a small commercially available kit that contained basic first aid items (mainly self-adhesive dressings, bandages and antiseptic cream) or a self-prepared kit containing similar items. Only 5 interviewees mentioned that they were also carrying a sharps pack containing items such as hypodermic needles and syringes or a suture kit, and 5 interviewees were carrying very comprehensive kits, containing a wide range of items including prescription medications for diarrhoea and antibiotics, that are designed more for expedition-type or wilderness travel. All of the first aid items mentioned by the interviewees were collated and ranked and are summarised in table 2.18. Half of the interviewees in this sample (50%, 109/218) were leisure travellers and many were travelling to developed destinations. Therefore, many were not carrying large comprehensive first aid kits and it can be seen that those that were carrying first aid supplies were carrying mainly simple dressings and an antiseptic cream or solution. Frequent business travellers to PNG mine sites often mentioned during the interview that all first aid equipment was available at the mine site and was provided by their employer.

Table 2-18 Items being carried in the first aid kits of the interviewees (n=66)

Item	No. of interviewees carrying the item in their first aid (n=66)	Item	No. of interviewees carrying the item in their first aid (n=66)
Self-adhesive dressings	51	Hypodermic needles or syringes	3
Antiseptic cream or solution	23	Antidiarrhoeal drugs (Integral component of the first aid kit and not mentioned elsewhere)	2
Bandages and dressings	16	Medical equipment (such as stethoscope etc)	2
Dressing tape	10	Oral rehydration tabs or solution. (Integral component of the first aid kit and not mentioned elsewhere)	1
Insect bite cream or antihistamine cream	8	Anti-inflammatory gel/cream	1
Antibiotics (oral or topical, not mentioned elsewhere)	4	CPR mask	1
Insect repellent	4	Eye drops to wash eyes	1
Sterile suture kit	3		

2.5.5.1.10 Summary of medications for travel-related conditions

Overall, the interviewees were carrying a diverse mixture of medications and products to manage potential, travel-related conditions on their journey. However, the number and diversity of items carried varied considerably between interviewees. In the published literature there are only a small number of

reviews that make recommendations about the items and medications that should be carried or used by travellers[1 18 82 116 142 161-164], and it is recognised that a number of factors can influence what items should be carried. These factors include the traveller's actual itinerary, the size of the travelling party, the size of the recommended first aid kit and the baggage weight limits of the airline, the pre-existing chronic diseases of the traveller, the stability of the recommended supplies at extremes of temperatures and the legal issues of carrying some medications across borders[1 162]. Reviewers often categorise travel first aid kits based on traveller-type, use and contents, and examples of suggested traveller categories are: tourist-type travellers on a short holiday, tourists travelling to developing countries that are also endemic for malaria, travellers on longer trips to developing countries and expeditions to remote areas[1 162]. It is recommended that first aid kits for travellers include a range of both OTC and prescription medications and also a range of first aid items, and it is also recommended that the contents for each kit varies depending on the traveller-type and the needs of their destination, with for example, the first group (short-term tourist traveller) usually only requiring a very basic kit with some dressings, simple OTC remedies and their own medication for chronic conditions, whereas the final group (expedition travellers) would require a fully comprehensive kit with a wide range of medical supplies, medications and even perhaps some medical equipment [1 162].

A number of references have made recommendations on the most appropriate contents for first aid kits for travellers[1 18 116 142 161 162] and others have reviewed the contents of kits and discussed the usefulness of items carried by travellers[162-164]. However, in practice the first aid kit needs to be individualised to meet the needs of each traveller. Many of the medications recommended in these references were actually being carried by the interviewees as a whole, although few, if any, of the interviewees would be carrying the "ideal" or full complement of items.

Due to some of the factors listed above, mainly baggage weight limits and lack of space in their luggage, it is not practical to carry a large range of items and many travellers will balance what they should ideally carry with them with what they think are most important, or what they think they are most likely to use on their journey. In their review of the travel health kit issued to employees of the Coca-Cola Ltd, Harper et al[163] surveyed employees to determine which items were considered most useful or were most used by the employees. They found that employees thought analgesics and items to manage gastrointestinal complaints where the most useful items in the kit, whereas the items included in the kit for use by medical practitioners in an emergency, such as sterile needles and syringes, were deemed the least useful by the employees[163]. They also found that employees did not understand what many of the items in the kit were for, although it was thought that the presence of generic brands in the kit may have confused some employees in this regard[163]. They concluded that the less commonly used items should be removed from the standard pack issued to all employees and added to individualised packs issued to employees travelling to destinations where a lack of products such as sterile supplies may be a major issue[163]. They also reported that employees recommended the addition of throat lozenges and multivitamins to the pack and that the employee rarely used the sunscreen in the pack, which they thought may be either due to an under usage of sunscreen by the employees or the lack of exposure to outdoors conditions as the employees are travelling for business[163]. Goodyer and Gibbs[82] used a post-travel postal survey to review the medical supplies

taken by travellers from the UK to developing countries around the globe (127 respondents). Again, they found that analgesics and antidiarrhoeal medications were the most commonly used items and many stated that they did not need to use the wound dressings they had taken on their journey[82]. They found that 16% of respondents required antibiotic therapy and 40% had to purchase them overseas (ciprofloxacin followed by amoxycillin were the most commonly used antibiotics). They also reported that although 51% of respondents carried water purification tablets, just over half (52%) of these respondents said that they actually used them, which was much greater than the Coca-Cola study and perhaps reflects a difference between business travellers and backpacker travellers[82 163]. A point of concern in the Goodyer and Gibbs study was 20% of the group who were at risk of malaria did not use insect repellent[82].

In this study, analgesics and antidiarrhoeals were the most commonly carried agents (carried by 56.4% and 36.2% of the interviewees respectively), which corresponds to the findings of Goodyer and Gibbs in that travellers consider them to be the most useful agents. However the numbers of interviewees carrying other agents were relatively low with for example only 30.3% of the interviewees carrying a first aid kit and only 18.8% carrying sunscreens and lower numbers carrying items such as indigestion remedies and antibiotics. It appeared that many of the interviewees considered a first aid kit to be composed mainly of dressings, and therefore the results of this study correspond with the findings of Goodyer and Gibbs[82] and Harper et al[163], in that travellers do not either use some items (e.g. sunscreens) or consider them to be that useful (e.g. a range of dressings) and therefore do not consider it worthwhile to carry these items with them on their journey. Of course, it must be remembered that many of the interviewees in this study were tourists travelling to developed countries or business travellers with access to good first aid or more advanced medical facilities at their destination and that this would also have had a major influence of which items were being carried by the interviewees to manage any potential travel-related health issues.

2.5.5.2 Medications for pre-existing, chronic disorders

Using the method described in section 2.4.4.2, the interview notes and medication history of each of interviewees were assessed for both PPRs and PCIs. An example of this process and the outcome of the assessments applied is given in figure 2.3 and this process was repeated for each of the 218 interviewees. The number of the PCIs and PPRs identified for each interviewee before and after their independent review or moderations were then collated and are summarised in table 2.19.

Interviewee No: 59

Background

- Age group 61-70 years
- Male
- Returning to the UK from Australia via Singapore

Current Medications

- Warfarin
  - Therapy started just before leaving UK (INR was not tested prior to leaving or during journey – "Doctor said he will test my blood when I get back")
- Prednisolone 3mg once daily
- Flecainide 100mg once daily
- Losartan 50mg once daily
- Atenolol 50mg once daily
- Alendronate once weekly
- Calcium with vitamin D tablets 1 tablet once daily
- Frusemide 40mg once daily
- Ibuprofen 200mg four times a day when required (Started on the previous morning for aches and pains – interviewee bought supplies from an Australian supermarket)

Identified PPRs and PCIs

- **Age** - Aged 61yrs and over
- **Reg Meds** – Taking 8 regular medications (plus Ibuprofen when required)
- **Crit Meds** – 3 critical medications (Warfarin, Flecainide and Alendronate)
- **PCI 1** (Inappropriate dosage regimen)
  - Flecainide is usually prescribed using a twice daily dosing regimen
- **PCI 4** (Potential drug-drug interactions) **x 4**
  - Losartan + NSAID (Ibuprofen) + Frusemide = Increased risk of renal impairment
  - Warfarin + NSAID = Increased risk of bleeding (INR not being monitored until his return to the UK)
  - Alendronate + NSAID = Increased risk of gastrointestinal disorders
  - Flecainide + Beta blocker (Atenolol) = Risk of bradycardia plus AV block (Rare reaction)
- **PCI 6** (Monitoring required)
  - Warfarin therapy and INR should be regularly monitored (especially in the initial stages of therapy)
- **PCI 12i** (Drugs or diseases on which common travel-related diseases could have a major impact)
  - Severe traveller's diarrhoea could have a major impact on this traveller

Summary

- Due to the interviewee's age and because they are taking multiple medications, of which three are medications which have critical dosage or monitoring requirements or have a high risk of side effects, the interviewee would be deemed to have a relatively high overall PPR and would be a patient that should be monitored more closely
- A total of 8 PCIs were identified for this patient that, the planning or provision of pharmaceutical care would be investigated further or reviewed.

Figure 2-3 Interviewee 59: An example of how the interview notes and medication history of each interviewee was assessed for PPRs and PCIs

Table 2-19 Summary of PCIs and PPRs identified for the interviewees both pre- and post-review

PCI or PPR	Description	Number pre-review	Number post-review
Age	Travellers aged 61 years or over	44	44
Chr Meds	Travellers taking chronic medication	104	104
No Chr Meds	Travellers not taking chronic medication	114	114
Crit Med	Travellers taking critical medications	6	6
	Total number of critical medications	11	11
PCI 0	Travellers with no PCIs (Other than age, number of medicines or antimalarials)	79	84
PCI 1	Inappropriate dosage regimen	5	5
PCI 2	Inappropriate duration of therapy	11	11
PCI 3	Potential drug-disease interaction	11	11
PCI 4	Potential drug-drug interaction	11	10
PCI 5	Potential adverse drug reaction	18	16
PCI 6	Monitoring required	9	12
PCI 7	Potential of actual compliance problems	0	1
PCI 8	Discrepancy between prescribed dose and dose used	0	0
PCI 9	Duplication of therapy	2	1
PCI 10	Untreated indication	4	4
PCI 11	Patient education required	40	41
PCI 12a	Medications recently started (general)	4	4
PCI 12a(M)	Medications recently started (antimalarials)	23	24
PCI 12b	Medications with potential storage issues whilst overseas	8	4
PCI 12c	Carrying inadequate supplies for journey	2	3
PCI 12d	Carrying excessive supplies for journey	0	0
PCI 12e	Medications that could be illegal at destination	3	3
PCI 12f	Visiting a malarial endemic area without adequate chemoprophylaxis	37	41
PCI 12g	Visiting a malarial endemic area without chemoprophylaxis (Port Moresby)	35	35
PCI 12h	Medications which could increase the risk of common travel-related health disorders	20	17
PCI 12i	Drugs/diseases on which common travel-related health disorders would have a major effect	20	22
PCI 13	Other PCIs	10	9
	Total number of PCIs	273	274

2.5.5.2.1 Potential pharmaceutical risks (PPRs)

The researcher did not have access to the full medical records of each interviewee, only access to the data collected during the interview and medication history notes. Therefore, the interviewees could not be assessed for PPRs such as organ dysfunction. However, each interviewee was assessed for three individual PPRs; age, the number of chronic medications taken and whether they were taking one or more critical medications.

2.5.5.2.1.1 Age over 61 years (Age)

Due to a variety of factors which can increase the risk of adverse drug reactions, side effects and drug interactions, older patients generally have a higher PPR than younger patients. Factors include age-related changes in drug distribution, metabolism and elimination, polypharmacy and organ dysfunction[20 98 101]. 20.2% (44/218) of the interviewees were aged 61 years or older and these interviewees potentially have a higher PPR than younger interviewees. However, 31.8% (14/44) of the interviewees aged 61 years or older had no PPRs other than being in that particular age group and were otherwise healthy with no other PPRs or PCIs. The very young are also more prone to PPRs than adolescents or adults due to differences in the pharmacodynamics of some medications. However, travellers below the age of 18 years were excluded from the study.

2.5.5.2.1.2 Number of chronic medications (Chr Meds and No Chr Meds)

The number of chronic or regular medications taken by a patient can contribute towards their overall PPR as the risk of drug interactions, side effects and adverse drug reactions increase with the number of medications. The majority of interviewees (52.3%, 114/218) were not taking any regular medications. Whereas, 47.7% (104/218) of the interviewees were taking at least one regular medication for the treatment or prevention of a chronic condition. These findings are comparable with the findings of others, who state that about 50% of the general population regularly take prescription medications[165 166]. Also, the number of people taking medications, and the number of medications they take, increases with age with more than 60% of people aged 65 years and older taking 3 or more medications on a regular basis[165]. The interviewees taking regular medications were found to be taking a total of 239 medications (average 2.3 medications, range 0-9 medications per interviewee). 84.6% (88/104) of the interviewees taking regular medications were taking between 1-3 medications. As with age, the number of medications taken by a patient can be utilised in the planning of pharmaceutical care to prioritise care towards those patients in greatest need. In the provision and planning of pharmaceutical care, the clinical pharmacist would chose an arbitrary number of medications above which patients would be more intensively monitored. The number of medications chosen would vary from unit to unit based on the acuity and nature of the unit, but for many units it is often greater than 4-5 medications. Only 15.4% (16/104) on the interviewees taking chronic medications were taking 4 or more regular medications. Therefore again it can be concluded that, for this parameter, the overall PPR of the cohort is relatively low.

2.5.5.2.1.3 Critical medications (Crit Meds)

Critical medications are medications that usually require relatively intensive monitoring or have a critical dosage. These include medications with a narrow therapeutic index, require therapeutic drug monitoring, or have a high propensity to cause or be affected by drug interactions or cause serious side effects. The pharmacokinetics or pharmacodynamics of some of these agents could potentially be altered by common travel-related health conditions such as diarrhoea, which could then in turn affect the therapeutic control of a patient's disease state, or lead to increased risk of side effects or adverse drug reactions. On review it was determined that 6 interviewees were prescribed a total of 11 critical medications and these were categorised as anticonvulsants (4 medications), anticoagulants (2 medications), insulin (2 medications) or miscellaneous medications (3 medications).

2.5.5.2.1.4 The overall PPR of the sample

PPR is intended to be a tool that allows the clinical pharmacist to assess a group of patients and help identify individual patients among a group that require more intensive care or input. As the overall PPR of a patient can be affected by a wide range of factors, and as each individual factor is in turn influenced by other concomitant factors, it is difficult to give an absolute value to the PPR of each patient, although a rough comparison can be made between patients by comparing their number of PPRs and PCIs. Each interviewee in the sample was assessed for 3 standard PPRs and when these are counted and collated it was found that overall 75.2% (164/218) of the interviewees had no PPRs, 20.2% (44/218) had one PPR, 3.7% (8/218) had two PPRs and only 0.9% (2/218) had three PPRs. Therefore, the overall PPR of the sample could be described as low.

2.5.5.2.2 Pharmaceutical care issues (PCIs)

38.5% (84/218) of the interviewees were determined to have no PCIs other than their age, the number of chronic medications they were taking or if had recently started taking antimalarials. A total of 274 PCIs were identified across the remaining 134 interviewees (average of 2.04 PCIs per interviewee). The PCIs identified across the sample are discussed below in order of prevalence.

2.5.5.2.2.1 PCI 12f – Visiting a malarial endemic area without adequate chemoprophylaxis and PCI 12g – Visiting a malarial endemic area without chemoprophylaxis (Port Moresby)

Visiting a malarial area without adequate chemoprophylaxis was the most prevalent PCI reported from the study data. As previously discussed, 94 interviewees (43.1%) were travelling to a potentially malaria-endemic area. However, only 15 of these interviewees were intending to use a chemoprophylactic regimen that fully complied with recognised recommendations with regard to agent, dose and duration of therapy. The remaining 79 interviewees where either not intending to use chemoprophylaxis, or their regimen did not fully comply with current recommendations.

In the assessment of each interviewee for PCIs these figures differ slightly in that only 76 (not 79) interviewees were categorised as having either PCI 12f or PCI 12g. (Interviewees taking inadequate chemoprophylaxis were categorised into one of two separate PCIs because a large number of interviewees were travelling to PNG, and at the time of the study there was some conflict between information sources as to whether chemoprophylaxis was required for short term visitors to Port Moresby). 37 interviewees were found to be travelling to Port Moresby. However, 35 of these interviewees where not using appropriate chemoprophylaxis and were therefore categorised as having PCI 12g. Another 41 interviewees were categorised into the PCI 12f group, giving a total of 76 interviewees. In the assessment of PCIs it was found that 3 interviewees were travelling to the PNG highlands where the risk of malaria is very low and therefore the researcher and reviewer did not categorise these interviewees as possessing PCI 12g which is the cause of the discrepancy between the 79 interviewees and 76 interviewees who were either not intending to use chemoprophylaxis, or their regimen did not fully comply with current recommendations.

2.5.5.2.2.2 PCI 11 – Patient education required

18.8% (41/218) of the interviewees required some form of patient education about their medication or medication regimen and, this was the second most prevalent PCI identified across the cohort of interviewees. The most common problem encountered in these interviewees was that 37 interviewees (17%) could not recall key facts about their medications such as, the name, strength or dose, which could be a concern if a traveller needs to obtain either medicationss or healthcare while overseas. Other education needs identified in the group were that one long-haul, diabetic traveller was unclear how they should alter and monitor their insulin dosage as they cross multiple time zones during their journey, and three interviewees were totally unsure of when to start or stop their antimalarial medication.

2.5.5.2.2.3 PCI 12a(M) – Medications recently started (antimalarials)

Side effects and adverse drug reactions can commonly occur soon after commencing therapy. 24 interviewees (11%) had recently started, or were about to start, their chemoprophylactic regimen and therefore, could experience side effects during their journey. The other interviewees who reported taking chemoprophylaxis were continuing therapy.

2.5.5.2.2.4 PCI 12i – Drugs/diseases on which common travel-related health disorders would have a major affect

During the PCI review, it was considered if a common travel-related disease (mainly severe diarrhoea) could potentially adversely affect the control of any of the interviewee's chronic diseases, or affect the medications that were being used to manage these diseases, which could then potentially either lead to a worsening of the interviewee's chronic condition and/or the need to seek medical care while overseas. A total of 22 interviewees (10.1%) were identified as having chronic disease states or were taking medications that could potentially be adversely affected by severe diarrhoea or other common travel-related disorders. Chronic disease states that could be adversely affected include diabetes (6 interviewees), significant cardiac disease (4 interviewees), inflammatory bowel disease (3 interviewees) and epilepsy (2 interviewees). One interviewee had multiple disease states that could be adversely affected. Medications taken by the interviewees that could be affected by severe diarrhoea include combined oral contraceptives (4 interviewees) and warfarin (2 interviewees). Only 4 interviewees stated they were taking combined oral contraceptives, actual usage rates may be higher, and therefore, this PCI may have been more prevalent in the cohort.

2.5.5.2.2.5 PCI 12h – Medications which could increase the risk of common travel-related health disorders

It is well recognised that traveller's diarrhoea is one of the most common travel-related illnesses and that certain drugs can increase the risk of diarrhoea. It was identified that 17 interviewees (7.8%) were taking medications that could increase the risk of travel related disorders. These included 13 interviewees (6%) who were taking either proton pump inhibitors (such as esomeprazole) or H_2 receptor blockers (such as ranitidine) which could increase the risk of TD, and 2 interviewees who had been taking immunosuppressant drugs long-term which could potentially increase the risk of infection. Finally, one interviewee was taking a prolonged course of antibiotics and another interviewee was taking long-term magnesium supplements, both of which may potentially increase the risk of diarrhoea in the patient.

2.5.5.2.2.6 PCI 5 – Potential adverse drug reactions

In the review process it was noted that a number of the interviewees mentioned that they possess a severe allergy to certain medications that are frequently used in Australia or overseas to treat travel-related conditions. The researcher and reviewer agreed that this was potentially a risk to a traveller in that they may be administered these medications whilst overseas and may not be aware of it (due to name differences) and as a result suffer an allergic response. These issues were classified as PCI 5 (potential adverse drug reactions) and across the cohort 16 PCIs of this category were recorded, 14 of which involved potential allergic reactions to penicillin (6 cases), sulphur-containing preparations (4 cases) and macrolide antibiotics, severe lactose-intolerance and pethidine and morphine (1 case each). The other two potential adverse drug reactions noted in the cohort was that one interviewee was taking doxycycline for malarial chemoprophylaxis, but was taking no sun precautions, whereas other interviewees who were taking doxycycline were fully aware of the risk of photosensitivity reactions, and one interviewee was taking both alendronate and an oral steroid which results in an increased risk of osteonecrosis.

2.5.5.2.2.7 PCI 6 – Monitoring required

Therapeutic drug monitoring (TDM) is often required for drugs with either a narrow therapeutic index or when there is a close relationship between therapeutic response, toxic effects and plasma drug concentration. 12 interviewees (5.5%) were identified as either having disease states that require regular monitoring (such as diabetes, 7 interviewees) or were taking medications that required regular monitoring of the plasma drug levels, their clinical effects or side effects. Such medications included warfarin (2 interviewees), anticonvulsants, digoxin and hydroxyurea (all 1 interviewee each)). The frequency of monitoring and how it would impact on a traveller would vary depending on how well the actual disease state and concomitant disease states were controlled, as in the case of diabetes, or whether the patient had been taking the medication for some time and therapy was therefore relatively stable. In this situation, TDM during a short journey may not be required for most interviewees identified, unless the traveller became acutely unwell on their journey. Although in one situation, (Interviewee 59, see figure 2.4), it was felt that monitoring of the interviewee's INR should have occurred during their journey, as the patient had commenced warfarin therapy just before travel and had then started to take another agent which potentially could interact with the anticoagulant.

2.5.5.2.2.8 PCI 2 – Inappropriate duration of therapy

When assessing the PCIs of patients in a clinical environment, patients may often present with medications that are usually only prescribed for a fixed course and which have inadvertently been continued for a longer period or perhaps have been given a shorter course. As previously mentioned, a total of 11 interviewees were taking a course of antimalarials that did not fully comply with standard dosage recommendations (2 interviewees were starting their chemoprophylaxis later than recommended and 9 interviewees were finishing their course earlier than recommended) and these were placed in this category.

2.5.5.2.2.9 PCI 3 – Potential drug-disease interaction

11 potential drug-disease interactions were identified amongst the cohort and most involved potential interactions between OTC or prescription non-steroidal anti-inflammatory drugs (NSAIDs) and the concomitant chronic disease states of the interviewee. The two most prevalent drug-disease interactions identified in the cohort was that a number of interviewees were taking NSAIDs even though they had a history of dyspepsia (3 interviewees) which may be worsened by the NSAID, and 3 asthmatic interviewees were taking NSAIDs when needed for pain or inflammation which could potentially increase the risk of drug-induced bronchospasm[160]. 2 interviewees were reported as suffering from both gout and hypertension whilst being prescribed a thiazide or thiazide-like diuretic which although will lower the interviewee's blood pressure, also increases the risk of acute gout[160]. Finally, one case each of the following were identified; an interviewee with chronic hypertension also taking an NSAID which may potentially worsen their hypertension, an interviewee with a history of indigestion that was taking doxycycline which can cause dyspepsia and oesophagitis, and an interviewee with diabetes who was also taking a beta blocker which can affect diabetic control and mask the warning signs of hypoglycaemia[160]. Of course, these are not all absolute contraindications, and the risk of the interaction can vary due to a range of drug-related and patient-related factors. For example, the risk of drug-induced bronchospasm with NSAIDs can vary between 0.6% and 44% of patients depending on the level of COX-1 inhibition of the NSAID and the susceptibility of the patient[167]. However, although the response is clinically variable, patients (and travellers) should be aware that reactions can potentially occur.

2.5.5.2.2.10 PCI 4 – Potential drug-drug interactions

10 potential drug-drug interactions were identified in the medication regimens of the interviewees and these are summarised in table 2.20. It can be seen that the interactions identified vary in clinical significance with about half being significant and the others being rare or low risk as the interviewee had been using the combination of medications for quite some time. It must be noted that some of the identified potential drug interactions were not specifically related to travel *per se* but were more related to the long term management of their pre-existing medical conditions. Likewise many of the NSAIDs involved in these potential drug interactions were prescribed or purchased for the management of chronic conditions.

2.5.5.2.2.11 PCI 1 – Inappropriate dosage regimen

In 6 cases it was noted that the dosage regimen of the interviewees' non-antimalarial medications was unusual or nonstandard and did not fully comply with recognised guidelines as stated in either the manufacturer's guidelines, or in standard basic drug information texts such as the Australian Medicines Handbook. The cases identified are summarised in table 2.21.

Table 2-20 Summary of the potential drug-drug interactions identified in the sample

Interviewee Number	Potentially interacting drugs	Description
17	Carbamazepine + Valproate	Both antiepileptics may affect the serum levels of the other. (Valproate may decrease carbamazepine concentrations and increase concentrations of its active metabolite and carbamazepine may decrease valproate concentrations and its activity). However, the patient had been taking the combination for some time and did not mention either a lack of efficacy or signs of toxicity[160 168].
17	Levetiracetam + Alcohol	Levetiracetam can increase the effects of alcohol[160], and as levetiracetam had also just been recently commenced and as the interviewee stated that he is likely to drink more heavily whilst on holiday the interactions was highlighted to the interviewee.
31	Enoxaparin + NSAID	Increased risk of bleeding with some reports of spinal haematomas when epidural or spinal anaesthesia is given[168]. The risk of this occurring is likely to be low.[168]
59	"Triple whammy" – A2RB + Loop diuretic + NSAID	When used in combination, an A2RB (or ACE inhibitor), a loop diuretic and a NSAID can significantly increase the risk of renal impairment and electrolyte disturbances[160 168].
59	Warfarin + NSAID	Some NSAIDs can increase plasma warfarin levels and increase the risk of bleeding. Monitoring is required when regular NSAIDs are commenced and using NSAIDs when required for pain (as with this interviewee) is not recommended[160 168]. In this situation warfarin had just been commenced before travelling
59	Alendronate + NSAID	Some reports of increased risk of gastrointestinal damage although others have found no evidence of increased risk[168]. This risk of this reaction would be relatively low.
59	Flecainide + Beta blocker	May cause additive cardiac depression and there are a few isolated reports of bradycardia and fatal AV block with flecainide and sotalol[168]. This patient appeared to have been using the combination for quite some time.
149	ACE Inhibitor + NSAID	Increased risk of renal impairment and hyperkalaemia[160 168]
170	ACE Inhibitor + NSAID	Increased risk of renal impairment and hyperkalaemia[160 168]
213	Warfarin + Paracetamol (Regular dosing	There are isolated case reports that regular and chronic dosing with paracetamol may increase the anticoagulant effect of warfarin[160 168]. Therefore the patient should be routinely monitored

Table 2-21 Nonstandard dosage regimens identified from the medication histories of the interviewees[160]

Interviewee number	Dosage regimen being used	Comment
24	Aspirin 100mg on alternate days	For its antiplatelet effect the usual dose would be Aspirin 100-150mg once daily[160]
59	Flecainide 100mg once daily	Flecainide is usually administered with a twice daily regimen[160]
61	Atorvastatin 2.5mg once daily	The dose is very low. Normal dose range is 10-80mg once daily[160]
172	Aspirin 100mg once daily and Dipyridamole 100mg once daily	The normal dose for stroke prevention would be Aspirin 25mg and Dipyridamole 200mg controlled release twice daily[160]
182	Amoxycillin 250mg three times daily	Dose low for the patient's indication[160]

2.5.5.2.2.12 PCI 10 – Untreated indications

As the researcher did not have access to the full medical records of the interviewees it was difficult to accurately assess for untreated indications. However, from the information given, 4 (1.8%) interviewees were identified that potentially could have untreated indications. For 3 interviewees it was evident from their medication histories that they suffered from coronary artery disease and/or hypertension and yet were not taking low dose aspirin and one interviewee mentioned that they suffered regularly from acute gout and yet did not take any prophylactic medications. Further investigation is required to determine whether these interventions would be clinically justifiable.

2.5.5.2.2.13 PCI 12a – Medications recently started (general)

4 interviewees (1.8%) reported that they had recently started medications just prior to their journey and all were from different drug groups including antihypertensives, anticonvulsants, anticoagulants and antibiotics. All four could result in side effects or hypersensitivity reactions that may cause a problem whilst overseas such as hypersensitivity reactions and diarrhoea with antibiotics, haemorrhaging with anticoagulants, hypotension, electrolyte disturbances and fainting with antihypertensives and toxicity syndromes with anticonvulsants.

2.5.5.2.2.14 PCI 12b – Medications with potential storage issues whilst overseas

Medications that require refrigerated storage could be the major concern whilst travelling overseas if facilities are not available at the destination. 4 interviewees (1.8%) in this sample were travelling with thyroxine tablets or insulin, both of which require refrigerated long term storage. Although thyroxine tablets may be stored out of a refrigerator at 25^0C for up to 21 days[169] storage in the higher temperature and humidity associated with tropical conditions may be problematic and therefore, this must be considered if the traveller is visiting a rural tropical area for some time. Also, although most insulin manufacturers state that their products may be stored at room temperature for up to a month[170], freezing of the insulin (which can occur if medications are packed in a traveller's suitcase in the main hold of an aircraft) can alter the protein structure of the insulin and result in a loss of

potency[170]. Therefore, in situations such as these travellers need to be aware of these issues and ensure that their medications are stored appropriately.

2.5.5.2.2.15 PCI 12c – Carrying inadequate supplies for the journey

It is usually recommended that travellers carry sufficient medications for the duration of their journey and a small amount of overage in case their return is delayed. Only 3 interviewees (1.4%) reported that they were carrying inadequate supplies of medications for their journey. One interviewee reported that they were only carrying 1 week's supply of their medications, however was travelling to PNG for a month and said that they had intended on buying further supplies once they got to Port Moresby. One interviewee was an asthmatic person travelling to PNG for 2 months. However, they were only carrying one Salbutamol metered dose inhaler, which may have been sufficient if they do not use their inhaler frequently. Finally, one interviewee was carrying 4 weeks supply of their medications but stated they were travelling for 5 weeks and so may run short of some of their medications whilst overseas.

2.5.5.2.2.16 PCI 12e – Carrying medications that could be illegal at the destination

The Japanese government prohibits the import of narcotic agents such as morphine, oxycodone and pethidine but also codeine and stimulants such as pseudoephedrine which are present in many OTC products. People who are intending to enter Japan carrying these agents for their own personal use are required to obtain permission in advance[1 159]. Two of the interviewees travelling to Japan were carrying codeine-containing OTC preparations (one was carrying a small quantity of one product and the other was carrying small quantities of multiple products), and one interviewee was carrying small quantities of a pseudoephedrine-containing OTC product. In all situations the quantities being carried were small (less than 10 tablets) however the products had been removed from their original packaging and were being carried as unlabelled foil strips.

2.5.5.2.2.17 PCI 7 – Potential or actual compliance problems

It was difficult to determine whether each interviewee had actual compliance problems because the researcher could not access the full medical and pharmacy records of the interviewee. Therefore, only one actual or potential compliance problem was identified in that one asthmatic interviewee appeared reluctant to use his corticosteroid inhaler on a regular basis to help control their asthma.

2.5.5.2.2.18 PCI 9 – Duplication of therapy

From the information obtained from their medication histories, only one interviewee was taking duplicate therapy – an interviewee who reported using 2 concurrent NSAIDs (Indomethacin and Diclofenac sodium). Although some patients respond more to one NSAID than another, overall there is little difference in anti-inflammatory efficacy and there are no benefits in using more than one NSAID at a time[160].

2.5.5.2.2.19 PCI 8 – Discrepancy between prescribed dose and dose used and PCI 12d – carrying excessive supplies for the journey

Australian Customs monitor for, and attempt to stop people taking excessive quantities of PBS medications overseas to prevent diversion to citizens of other countries. None of the interviewees

admitted carrying excessive quantities of PBS medications. Finally, PCI 8 was not identified in any interviewee because the researcher did not have access to the interviewee's prescriptions or medical notes and it was difficult to identify discrepancies between the prescribed dosage and what the interviewee was actually taking.

2.5.5.2.2.20 PCI 13 – other PCIs

In the assessment process a range of miscellaneous issues were identified that did not exactly fit into the other previous categories of PCIs as described. However, the researcher thought that these issues could potentially increase the risk of some travel-related diseases or medication-related issues and this was agreed by the reviewer and therefore these issues were placed into a miscellaneous category, PCI 13 – Other PCIs. These PCIs are summarised in table 2.22.

Table 2-22 Miscellaneous PCIs identified amongst the interviewees

Interviewee number	Potential PCI	Comments and concerns
12	Reported taking ibuprofen for severe varicose veins on a long flight to Europe	Potential increased risk of DVT/VTE and interviewee did not appear to be taking any effective precautions
60	Patient being treated for osteoporosis with alendronate but is not taking a calcium and vitamin D supplement	This was not categorised as a PCI 10 as the indication was being treated with alendronate. However, it was categorised as a PCI 13 as the Calcium and Vitamin D may have improved the final long term outcome of the interviewee.
66	Interviewee reported that she and her parents objected to vaccination in principle. Therefore, she had never received any vaccinations to date in her lifetime. The interviewee was travelling to India.	It was felt that the interviewee was at risk of many infections including many of the infections of childhood, many of which are still relatively common in India.
69	Interviewee reported as having a severe allergy to wasp stings	Concern that, if stung, the interviewee could have a severe reaction beyond the reach of medical services.
77	Interviewee had a severe nut allergy	Interviewee was carrying an Adrenaline Epipen® and was travelling to remote PNG. Concern that the interviewee could have a severe allergic reaction beyond the reach of medical services
94	Carrying both amoxycillin and chloramphenicol to be used if required for "sores and bruises"	Interviewee had obtained supplies with a prescription. Concern about the inappropriate use of antibiotics and the side effect profile of chloramphenicol in particular.
134	Interviewee had a severe shell fish allergy	Concern that interviewee could have a severe reaction beyond the reach of medical services
170	Interviewee taking a number of medications as part of a clinical trial	Concern that if medications are lost they may not be replaced or if the interviewee has a health care problem overseas there may be difficulty obtaining equivalent therapy or identifying the medications the interviewee is taking
195	Interviewee had a severe shell fish allergy	Concern that interviewee could have a severe reaction beyond the reach of medical services

A total of 9 miscellaneous PCIs were identified, of which nearly half (4 PCIs) are associated with a form of severe allergy which may either increase the risk of other allergic reactions or potentially could be serious if the traveller experienced a severe allergic reaction at a remote location, far from medical services.

2.5.5.3 How medications were carried by the interviewees

Ideally when travelling overseas, travellers should carry sufficient medication for their journey (with some overage), and the medications should be appropriately packaged and labelled in a way that ensures the efficacy and stability of the medications, but also ensures that they are still identifiable[1 162]. It is also useful for travellers to carry some form of documentation about their medications with them, such as a doctor's letter or copies of prescriptions. These are useful to show people in authority when required. For example, Customs officials may want evidence that medications are required for medical purposes and are for personal use or health professionals would find it useful when trying to obtain replacement medications in cases of loss or theft[1 162].

Although the average interviewee was planning to spend 43.9 days at their destination, they were only carrying 19 days' supply of medications. However, many of the interviewees did not require to carry medications for use every day because they were perhaps only using OTC medications on a 'when required' basis, or were not taking regular medications, or were returning residents or had another justifiable reason. Therefore, when assessed individually, only 3 interviewees were found to carrying inadequate supplies of medications for their planned journey (PCI 12c).

Not all interviewees showed their medications to the interviewer. However, many that did were carrying unlabelled blister strips or loose tablets. When asked, only 90 interviewees (41.3%) stated that their medications were appropriately labelled. However, it must be remembered that many interviewees were carrying OTC products that are likely be unlabelled, and some interviewees were from countries where it is not the usual practice to label dispensed items. Only 37 interviewees (17%) stated that they were carrying either a letter from their GP, prescriptions, or equivalent documentation to show that their medications were for their own personal use.

Interviewees were also asked how they would obtain supples of their medications if they ran out, or were lost or stolen. Just over half of the interviewees (51%, 111/218) said that they would initially contact a local pharmacist at their destination to obtain advice on how best to deal with the situation if their medications were lost or stolen and obtain advice, a lower number (16.5%, 36/218) said that they would initially contact a local doctor, whereas only 4% (9/218) said that they would go to a local hospital. A larger than expected number (16.5%, 36/218) said that they would just wait and obtain new supplies when they got home and most of these interviewees were taking antihypertensives or complementary medications. Other options suggested by the interviewees were to contact their employer (4%, 9/218), travel insurer (3.7%, 8/218) or hotel (2.3%, 5/218) for advice. 3.2% (7/218) of the interviewees were not sure what they would do and 1 interviewee (0.5%) said they would get medications sent from Australia.

2.6 Limitations and Recommendations for Further Work

Most other airport KAP studies were performed in large international airports and/or at multiple sites in multiple countries. Therefore, it is a major limitation of this study that it was performed at one relatively small, regional international airport in Australia. This limited the number of travellers interviewed, the range of destinations among the sample of travellers and other demographic factors such as the range of nationalities and occupations present. For example, as Cairns International Airport is a major hub for travel to PNG, a relatively large number of travellers in the sample were FIFO business travellers flying to that destination. This means that care is required when extrapolating the results of this study to the wider travelling population. However, performing this study at Cairns International Airport did offer some advantages. Firstly, no other KAP studies have been performed in an Australian regional international airport. Secondly, no other KAP study has focussed in any detail on FIFO business travellers flying specifically to PNG and finally, as chapter 6 focusses on the evaluation of a pharmacy-run travel health advisory service in north Queensland this study gave some indication of the level of KAP of travellers leaving the closest international airport to the pilot site.

Other limitations include that the study was performed with one male interviewer. The use of at least two interviewers (one male and one female), and if one of those interviewers was fluent in Japanese or Mandarin, may have encouraged greater participation from female travellers and from citizens of Asian countries. Another important limitation was that the interviews were performed in a public area, which limited the types of questions that could be asked and the extent of the information given in response to the interviewer.

2.7 Summary

This study examined the knowledge, attitudes and practices (KAP) and pharmaceutical care risks of a group of international travellers leaving a regional international airport in Australia, with the majority of interviewees (58.3%) found to be travelling without having sought any form of pre-travel health advice. Those who did seek pre-travel health advice obtained it mainly from their GP, or the internet, with few using other service providers such as travel clinics or pharmacists.

Interviewees were assessed for a series of potential pharmaceutical risks (PPRs) and pharmaceutical care issues (PCIs) and the sample were found to have a low overall PPR, with 75% of interviewees having no PPRs and only 4.6% having more than 1 PPR. However, although many interviewees had no medication-related issues, 61.5% of the interviewees did have PCIs and a total of 274 PCIs were identified (average 2.04 PCIs per interviewee). The most prevalent PCIs identified were related to issues with malarial chemoprophylaxis and that some travellers needed medication-related education. The study thus highlighted potential roles for pharmacists as part of the multidisciplinary travel health team, providing pre-travel assessments to the many, relatively low-risk travellers, visiting mainly metropolitan destinations.

The next chapter of this thesis will therefore present an investigation of the current level of involvement of Australian pharmacists in the provision of travel health services, their views regarding the future development of pharmacy-run travel health services in Australia, and assess their current level of knowledge relating to a selection of travel-related health issues.

Chapter 3 Australian Pharmacists Perceptions, Knowledge and Understanding of Current and Future Roles in Travel Health

3.1 Introduction

Many travellers do not obtain pre-travel health advice before travelling overseas, and those who do seek pre-travel health advice visit mainly their general practitioner (GP), a travel health clinic or specialist, or use the internet to obtain the advice they need[54-59]. Some pharmacies offer travel health services, although the type and level of service varies, and pharmacy-run travel health services are generally used by smaller numbers of travellers, than services offered by other providers[77 79 80 86 87]. However, it has been suggested that pharmacies are perhaps an underutilised resource and that their accessibility and convenience make them an attractive source of pre-travel health information for some travellers[72 74]. However, although there are some reports in the literature about the types of pre-travel services offered by pharmacies and/or their success, there appears to be fewer reports in the published literature about the quantity and quality of the advice given or the sources of information used by these pharmacists[71].

Kodkani et al[71] examined the travel-related health advice given by Swiss pharmacists and their knowledge of travel-related health issues, using a cross sectional telephone interview followed by a postal, written survey. The overall knowledge of the Swiss pharmacists on travel health issues was considered to be satisfactory, although there were areas, such as the treatment of traveller's diarrhoea, sun protection, vaccinations and malaria prophylaxis, where the information given by pharmacists was deemed lacking[71]. Few pharmacists were found to use specialist travel health information resources, although many participants did wish for a single, up-to-date, easy-to-use, travel health information resource for use in pharmacies[71]. The need for reliable and consistent written information for travellers and good communication and cooperation between doctors, clinics and pharmacists was recognised as being essential to ensure that the traveller receives reliable and consistent information[71].

Teodosio et al[81], who examined the travel health advice given by pharmacists in Portugal, found that travel health advice was given on a regular basis, however the number of travellers advised by the participants was low. The majority of pharmacists (93.2%) did not have any formal training in travel health and it was felt that the advice given was incomplete and/or incorrect particularly relating to the management of traveller's diarrhoea and malaria prevention. Similar to the Swiss study, it was recommended that pharmacists have greater access to specialised training in travel health[81].

The intention of this study was to firstly examine the current level of involvement of Australian pharmacists in the provision of travel health services in addition to the type of services provided. Their views regarding the provision of travel health services from pharmacies and some of the barriers to implementation were examined. Finally, the aim was to assess their current level of knowledge in order to inform both training requirements and the delivery of training.

3.2 Contribution

My estimated overall contribution to this study was 100%.

I performed the necessary literature searches and developed the survey instrument, completed the necessary ethics applications and liaised with both the Pharmaceutical Society of Australia and the Pharmacy Guild of Australia. The printing and photocopying of surveys was outsourced, however I assembled and filled envelopes prior to posting the postal survey. Finally, I performed the final data entry and analysis, although a small amount of administrative assistance was received with opening returned the surveys.

3.3 Research Question and Aims

The research question for this chapter is:

> **Do Australian pharmacists consider travel health to be an appropriate role, and if so, what do they consider to be the most appropriate level of involvement and what do they perceive are the barriers to delivering travel health services?**

The main objectives of this chapter are to investigate:

1. the current level of involvement of a sample of Australian pharmacists in the provision of travel health services, examining the range of services offered and whether they have received any formal training and what information resources are used.
2. the perceptions and views of those pharmacists regarding the future development of extended clinical services in the area of travel health, their training needs and their perceptions of potential barriers to the service.
3. the current level of knowledge of those pharmacists regarding a selection of travel-related health issues.

3.4 Methods and Processes

This study was a cross-sectional survey of a sample of Australian pharmacists using a self-completion questionnaire. The survey instrument was distributed to potential respondents by two methods; firstly as an electronic e-survey and then as a more traditional, postal survey.

3.4.1 Inclusion criteria

Invitations to participate in the e-survey were e-mailed to all members of the Pharmaceutical Society of Australia (PSA). The PSA is a professional organisation for Australian pharmacists and has approximately 18,000 members. In Australia, it is not compulsory for registered Australian pharmacists to be members of the PSA, as the regulatory controls for Australian pharmacist registration are controlled by the Australian Health Practitioner Regulation Agency (AHPRA). Conversely, it is not a compulsory requirement for PSA membership that members must be registered and practising pharmacists in Australia. However the majority of PSA members are registered pharmacists working in Australia. The postal survey was also sent to the pharmacist managers of a sample of Australian community pharmacies.

3.4.2 Design and testing of the survey instrument

The survey instrument was a self-completion questionnaire designed to meet the objectives of the study. The questions in the questionnaire were designed so that they could be distributed in both an electronic and postal format.

3.4.2.1 Format of the survey instrument

The survey instrument (Appendix 3.1) consisted of a combination of 44 multiple choice questions (MCQs), multiple answer questions (MAQs), open answer and rating scale questions (using 5 point Likert scales) divided into 4 main sections.

3.4.2.1.1 Section A (Demographics)

This section consisted of 8 MCQs to collect demographic data about the respondents such as; gender, age, state of residence and their current practice situation as a pharmacist.

3.4.2.1.2 Section B (Current travel health services)

This section consisted of 15 MCQs, MAQs and rating scale questions to collect data regarding any current travel health services, if any, offered by respondents. Issues examined included the workload of current travel health services, the type of travellers who use these services, how respondents assess and counsel travellers and the information resources used by the respondents. Respondents were also asked whether they thought that travellers would be willing to pay for the travel health services they received.

3.4.2.1.3 Section C (Perceptions of current and future travel health services)

Using a combination of rating scale questions (using 5 point Likert scales), MCQs and open answer questions, respondents were asked to rate their level of agreement or disagreement about current and future extended roles for pharmacists in the area of travel health and the respondents' views about the training needs of pharmacists operating travel health services.

3.4.2.1.4 Section D (Knowledge assessment)

Using a combination of MCQs, MAQs and small vignettes, the final section of the questionnaire was intended to test the knowledge of respondents about travel-related health issues. Topics included common causes of morbidity and mortality in travellers, the causes and management of Traveller's Diarrhoea, and the selection of appropriate vaccinations and first aid items for travellers.

3.4.2.2 Testing of the survey instrument

To ensure the validity and reliability of the study and the questionnaire, to reduce bias and to allow comparison with other similar studies the survey instruments used in other studies were reviewed and some questions used were based on similar questions used by Kodkani[71] and Teodosio[81]. Also, once the questionnaire was designed and formatted, and before it was finalised, it was pre-tested by a group of 5 pharmacists prior to distribution. They completed the questionnaire, assessing it for

understanding, readability and to ensure that it did not take too long to complete. Only minor grammatical changes were then made prior to distribution.

3.4.3 Study process

3.4.3.1 Electronic e-survey

The self-completion questionnaire was formatted into an electronic e-survey using SurveyMonkey®. An invitation to participate in the survey was included in a PSA weekly electronic newsletter sent to all PSA members. The invitation contained details of the project and a hyperlink. If the PSA member wished to participate in the study they clicked on the hyperlink which led to a description of the survey and the participant information sheet approved by the JCU HREC (Appendix 3.2) which explained the participant's rights of withdrawal and that participation was voluntary. In an attempt to improve response rates, an invitation for respondents to take part in an anonymous prize draw to win one of two Apple iPod nanos was incorporated at the end of the survey. To maintain the anonymity of respondents, the names and contact details of respondents were separated from their responses by the SurveyMonkey® system. The e-survey was open for a 6 week period from late March 2009.

3.4.3.2 Postal survey

Using the most current Yellow Pages® Business Directory, it was estimated that there were just over 7,600 pharmacy businesses in Australia. However, due to differences in population distribution to ensure that less populous states were not over-represented in the sample, a stratified sample of approximately 600 pharmacies was drawn from those pharmacy businesses advertising in the Yellow Pages® in each Australian State or Territory using the Yellow Pages® as a sampling frame (Table 3.1).

Table 3-1 Number of pharmacies chosen for postal survey

Australian State/Territory	Pharmacies advertising in Yellow Pages®		No. of pharmacy businesses chosen to represent each State or Territory	
	Number	% (n=7604)	Number	% (n=601)
Northern Territory	49	0.64%	4	0.67%
Australian Capital Territory	78	1.02%	6	1%
Tasmania	188	2.47%	15	2.50%
South Australia	665	8.75%	53	8.82%
Western Australia	683	8.98%	55	9.15%
Victoria	1945	25.58%	154	25.62%
New South Wales	2453	32.26%	192	31.95%
Queensland	1543	20.29%	122	20.3%
Total	7604	100%	601	100%

A postal survey was sent to each of the selected pharmacies in each state. The letter sent to each pharmacy contained an information leaflet (Appendix 3.3), the survey instrument (Appendix 3.1) and a stamped address envelope. Again, in an attempt to improve response rates, respondents were invited to take part in an anonymous prize draw to win one of two Apple iPod nanos. To participate in the draw, respondents were asked to complete a draw form (Appendix 3.4) and return it with their survey. To maintain the anonymity of respondents, returned surveys were initially returned to the receptionist of the Discipline of Pharmacy. Surveys were initially posted on Monday 11th May 2009 and completed surveys were accepted until the end of June 2009. Consent forms were not supplied for either the electronic or postal survey as it was assumed that informed consent was implied if the participant returned a completed survey.

3.4.3.3 Timing of surveys

A continuing professional education (cpe) module on the topic of travel health was prepared for the Pharmaceutical Society of Australia (Essential CPE: Travel Health. June 2009. ISBN 978-0-646-51329-4) by Ian Heslop (Appendix 3.5). In the process of publication the module was reviewed by two independent reviewers; Assoc Prof Karin Leder, Head of Infectious Disease Epidemiology Unit, Monash University and Dr Bernie Hudson, Medical Director, Medical Advisory Services to Travellers Abroad (MASTA), Australia and the module was also submitted as a doctoral project (TM6018:06) towards this degree.

The cpe module was sent to all PSA members in late June 2009, as this may have influenced the knowledge assessment in this study, any postal surveys received after the end of June 2009 were not included in the study. (The e-survey ended in late April 2009 and therefore was not affected).

3.4.3.4 Data analysis

On receipt of completed surveys. The data was entered into Microsoft® Excel® Spreadsheets and the IBM® SPSS Statistics Package® (Version 22) was used for any statistical analysis. The responses to the electronic and postal surveys were combined because, other than their mode of delivery, the surveys were identical. Although any differences in demographic data about respondents of the two surveys were noted. It was noted that some respondents either failed to enter all of their demographic details (Sec A) and/or then failed to complete sections B and C. Returned surveys with an incomplete data set in sections A to C were therefore excluded from the data analysis. Of those that fully completed sections A to C, most attempted and completed the knowledge test (Section D). However, some respondents did not attempt the knowledge test at all and others failed to complete it. Therefore, only those respondents that fully completed the knowledge test were included in the data analysis for section D.

3.4.4 Ethical approval

Ethical approval for the study was granted by the James Cook University Human Research and Ethics Committee (JCU HREC Approval No: H3182) (Appendix 1). Initial ethical approval was granted for the e-survey, and then an application to amend the protocol to include the postal survey was made and

approved. Approval to send a postal survey to community pharmacies was also obtained from the Survey Approval Program of the Pharmacy Guild of Australia (Approval No: 755) (Appendix 1).

3.4.5 Financial support

The study was supported with a James Cook University Faculty Allocated Internal Grant (FAIG) of $4000 awarded by the Faculty of Medicine, Health and Molecular Sciences.

3.5 Results and Discussion

The e-survey was viewed or started by only 239 PSA members and of these, only 195 respondents fully completed sections A to C (completion rate 81.6%). However, a definitive response rate could not be calculated as it was unclear how any PSA members had actually opened the newsletter containing the hyperlink to the survey. Response rates to surveys can be influenced by a variety of factors. In informal discussions in the development of the project, the PSA staff highlighted that they had noted that previous member response to e-surveys varied and seemed to be dependent upon the topic of the survey and was used as a rough indicator of member interest. The positioning of the survey notification in the newsletter, towards the end of the newsletter, may have also influenced response rates. The length and complexity of the survey may have also adversely affected response rate. However, with the e-survey, pharmacists would have been unaware of the length of the survey prior to opening the questionnaire and the completion rates of sections A-C was relatively high. Therefore, it was thought that positioning of the survey within the newsletter had a greater effect on the response to the e-survey. A total of 601 postal surveys were sent and 86 responses were received (14.3% response rate), although 7 responses were received after the end of June 2009 and were not included. Only 60 postal responses were complete. These response rates are low when compared to other studies. Kodkani et al[71] achieved a response rate of 83% for their postal survey, although they acknowledge that this was very high and that respondents' responses indicated a great deal of interest in the topic by Swiss pharmacists[71]. Also, the pharmacists were initially contacted by telephone, which may have influenced response rates. The response rate in the Portuguese postal survey was 39.96%[81], which could be explained by the distribution of the survey in the home city of the research institute, whereas in this study the surveys were sent throughout Australia.

3.5.1 Demographic data

The responses to both the electronic and postal surveys were collated and combined and responses to the demographic questions in section A are summarised in table 3.2. In total, 255 respondents appropriately completed sections A to C of the survey. The two surveys were distributed to slightly different groups of pharmacists, PSA members (e-survey) and community pharmacists, either employees or managers/owners (postal survey). Table 3.2 allows a comparison to be made of the demographics of the two groups of respondents. It shows that more males than females responded to the postal survey, which was opposite to the pattern of respondents in the e-survey. This may be explained by the higher proportion of male pharmacists who manage or own community pharmacies compared to the total number of male pharmacists in the pharmacy profession. However, when the responses to the two surveys are combined, from Table 3.2, it can be seen that the respondents were

Table 3-2 Demographic data of the survey respondents

		Electronic Survey		Postal Survey		Combined Surveys	
		No.	%(n=195)	No.	%(n=60)	No.	%(n=255)
Gender	Male	44	22.6%	35	58.3%	79	31%
	Female	151	77.4%	25	41.7%	176	69%
Age	20-50yrs	147	75.4%	43	71.7%	190	74.5%
	51yrs or greater	48	24.6%	17	28.3%	65	25.5%
Years registered as a pharmacist	0-30yrs	156	80.0%	49	81.7%	205	80.4%
	31yrs or greater	39	20.0%	11	18.3%	50	19.6%
State of residence	ACT	7	3.6%	0	0%	7	2.%
	NSW	40	20.5%	19	31.7%	59	23.1%
	NT	1	0.5%	1	1.7%	2	0.8%
	Qld	42	21.5%	12	20%	54	21.2%
	SA	9	4.6%	3	5%	12	4.7%
	Tas	9	4.6%	3	5%	12	4.7%
	Vic	51	26.1%	13	21.7%	64	25.10%
	WA	36	18.5%	9	15%	45	17.7%
Area	State or Territory Capital	107	54.9%	23	38.3%	130	51%
	Regional metropolitan centre (Pop'n >75,000)	50	25.6%	17	28.3%	67	26.3%
	Rural/Remote area	38	19.5%	20	33.3%	58	22.7%
Employment status	Full-time	123	63.1%	54	90%	177	69.4%
	Part-time	59	30.3%	6	10%	65	25.5%
	Retired/Not Practising	13	6.6%	0	0%	13	5.1%
Field of practice	Pre-reg Pharmacist	14	7.2%	25	41.7%	14	5.5%
	Comm. Pharmacist	140	71.8%	35	58.3%	121	78.4%
	Hospital Pharmacist	19	9.7%	0	0%	19	7.5%
	Defence Force	9	4.6%	0	0%	9	3.5%
	Academia	3	1.5%	0	0%	3	1.2%
	Other	10	5.1%	0	0%	10	3.9%
Highest level of education	BPharm or equiv	162	83.1%	49	81.7%	10	82.7%
	PG certificate	22	11.3%	3	5%	25	9.8%
	Masters	10	5.1%	7	11.7%	17	6.7%
	Doctorate	1	0.5%	1	1.7%	2	0.8%

predominantly female (69%), below the age of 50yrs (74.5%), registered less than 30 years as a pharmacist (80.4%), residing in metropolitan areas or capital cities (77.3%) and most were working in a full-time positions (69.4%) with standard Bachelor-level or equivalent qualifications (82.7%). Although, little detail is given regarding the demographics of respondents in the Swiss study[71], a similar number of pharmacists participated in the Portuguese postal survey (251 respondents) as in this study and again, a high number of respondents were female (79.9%) with an average age of 43.55 years and an average time since graduation of 17.66 years[81].

3.5.2 Current travel health services (Section B)

Section B of the survey asked questions relating to the current travel health services provided by the survey respondents and it focussed on two main areas. Firstly, if services were offered, what is their current workload and what types of travellers do they mainly advise. Secondly, what level or type of service is offered by the respondents i.e. how do they initially assess travellers, what advice do they give to the travellers and what information resources do they routinely use in the provision of the service? Finally, respondents were asked whether they felt that travellers would be willing to pay for the services offered.

Of the 255 respondents to the survey, 174 (68.2%) respondents said that they provided travel-related advice or services in their current employment (question 9) and 81 (31.8%) did not offer services

3.5.2.1 Workload and demography of travellers

The responses to Questions 10-16 are summarised in table 3.3. and it can be seen that although many of the respondents offered travel health services (68.2%, 174/255), the travel health workload for most pharmacists was low, with the majority (69%, 120/174) advising less than 2 travellers per week and 83.9% (146/174) spending less than one hour per week on the provision of travel health services. No respondents spent more than 5 hours a week providing travel health services. Again, this is comparable with other studies because although Kodkani et al[71] reports a wide variation in workload in the Swiss study with 8% of respondents giving frequent advice (more than 5 times per week) and 10% giving infrequent advice (less than 6 times per year), the majority of respondents (56%) in the study gave travel health advice at a rate of 2-3 times per month. Likewise, Teodosio et al[81] report that advice was only sought by up to 3 travellers per month in 87.6% of the pharmacies.

Questions 12 to 16 of the survey focussed on the type of travellers that the pharmacists currently advise in an attempt to see if the pharmacists dealt with any particular niche groups of travellers. The respondents dealt with the most common groups of Australian travellers i.e. mainly either below the age of 30 or above the age of 50, travelling for leisure, business or VFR, and to destinations in mainly in the Asia, Western Europe or Oceania regions. They appear to deal with travellers from both genders, travelling alone or in couples and often with children.

3.5.2.2 Level or types of services offered by pharmacists

Questions 17-23 of the survey examined the type and level of travel health advice services that are currently offered by Australian pharmacists. Questions focussed on how the traveller is initially

Table 3-3 Travel Health workload and clientele of respondents who offered travel health services

Survey Question	Response option	No. of respondents	% (n=174)
Q10. Approximately, how many travellers do you advise on travel-related health issues each week? (Tick ONE answer)	1-2 travellers per week (or less)	120	69.0%
	3-5 travellers per week	43	24.7%
	6 or more travellers per week	11	6.3%
Q11. Approximately, how much time in total do you spend advising travellers on travel-related health issues each week? (Tick ONE answer)	Less than 1hr per week	146	83.9%
	1-2 hrs per week	22	12.6%
	3 or more hrs per week	6	3.5%
Q12. Do you advise more travellers of a particular gender and if so, which? (Tick ONE answer)	Male	10	5.8%
	Female	43	24.7%
	Equal numbers of male and female travellers	121	69.5%
Q13. What age group of travellers do you commonly advise on travel-related health issues? (Select the TWO commonest age groups of travellers that you advise)	18-30 yrs	99	56.9%
	31-40 yrs	66	37.9%
	41-50 yrs	47	27.0%
	51yrs or older	83	47.7%
Q14. What are the commonest destinations for the travellers that you advise on travel-related health issues? (Select up to FOUR of the destinations below)	South East Asia	160	92.0%
	Western Europe	94	54.0%
	Oceania	49	28.2%
	North Asia	42	24.1%
	South Asia	35	20.1%
	South America	30	17.2%
	North America	29	16.7%
	Southern Africa	23	13.2%
	North Africa	17	9.8%
	Others	44	25.3%
Q15. Do the travellers you advise travel alone or in groups? (Select the TWO commonest types of travellers that you advise)	Travelling alone	51	29.3%
	Couples	141	81.0%
	In groups of three or more adults	57	32.8%
	Travelling with children	39	22.4%
Q16. What are the most common reasons for travel for the travellers that you advise on travel-related health issues? (Select the THREE commonest types of travellers that you advise)	Holiday-makers or tourists	172	98.9%
	Business travellers or overseas workers	89	51.2%
	Migrants or long-term travellers	17	9.8%
	People travelling for religious purposes	11	6.3%
	People visiting relatives overseas	90	51.7%

assessed by the pharmacist, what advice topics are discussed with travellers and how that advice is communicated to the traveller. Other questions focussed on the information resources used by the pharmacists. Table 3.4 summarises the responses to respondents to questions 17 and 19 to 21 and 23, whereas the responses to questions 18 and 22 are summarised separately in figure 3.1 and table 3.5 and figure 3.2 and table 3.7 respectively.

3.5.2.2.1 Pre-travel assessment of travellers by pharmacists

Question 17 examined how pharmacists initially assessed travellers seeking advice. Respondents were presented with a series of assessment options ranging from no formal assessment, to a full, formal travel health risk assessment. Recommendations for the pre and post-travel assessment of travellers and the use of a risk management approach to the initial pre-travel assessment of travellers

Table 3-4 Level or types of travel health services offered by pharmacists

Survey Question	Response option	No. of respondents	% (n=174)
Q17. Before advising the traveller, how do you initially assess the traveller? (Select the most appropriate response)	No formal assessment, only answer the questions raised by the traveller	60	34.5%
	Interview the traveller about their travel itinerary and answer the questions raised by the traveller	60	34.5%
	Interview the traveller regarding their current state of health, medical history and medications (and their travel itinerary) and answer the questions raised by the traveller	52	29.9%
	Get the traveller to complete a pre-interview questionnaire; then formally interview the traveller regarding their current health, medical history, medications; review their travel itinerary for risks; answer the questions raised by the traveller	2	1.1%
Q19. In what form do you give your advice to the traveller? (Tick ONE answer)	Verbal advice only	70	40.2%
	Written advice only	0	0%
	Combination	104	59.8%
Q 20. Do you ever advise travellers via the telephone?	Yes	77	44.2%
	No	97	55.8%
Q21. Do you ever advise travellers via e-mail?	Yes	5	2.9%
	No	169	97.1%
Q23. Are travellers willing to pay for this service? (Tick ONE answer)	Yes	2	1.1%
	No	52	29.9%
	Don't know	120	69.0%

will be described in more detail in the introduction to chapter 7. The pre-travel consultation is recognised to be the key and fundamental component of the clinical, decision-making process in travel health, and it is recommended for all international travellers[18 116 171]. It is also recommended that a systematic approach is used, possibly supported with standardised questionnaires, interview schedules and/or other data collection tools in order to expedite the process, help to maintain a consistent approach and to aid in the recording of findings[18 116 171].It can be seen from the results in table 3.4, that just over a third of responding pharmacists (34.5%, 60/174) provide a relatively simple, 'reactive' information service. While 64.4% (112/174) of the respondents stated they question the traveller about their itinerary and/or health status, only 2 respondents (1.2%) stated they would complete a full, formal, travel-related health risk assessment. The pharmacy-run travel health services reported in the literature are generally those operating a comprehensive service, supported with standard questionnaires and interview schedules to aid the assessment of travellers[77 79 80 86 87 172].

3.5.2.2.2 Counselling or information provided to travellers by pharmacists

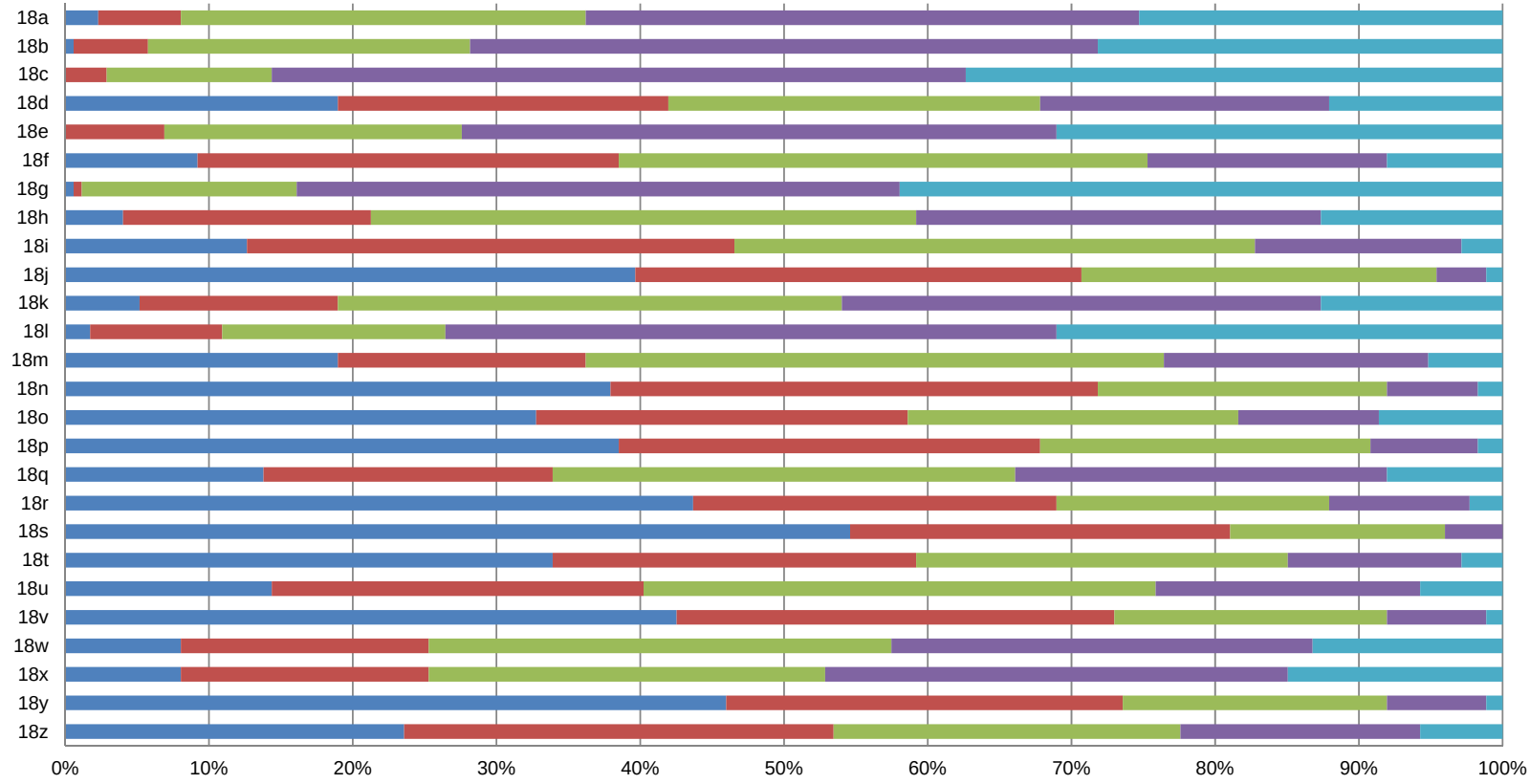
Question 18 presented respondents with a series of 26 health or travel-related topics taken from the list of obligatory and optional counselling or education topics suggested by Spira[18], the UK National Travel Health Network and Centre (NaTHNaC)[3] and other sources[116 171 173] and they were asked to rate how frequently they counsel or discuss these topics with travellers using a 5-point Likert scale. 174 pharmacists completed this question and the results are summarised in figure 3.1. Table 3.5 lists the average rating of each topic (in order), and also acts as a key for figure 3.1.

From table 3.5 and figure 3.1, it can be seen that the respondents tend to discuss a limited range topics with travellers, with 16 of the 26 topics having an average rating below 3.0. However, the ten topics that pharmacists most frequently discuss with travellers (light blue shading in table 3.5) include many of the obligatory topics suggested by Spira[18], but also topics that are frequently of most concern to the traveller (namely their requirements relating to vaccinations and malaria chemoprophylaxis for their planned destination), some issues relating to common travel-related conditions such as diarrhoea and areas highlighted as key areas for pharmacist input (medications management and travel first aid kits). Those topics rarely discussed with travellers (average rating of 2.0 or below, dark blue shading in table 3.5) include topics that are more associated with more specialised travel situations, such as diving-related illnesses and acute mountain sickness, but also some relatively common travel health situations and issues, such as the risk or prevention of sexually transmitted diseases, the risk and prevention of accidents and how to obtain medical care overseas amongst others.

There are a variety of possible reasons why pharmacists may counsel travellers on some topics but not others. The time limitations of the counselling session may be a major factor, as is the perception by pharmacists as to their role which may not extend to topics such as travel insurance, the prevention of accidents or diving-related and mountaineering-related issues. Other studies have examined the advice given to travellers by both GPs and pharmacists and some have found some deficiencies or omissions in the advice given[63 64 71 81]. For example, Hatz et al[64] found that although high numbers of Swiss and German GPs regularly gave travel health advice, when interviewed many did not provide correct recommendations for vaccinations and malaria chemoprophylaxis for common tropical destinations. Ropers at al also found that some GPs also only give a limited range of pre-travel health

Table 3-5 Average ratings for how frequently pharmacists will advise travellers about common travel-related health topics (In order, most frequent first) (n=174)

Q18. What advice do you give travellers? Using the scale (1 – Never advise, 2 – Rarely advise, 3 – Occasionally advise, 4 – Frequently advise, 5 – Always advise) rate the following topics as to how commonly you advise the traveller about these issues.	
Counselling topic	Average rating (Scale 1-5)
18g. Treatment of diarrhoeal diseases	4.2
18c. Prevention of mosquito and other insect bites	4.2
18e. Safe food and water consumption	4.0
18b. The need for antimalarial chemoprophylaxis	3.9
18l. Travelling with medications for chronic conditions	3.9
18a. Vaccinations needed for the traveller's destination	3.8
18h. Risk and prevention of deep vein thrombosis	3.3
18k. Dealing with pre-existing conditions (e.g. diabetes) whilst travelling	3.3
18x. The recommended contents of a first aid kit	3.3
18w. Travelling with a medical or first aid kit	3.2
18q. Tropical diseases at their destination	2.9
18f. Methods of water purification	2.9
18d. The need for early diagnosis and treatment of malaria	2.8
18u. Health issues of travelling with children	2.8
18m. Altering dosages of medications when travelling through multiple time zones	2.7
18i. Prevention and treatment of jet leg	2.6
18z. Current disease outbreaks at their destination	2.5
18o. Need for travel medical insurance	2.4
18t. Health issues of travelling whilst pregnant	2.2
18j. Risk and prevention of accidents whilst overseas	2.0
18n. Risk and prevention of sexually transmitted diseases	2.0
18p. How to obtain medical care whilst overseas	2.0
18r. Prevention and treatment of acute mountain sickness	2.0
18v. Safe alcohol and drug consumption whilst overseas	1.9
18y. Issues regarding personal safety and crime prevention	1.9
18s. Prevention and treatment of diving-related illnesses	1.7



	18z	18y	18x	18w	18v	18u	18t	18s	18r	18q	18p	18o	18n	18m	18l	18k	18j	18i	18h	18g	18f	18e	18d	18c	18b	18a
1 Never advise	23.6	46.0	8.0	8.0	42.5	14.4	33.9	54.6	43.7	13.8	38.5	32.8	37.9	19.0	1.7	5.2	39.7	12.6	4.0	0.6	9.2	0.0	19.0	0.0	0.6	2.3
2 Rarely advise	29.9	27.6	17.2	17.2	30.5	25.9	25.3	26.4	25.3	20.1	29.3	25.9	33.9	17.2	9.2	13.8	31.0	33.9	17.2	0.6	29.3	6.9	23.0	2.9	5.2	5.7
3 Occasionally advise	24.1	18.4	27.6	32.2	19.0	35.6	25.9	14.9	19.0	32.2	23.0	23.0	20.1	40.2	15.5	35.1	24.7	36.2	37.9	14.9	36.8	20.7	25.9	11.5	22.4	28.2
4 Frequently advise	16.7	6.9	32.2	29.3	6.9	18.4	12.1	4.0	9.8	25.9	7.5	9.8	6.3	18.4	42.5	33.3	3.4	14.4	28.2	42.0	16.7	41.4	20.1	48.3	43.7	38.5
5 Always advise	5.7	1.1	14.9	13.2	1.1	5.7	2.9	0.0	2.3	8.0	1.7	8.6	1.7	5.2	31.0	12.6	1.1	2.9	12.6	42.0	8.0	31.0	12.1	37.4	28.2	25.3

Figure 3-1 Percentage rating of how frequently pharmacists advise travellers about particular travel-related health issues (n=174)

advice and that for example, over 50% of the GPs surveyed do not give travellers pre-travel advice on the risk and preventions of STDs[62].

Questions 19 to 22 focussed on how the pharmacists currently advise or provide information to travellers and the results are summarised in table 3.4. Most of the pharmacy-run services described in chapters 1 and 7, such as the Ukrop supermarket model described by Goode et al[172], the University-based PTC described by Durham et al[78] and the Grampian model described by Hind et al[80 83] are travel health or vaccination clinics based on a traditional clinic model, where the patient (or traveller) presents in person, is assessed and receives advice and/or other services in the clinic. In the process the patient is generally given a combination of both verbal and written advice. The Kaiser Permanente CPITC operating in Denver, Colorado is different in that it is a telepharmacy service in which travellers are advised initially over the telephone and are then sent supplementary information and materials via e-mail[76 77]. Table 3.4 shows that almost 60% of respondents to this survey use a combination of verbal and written advice when counselling travellers, which is probably the preferred option, and 40% used verbal information only. Less than half of respondents (44.2%) use the telephone to advise travellers and only 2.9% used e-mail. However, Australian pharmacists could consider the greater use of e-mail to send written advice and information to travellers with telephone enquiries or the provision of telepharmacy services as in the KP CPITC model.

3.5.2.2.3 Information resources used by pharmacists in the provision of travel health services

Travel health is a rapidly changing field and travel health providers must keep abreast of these changes, if they are to provide travellers with the most accurate and up to date information[174]. Some studies have examined the information resources used by other travel health providers such as general practitioners[64 174 175]. However, there appears to be little known about the information resources used by Australian pharmacists in the provision of travel health advice. Respondents were asked to rate the usefulness of 18 common information resource using a 5-point Likert scale with the results presented in table 3.6 and figure 3.2.

Respondents were presented with were a selection of information resources including common generic drug information resources such as the *Australian Medicines Handbook, Therapeutic Guidelines, Australian Immunisation Handbook* and *MIMS*, commonly-used travel health specific resources such as *MASTA, CDC* and *Travel Bugs* and finally, a range of Australian and international travel health, medical and pharmacy practice journals.

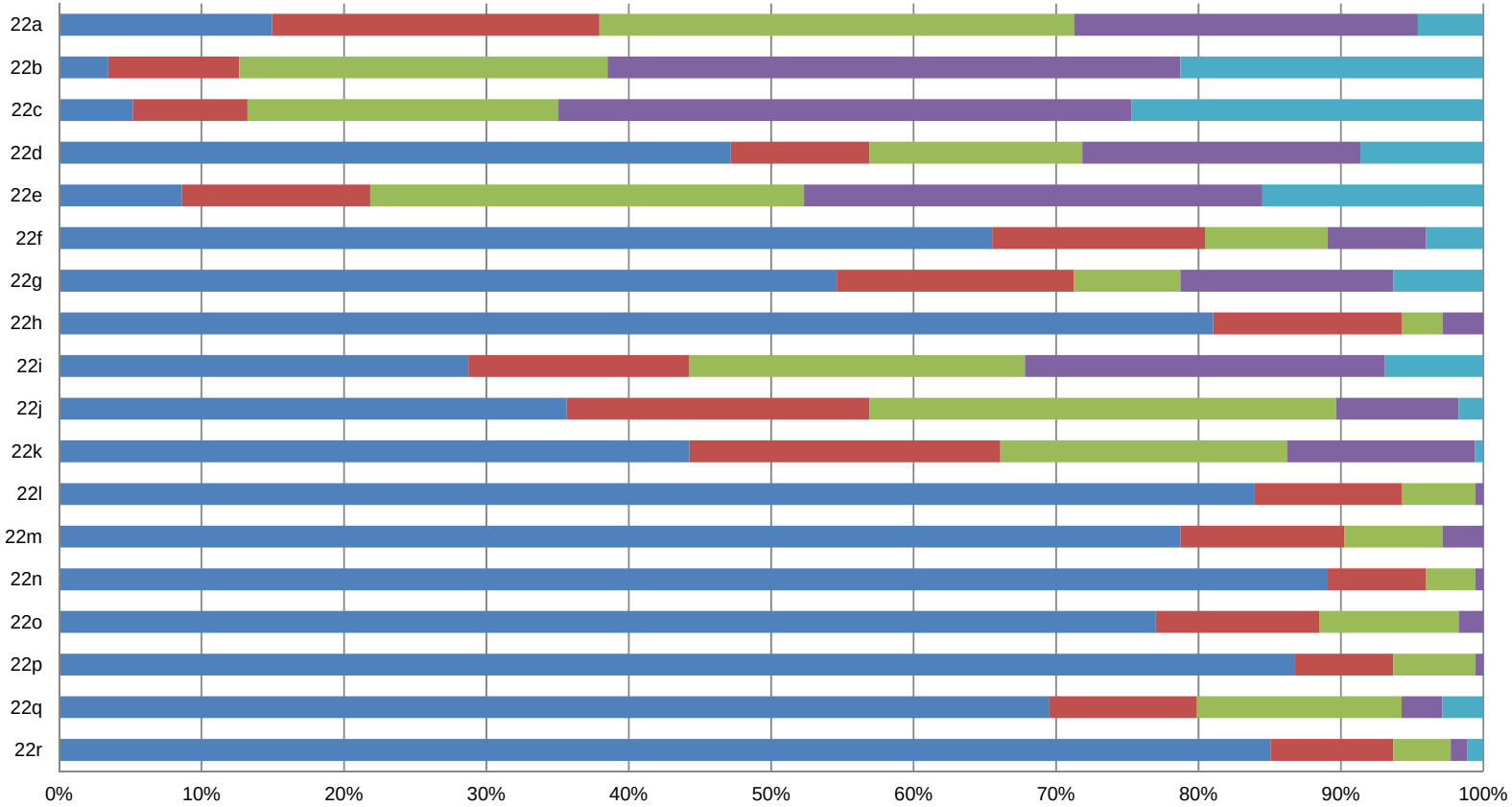
Table 3.6 and Figure 3.2 suggests that only a few of the resources are used that frequently and these tended to be the more generic information resources such as the *Australian Medicines Handbook (AMH)* and *Australian Immunisation Handbook(AIH)*, with over 60% of respondents saying that they use these resources frequently or above and an average rating of 3.7. The *Monthly Index of Medical Specialities (MIMS)* and *Therapeutic Guidelines* were considered to be the next most useful resources. All four are local publications that are readily accessible in most Australian pharmacies, are regularly up dated, and are fairly economical in price. Hatz et al[64] also found that Swiss GPs tend to prefer national resources and guides and Leggat and Seelan[174] also found that the *AIH* was a commonly used resource by Australian GPs. As for journals, apart from local pharmacy practice

journals such as the *Australian Pharmacist* and *Australian Journal of Pharmacy* which were rated as occasionally used by 32.8% and 20.1% of respondents respectively, the majority were rated as never used by a majority of respondents. A lack of accessibility, which concurs with findings from Australian GPs by Leggat and Seelan[174] is one explanation for this trend. Similarly, pharmacists did not rate on-line travel health websites high for usefulness, 81% of pharmacists said that they never use Travax, 65.5% never use *MASTA* and 54.6% never use the CDC site with cost a possible reason, although the American *CDC* site is free to use however, some Australian pharmacists may be unaware of its existence and/or usefulness.

Finally, nearly half of the respondents (47.1%) stated that they never use *Travel Bugs*, a compendium of vaccine and travel information distributed to free to GPs by the pharmaceutical industry. It received an average rating for usefulness of only 2.3 by the pharmacists in this study, however over 50% of Australian GPs rated it more highly and only 21.2% said that they never use the resource[174].

Table 3-6 Average ratings for how frequently pharmacists use particular information resources in the provision of travel-related health advice (In order, most frequent first) (n=174)

Q22. What information sources do you use in the provision of travel-related health advice? Using the scale (1 – Never use, 2 – Rarely use, 3 – Occasionally use, 4 – Frequently use, 5 – Always use) rate the following resources on their usefulness.	
Information resource	Average rating (Scale 1-5)
22b. Australian Medicines Handbook (AMH)	3.7
22c. Australian Immunisation Handbook	3.7
22e. MIMS	3.3
22i. World Health Organization (WHO)	3.0
22a. Therapeutic Guidelines	2.8
22d. Travel Bugs	2.3
22f. Medical Advisory Service for Travellers Abroad (MASTA)	2.0
22g. Centers for Disease Control and Prevention (CDC)	2.0
22j. Australian Pharmacist	2.0
22k. Australian Journal of Pharmacy	2.0
22q. Current Therapeutics	1.6
22o. Medical Journal of Australia	1.4
22m. The Pharmaceutical Journal	1.3
22h. Travax	1.3
22n. Hospital Pharmacist	1.2
22p. Australian Family Physician	1.2
22l. Journal of Pharmacy Practice and Research	1.0
22r. Journal of Travel Medicine	1.0



	22r	22q	22p	22o	22n	22m	22l	22k	22j	22i	22h	22g	22f	22e	22d	22c	22b	22a
1 Never use	85.1	69.5	86.8	77.0	89.1	78.7	83.9	44.3	35.6	28.7	81.0	54.6	65.5	8.6	47.1	5.2	3.4	14.9
2 Rarely use	8.6	10.3	6.9	11.5	6.9	11.5	10.3	21.8	21.3	15.5	13.2	16.7	14.9	13.2	9.8	8.0	9.2	23.0
3 Occasionally use	4.0	14.4	5.7	9.8	3.4	6.9	5.2	20.1	32.8	23.6	2.9	7.5	8.6	30.5	14.9	21.8	25.9	33.3
4 Frequently use	1.1	2.9	0.6	1.7	0.6	2.9	0.6	13.2	8.6	25.3	2.9	14.9	6.9	32.2	19.5	40.2	40.2	24.1
5 Always use	1.1	2.9	0.0	0.0	0.0	0.0	0.0	0.6	1.7	6.9	0.0	6.3	4.0	15.5	8.6	24.7	21.3	4.6

Figure 3-2 Percentage rating of how frequently pharmacists use particular information resources in the provision of travel-related health advice (n=174)

3.5.2.2.4 Are travellers willing to pay for travel health advice from a pharmacy (pharmacists perception)

The final question in section B of the questionnaire (Question 23) asked respondents whether they thought that travellers would be willing to pay for the travel health service that they are currently providing. Only 2 respondents (1.1%) said that they thought travellers would definitely pay for the service and 29.9% (52/174) said that travellers would definitely not pay for service. The vast majority (69%, 120/174) of respondents did not know whether travellers would be willing to pay. The reasons for this are unclear. Anecdotally, pharmacists feel that if patients are used to receiving services free of charge from pharmacies, they would be reluctant to pay for any extended services from pharmacies however, some studies have shown the reverse to be true[176 177].

3.5.3 Future travel health services (Section C)

Section C of the questionnaire focussed on three main areas: the views of the respondents regarding the current and future role of pharmacists in the area of travel health, potential barriers that may limit or slow the development of pharmacist involvement in travel health and the training needs of pharmacists. All 255 respondents to the survey completed section C.

3.5.3.1 Current and future roles of pharmacists

Question 24, a rating scale question, asked respondents to rate their level of agreement or disagreement with a 5-point Likert scale to 10 statements relating to current or future roles of pharmacists in the area of travel health. The statements were divided into two themes. Firstly, the respondents' perceptions of whether travel health is an appropriate role for pharmacists and secondly, what are appropriate future roles for pharmacists in the area of travel health. Table 3.7 gives the respondents' average rating to each statement and also acts as the key for figure 3.3 which summarises the percentage of the respondents who chose a particular rating for each statement.

3.5.3.1.1 Do pharmacists consider travel health to be an appropriate role

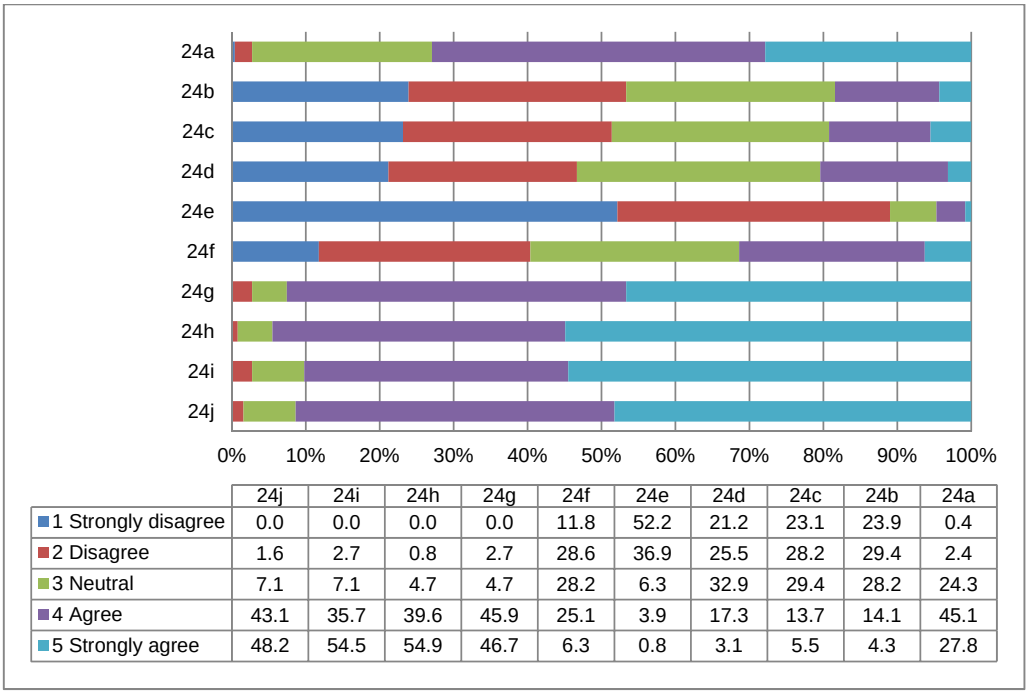
The results shown in table 3.7 and figure 3.3 demonstrate that respondents did consider travel health to be an appropriate role for pharmacists, as nearly 90% of respondents disagreed/strongly disagreed with statement e) (average rating 2.0). Respondents also feel that travellers would support pharmacist-run travel health services as 72.9% agreed/strongly agreed with statement a) (average rating 4.0).

3.5.3.1.2 Appropriate roles for pharmacists in the area of travel health

At the time of the survey it was uncommon for Australian pharmacies to offer vaccination services and they were, and still are, unable to supply S4 medications without a prescription from an appropriate prescriber, whereas many pharmacist-run travel health services overseas offer full vaccination services and sometimes supply antimalarial agents without prescription[80 86 172]. Therefore, it was thought Australian pharmacists may see this as a barrier to implementation. However the results show that this does not appear to be the case as 53.3% and 51.3% of respondents disagreed/strongly

Table 3-7 Average ratings for how frequently pharmacists agreed or disagreed to statements relating to the current or future roles of pharmacists in the area of travel health (n=255)

Q24. We are interested in your views regarding the current and future role of pharmacists with regard to travel health. (Read the following statements and using the 5-point scale select as appropriate (1 – strongly disagree, 2 – disagree, 3 – neutral (neither agree or disagree), 4 – agree, 5 – strongly agree)).	
Statement	Average rating (Scale 1-5)
a. Travellers want pharmacists to offer travel health services	4.0
b. Pharmacists cannot offer adequate travel health services as they cannot administer vaccines	2.0
c. Pharmacists cannot offer adequate travel health services as they cannot supply S4 medications without prescription	3.0
d. Offering travel health services would cause antipathy with the medical profession	3.0
e. Travel health is not an appropriate role for pharmacists	2.0
f. The most appropriate role for pharmacists in travel health is to check the appropriateness of medications prescribed for the traveller	2.9
g. The pharmacist has a role advising travellers who would not normally visit a doctor before travelling on travel-related health issues	4.0
h. The pharmacist has a role advising travellers whether to seek medical advice before visiting certain destinations	4.0
i. The pharmacist can adequately advise the traveller on items to place in a first aid kit when travelling to remote destinations	4.4
j. The pharmacist has a role in advising travellers on the prevention and treatment of travel-related health issues not covered by the doctor	4.4



	24j	24i	24h	24g	24f	24e	24d	24c	24b	24a
1 Strongly disagree	0.0	0.0	0.0	0.0	11.8	52.2	21.2	23.1	23.9	0.4
2 Disagree	1.6	2.7	0.8	2.7	28.6	36.9	25.5	28.2	29.4	2.4
3 Neutral	7.1	7.1	4.7	4.7	28.2	6.3	32.9	29.4	28.2	24.3
4 Agree	43.1	35.7	39.6	45.9	25.1	3.9	17.3	13.7	14.1	45.1
5 Strongly agree	48.2	54.5	54.9	46.7	6.3	0.8	3.1	5.5	4.3	27.8

Figure 3-3 Percentage ratings of how frequently pharmacists agreed or disagreed to statements relating to the current or future roles of pharmacists in the area of travel health (n=255)

disagreed with statements b) and c) respectively. In the UK and USA, the ability to offer vaccinations in pharmacies without prescription was an important enabling factor for the development of pharmacy-run travel health services[73 80 83], therefore it would be interesting to investigate the views of Australian pharmacists about pharmacist immunisation in more detail. The safe dispensing and supply of medications is a core function of pharmacists in the healthcare system, however the responses to statement f) suggest that respondents were divided as to whether it should be their only function in the area of travel health as although many respondents disagreed/strongly disagreed (40.4%) to statement f), 31.4% agreed/strongly agreed and 28.2% appeared neutral. Responses to statements g) to j) showed that respondents agreed that suitable roles for pharmacists may include the advising of travellers who would not normally obtain pre-travel advice from their doctor (92.6% agreed/strongly agreed with statement g), supplementing or reinforcing the advice given by other practitioners and to give advice on travel-related health issues that may not have been covered by their doctor (91.3% agreed/strongly agreed with statement j) and referring some travellers back to their doctor if they are visiting certain destinations, perhaps for vaccinations and antimalarials or other medications (94.5% agreed/strongly agreed with statement h). Finally, they agreed that pharmacists have a role in the supply of traveller's first aid kits and advising on their contents (90.2% agreed/strongly agreed with statement i).

3.5.3.2 Barriers to the development of pharmacist-run travel health services

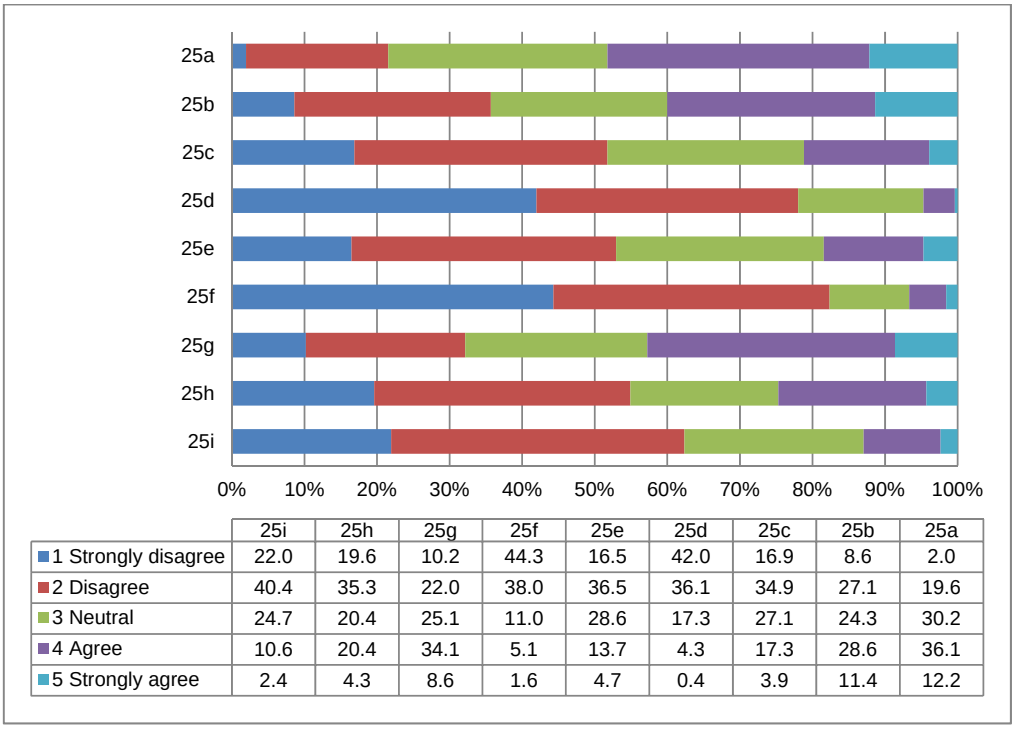
Inadequate staffing levels, time, lack of training and antipathy with other health professions are often listed as potential barriers to the development of extended services by pharmacists[178]. Question 25 asked respondents to rate their level of agreement or disagreement with a 5-point Likert scale to 9 statements relating to potential barriers to the development of pharmacist-run travel health services. Table 3.8 gives the respondents' average rating to each statement and also acts as the key for figure 3.4 which summarises the percentage of the respondents who chose a particular rating for each statement.

Firstly, whereas 72.9% of respondents agreed/strongly agreed with question 24 statement a), 78.1% disagreed/strongly disagreed with the similar but opposite question 25 statement d) which again highlighted that respondents felt that travellers supported the idea of pharmacy-run travel health services and also demonstrated some consistency in the respondents' responses throughout the survey.

The results summarised in table 3.8 and figure 3.4 show that although respondents were very interested in providing travel health services (82.3% disagreed/strongly disagreed with statement f), they do recognise some potential barriers. Some respondents did recognise that both time and staffing could be potential barriers to offering a travel health service as 48.3% and 40% agreed/strongly agreed to statements a) and b) respectively. However, responses were divided as 30.2% were also neutral to statement a) (time) and 35.7% disagreed/strongly disagreed with statement b) (staffing). One criticism of extended pharmacy services is that they are often operated by pharmacy assistants and not the qualified pharmacists[123], however from the responses to statement c), only 21.2% agreed/strongly agreed that travel health was a potential role for pharmacy assistants.

Table 3-8 Average ratings for how frequently pharmacists agreed or disagreed to statements relating to potential barriers that may limit of slow the development of pharmacists with regard to travel health (n=255)

Q25. We are interested in your views regarding possible barriers that would limit or slow the development of the role of pharmacists with regard to travel health. (Read the following statements and using the 5-point scale select as appropriate (1 – strongly disagree, 2 – disagree, 3 – neutral (neither agree or disagree), 4 – agree, 5 – strongly agree)).	
Statement	Average rating (Scale 1-5)
a. The average community pharmacist would not have enough time to provide quality travel health services	3.4
b. My pharmacy has inadequate staffing levels to provide quality travel health services	3.0
c. Pharmacy assistants could advise travellers on travel-related health issues	3.0
d. Travellers do not want pharmacies to offer travel health services	2.0
e. Travel health services would not be profitable for pharmacies	3.0
f. I am not interested in providing travel health services	1.8
g. Pharmacists are inadequately trained to provide travel health services	3.0
h. The inability to supply S4 medications without prescription would make travel health services unviable from pharmacies	3.0
i. Perceived antipathy from other health professionals would stop me developing travel health services	2.3



	25i	25h	25g	25f	25e	25d	25c	25b	25a
1 Strongly disagree	22.0	19.6	10.2	44.3	16.5	42.0	16.9	8.6	2.0
2 Disagree	40.4	35.3	22.0	38.0	36.5	36.1	34.9	27.1	19.6
3 Neutral	24.7	20.4	25.1	11.0	28.6	17.3	27.1	24.3	30.2
4 Agree	10.6	20.4	34.1	5.1	13.7	4.3	17.3	28.6	36.1
5 Strongly agree	2.4	4.3	8.6	1.6	4.7	0.4	3.9	11.4	12.2

Figure 3-4 Percentage ratings of how frequently pharmacists agreed or disagreed to statements relating to potential barriers that may limit of slow the development of pharmacists with regard to travel health (n=255)

Importantly, 53% and 54.9% of respondents disagreed/strongly disagreed with statements e) and h) respectively, which suggests that respondents feel that travel health services from pharmacies could be profitable and that the inability to supply S4 medications without prescription would not adversely affect the viability of the service. The similarity in response between question 25 statement h and question 24 statement c again demonstrates some level of consistency in response by the respondents.

Finally, antipathy from other health professionals may be a barrier to service development, however from the responses to question 24 statement d (46.7% disagreed/strongly disagreed) and question 25 statement i (62.4% disagreed/strongly disagreed) it suggests that respondents would not expect antipathy from the medical profession, and if they did experience some form of antipathy that it would not prevent them from developing services.

3.5.3.3 Training requirements of pharmacists offering travel health services

Questions 26 to 29 examined some of the training needs of respondents in the area of travel health. The results to these questions are summarised in table 3.9. The vast majority of respondents (96.9%, 247/255) reported that they have not received any formal training in the area of travel health. However, 42.7% of respondents also agreed/strongly with question 25 statement g) thereby demonstrating that many respondents recognise that they have training needs to provide quality travel health services. This is consistent with the findings of Teodosio et al[81] who also reported that the vast majority (93.2%) had no training in travel medicine, however they noted that 77.9% did attempt to stay

Table 3-9 Summary of responses to questions 26 to 29 of the questionnaire

Survey Question	Response option	No. of respondents	% (n=255)
Q26. Have you had any formal training in travel medicine? (Tick ONE answer)	Yes	8	3.1%
	No	247	96.9%
Q28. What training should pharmacists require to offer travel health services? (Tick ONE answer)	None	19	7.5%
	Accreditation from a Pharmacy Professional body	106	41.6%
	Accreditation from a Travel Medicine Professional body	115	45.1%
	University post graduate qualification specific to travel medicine	4	1.6%
	University subject as part of a post graduate pharmacy qualification	11	4.3%
Q29. If you were participating in a training or accreditation course in travel health, how would you like to study the course? (Tick ONE answer)	Face to face teaching in block mode	19	7.5%
	Distance education via the internet	102	40.0%
	Combination of distance education and block mode	134	52.5%

informed or be updated on the topic. Responses to other questions suggest that respondents would prefer training to be accredited by an appropriate professional body and available either via distance education or a combination of distance education and block mode.

3.5.4 Knowledge assessment of pharmacists (Section D)

Section D of the questionnaire was intended to examine some aspects of the current level of knowledge of a sample of pharmacists. Questions 30 to 44 presented the respondents with a series of multiple choice questions and scenarios which focussed on 5 main areas (Causes of morbidity and mortality and the global distribution of certain diseases, Traveller's diarrhoea, Vaccinations for travel, Malaria prevention and First aid kits and Jet lag). Respondents were asked to answer the questions without reference to information resources or without further research. Of the total 255 survey respondents, only 208 (81.6%) respondents fully completed section D and were included in the data analysis. Table 3.10 is a summary of the responses to each question.

3.5.4.1 Causes of morbidity and mortality in travellers and the distribution of certain diseases

The responses to question 30 indicate that the majority of respondents (67.8%, 141/208) were aware that accidents and cardiovascular events are the most common cause of mortality in travellers when compared to infectious diseases such as malaria[21 23]. However, 18.8% (39/208) of the respondents still did select malaria as the most common cause of mortality in travellers, and a further 13.4% (28/208) of respondents chose one of the other infectious disease options given.

The ranking of the four most common health problems experienced by travellers (question 31) approximates to that of epidemiological studies[21 23]. Some infectious diseases such as Cholera were however rated above typhoid, hepatitis B and HIV when the actual prevalence of cholera is much lower[21 23]. Also jet lag and motion sickness were rated relatively high, which could be because pharmacists tend to give advice about these conditions more frequently.

Questions 31 to 33 asked respondents to identify, from a selection of 5 destinations, countries in which yellow fever, malaria and typhoid are prevalent. The correct responses are highlighted in table 3.10 in orange. The vast majority of respondents (greater than 90%) were well aware that none of these disorders are prevalent in Japan. Likewise for Kenya, Thailand and India most respondents (70.7 to 87.5%) selected the correct options. However, only 45-54% of respondents selected correct options for Brazil, possibly because respondents were less familiar with the destination, as few Australians visit Brazil[6]. Finally, out of the three conditions, respondents appeared relatively less knowledgeable about the global distribution of yellow fever compared to malaria or typhoid, as over a third incorrectly thought it was prevalent in India (34.6%, 72/208) and Thailand (18.3% (38/208).

3.5.4.2 Traveller's diarrhoea

Respondents were asked three questions (questions 35-37) relating to travellers' diarrhoea. Just over half (51.9%, 108/208) of respondents were aware that the main causative organism for travellers' diarrhoea is Enterotoxigenic *E.coli* (ETEC), which is responsible for 40-75% of clinical cases of traveller's diarrhoea[30 32]. Only 6.3% (13/208) of respondents correctly selected the incorrect statement in question 36, which was that "eating raw seafood in north east Thailand may result in

opisthorchiasis, trypanosomiasis and paragonimiasis". Antimotility agents, such as loperamide, may be used to give symptomatic relief and can be used in combination with antibiotics. However, loperamide should be avoided in young children, pregnant women or if suffering from bloody diarrhoea, severe abdominal pain or high fever[30 32]. In response to the scenario in question 37, the two options most commonly selected by the respondents were that either no active treatment should be given and that the mountaineer should rehydrate with Gastroloyte (30.7%, 64/208) or that the mountaineer should start treatment with both norfloxacin and loperamide, whilst maintaining their level of hydration (30.3%, 63/208). Both were clinically justifiable options. A slightly lower number of respondents would have recommended the use of norfloxacin without loperamide, while maintaining hydration (23.1%, 48/208) or loperamide alone while maintaining hydration (13.0%, 27/208). Although all options mentioned some form of rehydration therapy, in total over half of the respondents (56.3%, 117/208) chose options involving the use of antibiotics and 46.2% (96/208) chose options involving the use of loperamide. By comparison, in their telephone interviews, Kodkani et al[71] found that only 59% of pharmacists spontaneously recommended rehydration therapy whereas 100% recommended the use of antimotility agents and 34% recommended the use of antibiotics and with the follow-up questionnaire these figures changed to 90%, 96% and 39% respectively, suggesting that the respondents in this study may be more likely to promote the use of antibiotics for traveller's diarrhoea than those in the Kodkani study. However, Teodosio et al[81] also found that 57.1% of the pharmacists in their study would recommend the use of antibiotics, 52.9% recommend the use of loperamide and that 55.5% would recommend rehydration with available fluids and/or oral rehydration solution.

3.5.4.3 Vaccinations for travel

Three questions in the questionnaire (questions 39, 40 and 44) examined aspects of the respondents' knowledge about travel vaccines. Question 39 was a scenario of a traveller going to Kenya and asked respondents to choose which vaccinations they would recommend for the journey. This was compared with the current CDC and MASTA vaccination recommendations for the destination[135 179]. The then current CDC and MASTA guidelines recommended that as well as standard childhood vaccinations the following vaccines should be considered for travellers visiting Kenya; typhoid, hepatitis A and B, Yellow fever, polio, rabies and meningococcal meningitis. Of course, which vaccinations are finally given would depend on a variety of itinerary-related and patient-related factors. Table 3.12 shows the percentage of respondents selecting each vaccine and it can be seen that many of the respondents (between 75-89%) stated that they would recommended typhoid, hepatitis A and B and yellow fever. 78.9% of respondents also stated that they would recommend tetanus and 62% would recommend cholera vaccines. Questions 40 and 44 focussed on more specific vaccine-related issues or facts that some respondents may not have known and would have preferred to refer to information resources before answering. However, respondents appear to have handled the questions relatively well with 47.1% selecting the incorrect answer in question 40 and 55.8% of respondents selecting the most appropriate option in question 44.

Kodkani et al also asked respondents in their surveys about the vaccination requirements for travellers to two destinations (Thailand and Kenya). They found that many respondents wanted to consult

information resources before answering but that in both the telephone and written survey that many did not give correct advice[71].

3.5.4.4 Malaria prevention

Questions 41 and 42 focussed on some preventative aspects of malaria. Question 41 focussed on bite prevention methods and the responses demonstrate that the respondents are generally knowledgeable in this area, the only concern being that 26.9% (56/208) of respondents appear to incorrectly believe that vitamin B_1 (Thiamine) is effective in decreasing the number of mosquito bites[142]. For question 42, the options given, artemisin/lumefantrine (Riamet®) (selected by 2.9% (6/208) of respondents) is not appropriate as it is used mainly in the treatment of malaria[145], as are chloroquine (selected by 3.4% (7/208) of respondents) and mefloquine (selected by 16.8% (35/208) of respondents) due to the incidence of choroquine or mefloquine resistance in the area being visited[145]. Of the two remaining options, atovaquone/proguanil (Malarone®) would be preferred as it is effective and also, will not interfere with any current medications or co-morbidities[145]. However, it is also relatively expensive, which is perhaps why it was selected by only a third of respondents (33.6%, 70/208). Doxycycline, being a tetracycline antibiotic, may interact with the oral contraceptive (although the risk is low) or increase the risk of recurrent thrush. Therefore, doxycycline may be less ideal than Malarone®. However, it is also a lot cheaper than Malarone®, which is why it was probably selected by so many respondents (43.3%, 90/208)[145]. Kodkani et al[71] also found the knowledge of Swiss pharmacists in this area to be generally good with over 95% being able to name the most important bite prevention methods. However, they too noted that up to 20% of pharmacists also recommended thiamine for the prevention of mosquito bites. When making recommendations for chemoprophylaxis, only 27% and 35% of all respondents were willing to give immediate advice on appropriate chemoprophylaxis for Thailand and Kenya respectively in the telephone survey and 19% and 31% of all respondents gave acceptable answers[71]. However, in the follow-up written survey, Kodkani et al[71] report that this increased to 74% (Thailand) and 93% (Kenya) of all respondents giving acceptable answers.

3.5.4.5 First aid kits and jet lag

As discussed in chapter 2, the provision of advice to travellers relating to first aid items and OTC remedies is recognised as a key role for pharmacists in the area of travel health. Question 38 asked the respondents to select the five most important items that they would recommend for a traveller to take with them to the Himalayas. These are listed in order of popularity in table 3.12. It can be seen that oral rehydration salts and antidiarrhoeal medications rate relatively highly, which may have been influenced by the previous question, whereas simple analgesics, which are often mentioned as being the most useful items for travellers to carry are only rated sixth in order of popularity[82 163 164]. That said, the 10 most popular items selected by the respondents contain most items recommended for a simple travel first aid kit, thereby demonstrating that respondents are capable of advising travellers on the most appropriate items to carry[82 163 164]. Finally, question 43 focussed upon some aspects of the causes and recommended management strategies for jet lag. Respondents were not aware of the aggravating factors for jet lag including travelling eastwards (not west as stated in statement a).

Table 3-10 Summary of responses to questions 30 to 44 of the questionnaire

Survey Question	Response option	No. of respondents	% (n=208)
Q30. What is the most common cause of mortality for travellers to developing countries? (Tick ONE answer)	Malaria	39	18.7%
	Typhoid	9	4.3%
	HIV	5	2.4%
	Motor vehicle accident	117	56.3%
	Cholera	13	6.25%
	Myocardial infarction	24	11.5%
	Yellow fever	1	0.5%
Q31. What are the FOUR most common travel-related health problems experienced by travellers from Australia to a developing country? (Select the FOUR most common problems from the list below) (Responses listed in order of popularity)	Diarrhoea	196	94.2%
	Jet Lag	137	65.5%
	Acute respiratory tract infection	118	56.7%
	Motion sickness	105	50.5%
	Malaria	73	35.1%
	Hepatitis A	61	29.3%
	Cholera	43	20.7%
	Typhoid	40	19.2%
	Hepatitis B	27	13.0%
	Gonorrhoea	15	7.2%
	Yellow fever	5	2.4%
	HIV	4	1.9%
	Schistosomiasis	4	1.9%
	Trypanosomiasis	3	1.4%
	Polio	2	1.0%
	Meningococcal meningitis	0	0.0%
	Rabies	0	0.0%
Q32.Yellow fever is prevalent in which of the following countries? (Choose all that apply)	Brazil	112	53.9%
	Kenya	158	76.0%
	India	72	34.6%
	Thailand	38	18.3%
	Japan	14	6.7%
Q33.Malaria is prevalent in which of the following countries? (Choose all that apply)	Brazil	109	52.4%
	Kenya	154	74.0%
	India	154	74.0%
	Thailand	182	87.5%
	Japan	5	2.4%

Q34.Typhoid is prevalent in which of the following countries? (Choose all that apply)	Brazil	94	45.2%
	Kenya	167	80.3%
	India	176	84.6%
	Thailand	147	70.7%
	Japan	13	6.3%
Q35. What is the commonest cause of Traveller's Diarrhoea? (Tick ONE answer)	*Salmonella* spp	35	16.8%
	Giardia intestinalis	39	18.8%
	Campylobacter pylori	1	0.5%
	Enterotoxigenic *E.coli* (ETEC)	108	51.9%
	A rotavirus	25	12.0%
Q36. With regard to the prevention of traveller's diarrhoea which of the following statements is incorrect? (Tick ONE answer)	When cooking poultry, travellers should buy fresh, clean meat and soak in salted water before rinsing under running water and drying before cooking	62	29.8%
	Be aware that raw seafood can transmit diseases such as typhoid fever, infectious hepatitis and dysentery	17	8.2%
	Eating raw seafood in north east Thailand may result in opisthorchiasis, trypanosomiasis and paragonimiasis	13	6.3%
	Before eating vegetables they can be soaked in Milton or potassium permanganate and rinsed in clean water	77	37.0%
	Newer oral cholera vaccines such as Dukoral offer some protection against ETEC-induced diarrhoea for up to 3 months after administration	39	18.7%
Q37. Jeff is a 26-year old mountaineer trekking in the Himalayas for 1 month. He develops diarrhoea and has had four loose bowel motions in the last 24 hours with nausea, abdominal cramps and faecal urgency. His doctor has supplied some medications including Gastrolyte® tablets, Loperamide 2mg capsules, Norfloxacin 400mg tablets and Doxycycline 100mg tablets. Which of the following statements best summarises how you would recommend he treats his diarrhoea? (Tick ONE answer)	No active treatment, just maintain hydration using Gastrolyte and allow the diarrhoea to take its course	64	30.7%
	Start treatment immediately with Loperamide whilst drinking plenty of fluids	27	13.0%
	Start treatment immediately with one dose of Norfloxacin 800mg plus Loperamide whilst drinking plenty of fluids	63	30.3%
	Start treatment immediately with one dose of Norfloxacin 800mg whilst drinking plenty of fluids	48	23.1%
	Start treatment immediately with one dose of Doxycycline 200mg plus Loperamide whilst drinking plenty of fluids	6	2.9%

Q38. Before leaving Australia for the Himalayas, Jeff asked his pharmacist for some recommendations on which items to carry in a first aid kit in his rucksack. Below is a list of common items included in some commercial kits. From the list below, select the FIVE most important items that you think Jeff should carry. (Tick FIVE answers) (Responses listed in order of popularity)	Oral rehydration sachets/salts	166	79.8%
	Small range of bandages, dressings and tapes	127	61.1%
	Antidiarrhoeal agent	114	54.8%
	Sunscreen	107	51.4%
	Insect repellent	92	44.2%
	Paracetamol or aspirin tablets	89	42.8%
	Iodine solution	73	35.1%
	Appropriate antimalarials	57	27.4%
	Norfloxacin tablets	48	23.1%
	Broad spectrum antibiotic	46	22.1%
	Metoclopramide tablets	30	14.4%
	Antiseptic cream	29	13.9%
	Sharps kit (containing sterile needles and syringes)	17	8.2%
	Salbutamol inhaler	16	7.7%
	Antihistamine tablets	14	6.7%
	Mercury thermometer	4	1.92%
	Throat lozenges	1	0.5%
	Sleeping tablets	1	0.5%
39. Jenny Smith is a 30-year old woman who is planning to go on safari in Kenya for 4 weeks. Which of the following vaccinations would be recommended? (Choose all that apply) (Responses listed in order of popularity)	Typhoid	185	88.9%
	Hepatitis A	183	88.0%
	Hepatitis B	182	87.5%
	Tetanus	164	78.9%
	Yellow Fever	156	75.0%
	Cholera	129	62.0%
	Malaria	121	58.2%
	Polio	101	48.6%
	Diphtheria	96	46.2%
	Rabies	72	34.6%
	Meningococcal meningitis	58	27.9%
	Dengue Fever	35	16.8%
	Tick-borne Encephalitis	22	10.6%
	Schistosomiasis	18	8.7%
	Japanese Encephalitis	13	6.3%

40. Regarding common vaccinations, which of the following statements is incorrect? (Tick ONE answer)	Hepatitis A vaccine and immunoglobulin may be administered simultaneously if a traveller present for immunisation the day before travelling	54	26.0%
	Polio vaccination only has an effective life of 3 years and therefore boosters are recommended for travellers to destinations where polio is endemic	98	47.1%
	Yellow fever vaccination is a legal requirement for travellers to many parts of tropical Africa	18	8.6%
	Japanese encephalitis vaccine can cause delayed anaphylactic reactions and therefore vaccinees should be observed for 30 mins after vaccination and should remain close to medical care for up to 10 days	16	7.7%
	Rabies vaccine is often in limited supply	22	10.6%
Q41. Regarding the prevention of malaria, which of the following statements is incorrect? (Tick ONE answer)	Oral vitamin B1 is not effective in decreasing the number of mosquito bites	56	26.9%
	The ideal mosquito repellent should contain 20-30% DEET (Diethyltoluamide)	19	9.1%
	When needing to apply sunscreen and mosquito repellent together it is better to apply the repellent first and wait 20 minutes before applying the sunscreen	122	58.7%
	Travellers should wear covered shoes and loose fitting long trousers and long-sleeved, light coloured clothing between dusk and dawn in malarial areas	8	3.9%
	Ideally travellers should sleep in air conditioned or well-screened rooms or under treated mosquito nets	3	1.4%
Q42. Alannah is a 22 year-old primary school teacher who is travelling to Thailand to work in a primary school in a small village near the border with Myanmar (Burma). She has no chronic conditions apart from occasional bouts of hayfever and thrush and her only regular medication is an oral contraceptive (Trifeme®). What would be the most appropriate agent for her to take for malarial chemoprophylaxis? (Tick ONE answer)	Atovaquone/proguanil (Malarone®)	70	33.6%
	Doxycycline	90	43.3%
	Mefloquine (Lariam®)	35	16.8%
	Chloroquine	7	3.4%
	Artemisin/lumefantrine (Riamet®)	6	2.9%

Q43. Jet lag is a common problem for long-haul passengers. Which of the following statements is incorrect? (Tick ONE answer)	Common aggravating factors for jet lag include travelling west, dehydration and excessive alcohol consumption on the plane	28	13.5%
	Daily doses of melatonin between 0.5mg and 5mg are equally effective	96	46.1%
	Melatonin doses above 5mg daily are no more effective than 5mg	65	31.3%
	Travellers should avoid sleep deprivation during the flight	15	7.2%
	Travellers should drink plenty of fluid during the flight but avoid caffeine-containing drinks	4	1.9%
Q44. Jayne is a 35-year old woman bitten by a dog whilst visiting a temple in Cambodia. The dog appears to be behaving normally but the dog's teeth punctured her skin. What would be the best course of action for Jayne to take? (Tick ONE answer)	Vigorously wash the area with soap and water and then apply povidone iodine and seek urgent medical attention to get the urgent administration of Rabies vaccine	46	22.1%
	Vigorously wash the area with soap and water and then apply povidone iodine and seek urgent medical attention to get the urgent administration of Rabies vaccine and Rabies immunoglobulin	116	55.8%
	Vigorously wash the area with soap and water and then apply 70% alcohol and povidone iodine and seek urgent medical attention to get the urgent administration of Rabies vaccine	37	17.8%
	Wash the area with soap and water only	9	4.3%
	No action is required	0	0.0%

3.6 Limitations and Recommendations for Further Work

The study has several limitations. Firstly, the survey was distributed by two methods (e-survey and postal survey), and although pharmacists were requested not to do so, potentially a pharmacist could have completed the survey by both methods. However, there was no evidence in the data to suggest that this had occurred. Secondly, response rates were very poor by both methods. Although the questionnaire was long and complex, it was thought that the major reason for the low response rate was the position of the hyperlink for the e-survey. Combined with the fact that anecdotally many pharmacists admit that they do not read the PSA newsletters, having the e-survey hyperlink positioned at the end of a PSA newsletter meant that, even though repeated reminders were sent to PSA members in other newsletters, the response rate remained low. An e-mail invitation sent direct to each PSA member may have improved response rates to the e-survey. The poor response rate may also be an indication of the level of interest of the pharmacy profession in travel health. Pharmacists who completed the survey may have been more interested in the topic or may be more clinically orientated than those who did not complete the survey. This may have introduced a level of bias into the results, which needs to be considered if the results are extrapolated across the general pharmacist population. Finally, it would have been useful to have followed the survey with either focus groups or in-depth qualitative interviews with individual pharmacists. Topics for further investigation include obtaining

more in-depth information about the actual advice given to travellers by pharmacists, the topics covered and the reasons why pharmacists regularly counsel some topics, but not others. As well as examining why pharmacists think that travellers would not pay for travel health services and why do Australian pharmacists not consider the inability to supply vaccinations without prescription to be a barrier to service development. The knowledge assessment of the pharmacists was also limited as the pharmacists could only be asked a limited number of questions about a limited range of topics, therefore this needs further investigation.

3.7 Summary

This study examined the perceptions and views of pharmacists regarding their current and future roles in the area of travel health, and also assessed their knowledge. The survey respondents agreed that travel health is an appropriate role for pharmacists and that their clients would seek travel health advice if offered. Although 68.2% offer travel health services, only a few pharmacists perform full pre-travel risk assessments.

The pharmacists do not see the inability to supply S4 medication without prescription, or the inability to vaccinate clients, to be major barriers to the development of a travel health service. Although, current staffing levels and lack of time appear to be barriers for some pharmacists, pharmacists do not consider the use of pharmacy assistants to be an option in circumventing these barriers. Importantly, pharmacists recognised the need for additional training in travel health, and that they see their role as part of the healthcare team, referring clients to medical practitioners when appropriate. This leads into the next chapter which will examine the attitudes of the medical profession towards extended roles for pharmacists in the area of travel health and will compare their attitudes with those of another set of stakeholders, the travel agents.

Chapter 4 Medical Practitioners and Travel Agents Perceptions of the Role of Pharmacists in Travel Health

4.1 Introduction

Since the late 1970s, the pharmacy profession has undergone a long period of self-reflection and re-evaluation of its role and relevance within the healthcare system and in particular, within the primary healthcare team (PHCT)[180 181]. The main drivers for this re-evaluation include the increasing corporatisation of the community pharmacy sector and the shift away from the preparation of individualised pharmaceuticals in local pharmacies to the mass production of pharmaceuticals by the pharmaceutical industry[180 181]. Other reported drivers include the greater use of computerisation and robotics in pharmacies, the increased use of unit pack and unit dose dispensing systems, and finally, the increasing availability of medications from retail outlets other than pharmacies[181]. It is also believed that these and other factors have led to a general deskilling of pharmacists and an erosion of traditional pharmacist functions[181]. As stated by Bush et al[181], this has resulted in some parties gaining the impression that some pharmacists are "over trained for what they do" and/or "under-employed in relation to what they know".

4.1.1 Extended role of pharmacists

In recent years, in response to the professional uncertainty caused by this self-perceived loss of function and role[181], the pharmacy profession has undergone a process of "reprofessionalisation", with the main aim of extending the pharmacist's role[180 181]. This has resulted in a gradual move away from more traditional dispensing or medication supply-centred roles, to the increased development of more clinical and patient-orientated services. The intention of these services is the provision of more focussed and individualised patient care, thereby further integrating the pharmacist within the PHCT[180]. These new services range from the development of a wide range of clinical pharmacy services in various settings, through to a variety of medication review services and different models of supplementary and independent prescribing by pharmacists, and they often focus on four main areas[180]:

- The management of prescribed medications,
- The management of long-term or chronic conditions,
- The management of common ailments, and
- The promotion and support of healthy lifestyles.

In the development and evaluation of some of these extended pharmacy services, stakeholders or competitors, such as pharmacists, medical practitioners, patients and members of the general public, were often asked to give their perceptions of the service and about the most appropriate roles for pharmacists within that type of service and the healthcare system.

4.1.2 Perceptions of the extended roles for pharmacists

4.1.2.1 General perceptions of pharmacists

Edmunds and Calnan[180] used telephone interviews to examine the perceptions of a range of stake holders influencing the development of extended pharmacy services in the UK. They interviewed a wide range of health care providers including 37 pharmacists and 26 medical practitioners (mainly GPs)[180]. They investigated the reasons why pharmacists wished to expand their role, and whether it was for professional, business, political or altruistic reasons. They also investigated whether the medical profession offered encouragement or resistance to these service developments and whether it was also because of self-interest, political or altruistic reasons[180]. As expected, pharmacists supported the development of extended services, because they felt that their skills were underutilised. They also wanted a greater role in the PHCT and greater involvement in the management of patients with chronic conditions[180]. The main drivers for the development of extended services by pharmacists were an increased sense of job satisfaction, job security and to maintain professional viability in what they perceived to be an increasingly competitive, insecure and deskilled work environment[180].

They also reported that the views of both pharmacists and medical practitioners regarding their roles and the traditional separation of prescribing and dispensing functions were entrenched. However, they did recognise some boundary encroachment with the medical role[180], and only a small number of pharmacists supported role extension into areas traditionally dominated by the medical profession[180]. This was because pharmacists still saw themselves in a delegatory role with doctors, who they saw as still ultimately responsible for the patient's overall management[180]. Therefore, it was concluded that in developing extended services, pharmacists were not trying to replace or threaten the status of medical practitioners, they were simply responding to, and trying to survive in a situation currently undermining their profession[180]. Pharmacists also highlighted that some medical practitioners seemed uncooperative and threatened by the pharmacist's activities and some were obstructive[180]. Edmunds and Calnan[180] also reported that internal divisions between different professional groups in pharmacy was hampering the reprofessionalisation process[180].

The attitude or culture of pharmacy and how it is a major barrier to service development was examined in a Canadian review by Rosenthal et al[178]. They discussed the need for patient-centred services and that many of the potential barriers to service development, such as pharmacist-time constraints, limited support from physicians, patient apathy and limited remuneration, were well recognised by the pharmacy profession[178]. However, they also reported that quick or sustained change in pharmacy practice had not occurred even when these barriers are removed. Therefore, they concluded that these factors were not true barriers to service development but were simply convenient excuses used by pharmacists and that the real barrier to service development, was actually the attitude and culture of the pharmacists themselves[178]. They continued to explain that many pharmacists have common personality traits such as a passive attitude, a lack of confidence in their own clinical ability, a fear of new responsibilities, paralysis when faced with ambiguity, a need for approval, and also risk aversion[178], and that these may be the main factors actually hampering the development of extended pharmacy services[178].

4.1.2.2 General perceptions of medical practitioners

A number of studies have examined the perceptions of the medical profession towards extended pharmacy services[180-185]. Edmunds and Calnan[180] found that medical practitioners were supportive of extended roles for pharmacists, and were confident in delegating tasks to pharmacists, when the pharmacist provided a supporting role, or filled a gap in the doctor's knowledge or abilities, and in such situations they held the pharmacists' abilities in high regard[180]. However, their level of support was limited, with doctors discriminating between the roles they deem acceptable for pharmacists and those that appeared to encroach too far into the medical area[180]. They appeared content in delegating tasks that they no longer wanted, that pharmacists could reduce the burden of, or that doctors had insufficient time to perform[180]. However, doctors did not regard pharmacists as equals and also expressed some exclusionary attitudes, especially in regard to pharmacists performing clinical activities, which they thought had the potential to undermine the doctor-patient relationship[180]. Some doctors were threatened by the extended role of pharmacists[180] and also expressed resistance in allowing pharmacists full access to medical histories, viewing this as a potential breach of patient confidentiality[180]. Overall, they concluded that doctors were happy to delegate tasks to pharmacists which they saw as mundane, or had difficulty with, or saw as low status. However, they were more resistant to the transfer of clinical roles which were viewed as an important part of the medical identity[180].

Some doctors appear more supportive of extended pharmacy roles than others. Ritchey et al[182] found that doctors who were more accustomed to sharing the responsibilities of the patient with other health professionals, and had been exposed to clinical pharmacy previously, were more positive towards extended pharmacy services. Young GPs, prescribing mainly low risk medications, appeared the most favourable towards pharmacists performing clinical tasks, whereas the opinions of older doctors, working in isolation with little previous exposure to clinical pharmacy, were found to be the least favourable[182].

Different professions view the roles of pharmacists differently, for example, Gilbert[183] surveyed the views of South African pharmacists, doctors and nurses about their perceptions of pharmacists as members of the PHCT and to identify and rank the roles of the pharmacist within that team. Pharmacists and doctors primarily considered pharmacists to be principally "health professionals", whereas nurses viewed pharmacists principally as "health educators"[183]. Although pharmacists also ranked their health educator role highly, doctors placed the health educator role of pharmacists much lower in their rankings. Importantly, many doctors and nurses viewed pharmacists as "businessmen"[183] and felt that the business environment in community pharmacy limits the integration of pharmacists in the PHCT, whereas pharmacists ranked this description much more lowly. However, the "businessman" or "shopkeeper" view of pharmacy and the associated concerns about commercial pressures limiting the ability of pharmacists to give unbiased advice has also been expressed elsewhere[184 186]. Interestingly, Gilbert also noted that doctors appeared happier for pharmacists to extend their role into areas traditionally thought of as nursing roles, rather than into traditional medical areas, and appeared more antagonistic towards extended roles in community pharmacy as opposed to extended roles in hospital settings[183].

4.1.3 Perceptions of specific extended services

There appears to be no literature examining the perceptions of medical practitioners specifically about pharmacy-run travel health services. However, studies have examined the views of medical practitioners about two closely related pharmacy roles: medication review and pharmacist prescribing, aspects of which are incorporated into some models of pharmacist-run travel health services.

4.1.3.1 Perceptions of medication review services

A number of studies have examined the perceptions of medical practitioners towards pharmacist-run medication review services[186-188]. Wilcock and Harding[187] surveyed the perceptions of GPs in South West England regarding community pharmacist-conducted medicines use reviews (MURs) and found that they expressed more negative views about the MUR than the pharmacist or their role[187]. Some GPs complained that MURs sometimes contained advice on clinical matters and contained suggestions that duplicated work already performed by the GP[187]. They felt that pharmacists should restrict their recommendations to medication-related matters[187]. It was concluded that this again demonstrated medical unease about pharmacists encroaching on professional boundaries, but also highlighted the need for pharmacists to have full access to the patient's full medical history[187].

Bryant et al[186] interviewed 38 doctors involved in a project evaluating medication reviews performed by community pharmacists working in collaboration with doctors. Similar to the findings of Ritchey et al[182], hospital doctors were found to be more positive towards extended pharmacist roles than GPs[186], and as found by Gilbert[183], many doctors were unaware of the pharmacist's training and responsibilities. Therefore, their role within the current medical model was seen as marginal, poorly defined and traditionally more associated with commercial or "shopkeeper" roles than healthcare roles[186]. Again, doctors found benefits of pharmacist medication review in areas where they had less knowledge, such as the identification of ADRs and pharmacokinetic issues, or that did not encroach onto their territory[186]. Importantly, doctors highlighted the need for face to face communication and that some would prefer having a pharmacist working within their practice[186]. These comments are in line with those in a Swedish study which highlighted the need for greater involvement and cooperation with doctors for medication review services to be effective or successful[188]. Bryant et al also noted that having a professional, trusting and respectful relationship with the pharmacist was important for the doctors, and that they considered it to be their role, not the pharmacist's, to control the clinical decision-making process[186]. Finally, an important consideration for other forms of extended pharmacy services was that some doctors felt that medication reviews would only be beneficial, if they were done well and if the pharmacist had some credibility[186]

4.1.3.2 Perceptions of pharmacist prescribing

A number of studies have examined the perceptions of the medical profession towards pharmacist prescribing[123 189-191]. Again, Hughes and McCann[123] found that the "shop keeper" image of community pharmacy was raised in a focus group study. Many GPs saw community pharmacists predominantly as businesspeople or specialist retailers and viewed this as a conflict with their healthcare role. Whereas, pharmacists agreed that their "shopkeeper" image would negatively influence the GPs' attitudes toward them and could impact on the future development of the pharmacists' role[123]. A small

number of GPs recognised that there were some commercial aspects to their own role, although they felt that this was less obvious than the commercial aspects of community pharmacy, however they did feel that pharmacists would be more tempted than GPs to prescribe unnecessary medications if granted prescribing rights[123]. The shopkeeper image also affected where each profession positioned themselves in the perceived healthcare hierarchy, which appeared important to both professions. Pharmacists thought they were perceived as a subordinate profession, on the periphery of the PHCT and the doctors agreed and admitted their views were heavily influenced by the pharmacists' shopkeeper image[123]. However, many GPs saw the co-location of a pharmacist in their practice as the best way of improving working relationships and helping pharmacy to lose this image[123]. Others suggested that the joint training of pharmacy and medical students may also help to break down barriers and increase mutual awareness of skills and strengths[123].

In a qualitative study exploring the perceptions of GPs towards practice-based, supplementary and independent pharmacist prescribers, Blenkinsopp et al[189] found that the GPs thought that pharmacists wanted prescribing roles as it would make their job more interesting. However, the views of the GPs were divided and although some GPs appeared unthreatened by pharmacist prescribing, even recognising some benefits, such as freeing time to provide specialist services, updating the GP's knowledge of medications and improving adherence with therapeutic guidelines, others expressed some anxiety and suspicion towards pharmacist prescribing, stating that it may threaten or undermine the doctors' role[189]. Again, GPs highlighted the compromises that pharmacists would have to make between professional and commercial pressures[189]. Some physicians said they would have to have trust the pharmacist, before they would support pharmacist prescribing[190].

Using focus groups, Lloyd and Hughes[190] examined the perceptions of pharmacists and their mentors (physicians) taking part in a training program for supplementary prescribers. They found that supplementary prescribing by pharmacists appeared more acceptable to physicians than independent prescribing[190]. The pharmacists viewed supplementary prescribing as an extension of their current role and a way of obtaining greater autonomy[190]. However, they also recognised limits in the supplementary prescribing role, as the physician ultimately remained in control[190]. Supplementary prescribing was acceptable to the mentors, who thought the limitations were advantageous for both safety reasons and to help reduce professional encroachment[190]. Independent pharmacist prescribing was less acceptable to doctors because of the pharmacists' perceived lack of training and limited diagnostic and decision making skills. However, physicians were more accepting of independent pharmacist prescribers if they operated in a defined clinical area, were protocol-driven and if the ultimate control still remained with the physician[190].

Pharmacists saw prescribing as a natural progression and formalisation of existing practices, especially for hospital pharmacists, and as a major opportunity to become more proactive in patient care and for greater professional development[190]. They envisaged the main benefits and concerns to be better practice, status and improved job satisfaction for pharmacists, and greater opportunity for interprofessional working[190]. One concern raised was that pharmacist prescribing could lead to a deskilling of junior doctors in hospital settings[190].

Stewart et al[191] also found that pharmacists saw supplementary prescribing as a natural extension of their advisory roles and a formalisation of current practice, and that key motivating factors included the opportunity to improve patient care and greater participation in the healthcare team[191]. Patients expressed some initial apprehensions about their first visit to a pharmacist prescriber, although most recognised that the pharmacist as a trained health professional and were reassured that they could see a doctor if unhappy about the service provided[191]. However, after consultation with the pharmacist prescriber, all patients reflected positively on the service, trusted the advice given and complimented the pharmacist on the quality of their knowledge related to medications[191].

Pharmacists and doctors recognise important benefits of pharmacist prescribing to the patient. Quicker healthcare access, longer appointment times and reduced doctor's waiting times are recognised as potential patient benefits of using pharmacists as supplementary prescribers[191]. Whereas, pharmacists recognised enhanced job satisfaction, responsibility, autonomy and a feeling of greater integration into the healthcare team as benefits for themselves[191]. Improved teamwork and the ability to spend more time on patients with acute conditions were seen as benefits to doctors by doctors[191]. As reported by Lloyd and Hughes[190], Stewart et al[191] also reported that doctors and pharmacists had strongly opposing views regarding pharmacists acting as independent prescribers. Pharmacists were keen to complete further training and become independent prescribers and thought it would be useful to be able to provide standalone services in community pharmacy and in specialist areas such as in family planning and travel clinics[191]. Pharmacists saw this as the next logical step and thought that doctors would give their support[191]. However, all of the doctors interviewed expressed some concern about pharmacists acting as independent prescribers and again, a major concern for most doctors was the pharmacists' limited diagnostic skills[191].

4.2 Contribution

My estimated overall contribution to this study was 100%. I performed the necessary literature searches and developed the survey instrument and completed the necessary ethics applications. The printing and photocopying of surveys was outsourced, however I assembled and filled envelopes prior to posting the survey. Finally, I performed the final data entry and analysis, although a small amount of administrative assistance was received with opening returned the surveys.

4.3 Research Question and Aims

The research question for this chapter is:

> ***What do medical practitioners and travel agents perceive to be the most appropriate roles for pharmacists in the area of travel health?***

The main objectives of this chapter are to investigate whether medical practitioners and travel agents consider:

1. it appropriate for pharmacies to offer travel health and vaccination services.
2. it appropriate for pharmacies to be able to supply antimalarials and/or antibiotics without prescription

3. pharmacists to be adequately trained to provide travel health services and if not, the type of training or accreditation they consider necessary.
4. whether maintaining patient confidentiality may be problematic if travel health services are operated from pharmacies.
5. whether a proposed service model for a pharmacy-run travel health advisory service has benefits for travellers.

4.4 Methods and Processes

This study involved a survey of a sample of Queensland medical practitioners and travel agents using a self-completion, postal questionnaire.

4.4.1 Inclusion criteria

A sample frame of 1128 travel agents in alphabetical order was constructed from the listings of the Yellow Pages® 2010 for Queensland. From this alphabetical list, a sample was drawn using a systematic random sampling technique, whereby every fourth travel agent in the list was selected for inclusion in the sample. Once assembled, travel agents with incomplete postal details were then discarded, which resulted in a final sample of 294 travel agents. Using a similar method, a list of 1662 medical practitioners in alphabetical order was prepared by adding together the membership rolls of the seven largest Queensland Divisions of General Practice. From this alphabetical list, a sample of medical practitioners was drawn by selecting every fifth medical practitioner on the list. Medical practitioners with incomplete postal details were then discarded, which resulted in a final sample of 287 medical practitioners.

4.4.2 Design and testing of the survey instrument

A self-completion, postal questionnaire was developed to elicit the perceptions of Queensland medical practitioners (Appendix 4.1) and travel agents (Appendix 4.2) and to meet the aims of the study.

The two questionnaires had an identical format consisting of 11 main questions. Questions 1 to 7 focussed on standard demographic issues of respondents such as their gender, age, region of residence in Queensland and approximately the size of the town or city in which they work or practise. The last two points were kept broad so that individual respondents residing in small towns or rural areas could not be identified from the data. Questions also asked the respondent to estimate the number of patients or travellers they advise on travel-related health issues each week. Questions 8 to 10 were rating scale questions which asked respondents to read 26 statements relating to current or future roles of pharmacists in the area of travel health or a proposed model for a potential pharmacy-run travel health service. Using a 5-point Likert scale, respondents were asked to rate their level of agreement or disagreement with each statement. The questions in both surveys were identical, except that the wording to some statements in questions 9 and 10 were changed slightly to reflect the differences in knowledge and understanding of the two groups of respondents (Appendix 4.3). The final question (question 11), was an open answer question to allow both groups to add their own

comments about the current or future roles that may be performed by pharmacists in the area of travel health.

4.4.3 Study process

The survey instrument, a JCU HREC approved information sheet (Appendices 4.4 and 4.5) and a stamped addressed envelope were placed in envelopes and posted to the sample of medical practitioners and travel agents. Questionnaires were posted to the travel agents at the beginning of May 2010, and to the medical practitioners at the end of May 2010. Returned questionnaires were collected until 9th July 2010. To improve response rates, respondents could be included into a draw to win an Apple iPod by completing a slip to return with the questionnaire. To maintain the respondent's anonymity, completed draw slips were separated from completed questionnaires by an Administration Officer before the completed surveys were given to the investigator for analysis.

Data was initially entered into Microsoft® Excel® spreadsheets and IBM® SPSS Statistics Package® (Version 22) was used to perform any statistical analyses. The respondents comments to question 11 were firstly collated and coded using a conceptual framework, and then an interpretive thematic analysis was performed to identify and report on patterns within the data using the methods and techniques described by the authors Braun and Clarke[106], Liamputtong and Serry[107] and Liamputtong[108].

4.4.4 Ethical approval

The study was conducted under ethical approval H3515 granted by the James Cook University Human Research and Ethics Committee (JCU HREC) (Appendix 1).

4.5 Results and Discussion

55 medical practitioners (response rate 19.2%, 55/287) and 46 travel agents (response rate 15.6%, 46/294) returned fully completed questionnaires.

4.5.1 Demographic data

The demographic data of the respondents to both surveys was collated and summarised in table 4.1. Whereas, just over half of the respondents to the medical practitioner survey were male (56.4%, 31/55), practising smaller towns (74.5% 41/55 in towns with a populations of 150,000 or less) in Northern Queensland (54.5%, 30/55) and were predominantly aged 41 years or older (85.4%, 47/55), the travel agent respondents were predominantly female (63.0%, 29/46), from Brisbane or South East Queensland (71.7%, 33/46) and aged 50 years or younger (89.2%, 41/46).

Travel health was a relatively small part of their daily workload for the majority of respondents, as only 10.9% (6/55) of the medical practitioner respondents advise six or more travellers per week, and although the vast majority of the travel agent respondents (93.5%, 43/46) were asked travel health-related questions, most (84.7%, 39/46) deal with less than 5 questions per week. Both groups of respondents deal more frequently with travellers visiting destinations in South East Asia, which estimated from ABS data, was the top region visited by Australian residents at the time of the study[192].

Table 4-1 Summary of the demographic data obtained from the survey respondents

		Medical practitioners		Travel agents	
		No.	% (n=55)	No.	% (n=46)
Gender	Male	31	56.4%	17	37.0%
	Female	24	43.6%	29	63.0%
Age	21 – 30 yrs	1	1.8%	9	19.6%
	31 – 40 yrs	7	12.7%	11	23.9%
	41 – 50 yrs	13	23.6%	21	45.7%
	51 - 60 yrs	26	47.3%	4	8.7%
	61 – 70 yrs	7	12.7%	1	2.2%
	71 yrs or older	1	1.8%	0	0.0%
	Prefer not to say	0	0.0%	0	0.0%
Region of Queensland	Brisbane or SE Qld	12	21.8%	33	71.7%
	Southern Qld	6	10.9%	0	0.0%
	Central Qld	7	12.7%	3	6.5%
	North or FN Qld	30	54.5%	10	21.7%
Population of town/city	Greater than 250,000	2	3.6%	21	45.7%
	200,000 – 250,000	4	7.3%	1	2.2%
	150,000 – 200,000	8	14.5%	4	8.7%
	100,000 – 150,000	11	20.0%	2	4.3%
	50,000 – 100,000	6	10.9%	4	8.7%
	Less than 50,000	24	43.6%	14	30.4%
Number of travellers advised per week	None	2	5.5%	3	6.5%
	1 – 3	32	58.2%	22	47.8%
	3 -5	14	25.5%	14	30.4%
	6 -10	3	5.5%	4	8.7%
	11-15	2	3.6%	2	4.3%
	Greater than 15	1	1.8%	1	2.2%
Commonest destinations of travellers	None	1	1.8%	3	6.5%
	Western Europe	28	50.9%	8	17.4%
	East & Central Europe	3	5.5%	4	8.7%
	Middle East	1	1.8%	11	23.9%
	North Africa	8	14.5%	19	41.3%
	Central Africa	6	10.9%	17	37.0%
	Southern Africa	11	20.0%	22	47.8%
	North America	8	14.5%	9	19.6%
	Central America	4	7.3%	5	10.9%
	South America	17	30.9%	21	45.7%
	South East Asia	51	92.7%	36	78.3%
	South Asia	9	16.4%	14	30.4%
	North Asia	9	16.4%	9	19.6%
	Oceania	19	34.5%	11	23.9%

4.5.2 Comparison of the perceptions of medical practitioners and travels agents regarding the current and future role of pharmacists in the area of travel health

Questions 8 and 9 were rating scale questions. Table 4.2 gives the respondents' average rating for each statement, the results of the Mann-Whitney U tests performed on the distribution of ratings between the two groups and also, acts as a key for figures 4.1 and 4.2 which summarise the distribution of ratings to the statements in questions 8 and 9 respectively for both medical practitioners (MPs) and travel agents (TAs).

Both groups of respondents were aware that many Australians do not obtain pre-travel health advice as 80% and 67.3% of MPs and TAs respectively agreed/strongly agreed with statement 8b. Both groups also agreed that most travellers who do obtain pre-travel health advice will obtain it from their GP (statement 8c), and few will use a pharmacist (statement 8d). However, these trends were more significant among the TA group compared to the MP group, as more TAs (86.9%) than MPs (61.8%) agreed with the statement 8c, and although more MPs agreed/strongly agreed than disagreed/strongly disagreed with statement 8d, a large number (56.4%) were neutral.

The responses to statements 8a and 8e, show that despite being aware that many travellers do not obtain pre-travel health advice, only 23.6% of the MPs supported the involvement of pharmacists in the provision of travel health services and the majority (52.8%) were opposed to pharmacist involvement. The TA group were significantly more supportive of pharmacist involvement, as 50% of respondents disagreed/strongly disagreed with statement 8a, and 52.2% of TAs agreed/strongly agreed that travellers would be confident in visiting pharmacists for travel-related health advice (statement 8e). Few MPs (16.4%) agreed with statement 8e, again demonstrating a lack of confidence in pharmacist involvement in travel health.

Statements 8f to 8h examined some of the respondents' perceptions of two often-raised concerns about extended pharmacy services; a lack of specialist training and issues relating to the maintenance of patient confidentiality in a busy pharmacy[123 186 190]. The response to statement 8f demonstrated that both MPs and TAs feel that pharmacists are either currently not adequately trained, or that the respondents were unsure of the current level of training to provide travel health services. This appears to be a greater concern for the MPs, as although nearly a third of the MPs (32.7%) appeared unsure about the current level of pharmacist training, the majority (67.3%) felt that pharmacists were inadequately trained (disagreed/strongly disagreed with statement 8f). Again, TAs appeared more positive towards pharmacists, in that a lower number (32.6%) disagreed/strongly disagreed with statement 8f, and a larger number (50%) were unsure. In addition, the majority of both groups (80% of MPs and 67.4% of TAs) agreed/strongly agreed that only pharmacists with specialist training should offer travel health services (statement 8g). However, as shown in chapter 3, many pharmacists interested in providing travel health services also agree with the MPs and TAs in this study, in that the pharmacists themselves also recognise a need for training.

The maintenance of patient confidentiality in a busy pharmacy appears to be a common concern for doctors[123]. In this study it appears that maintaining confidentiality may be more of an issue for the MPs than the TAs as 49.1% of MPs and only 30.4% of TAs agreed or strongly agreed with statement 8h. In

both groups the remaining respondents were divided equally between unsure (25.5% MPs and 34.8% TAs) and disagree/strongly disagree (25.5% MPs and 34.7% TAs). However, as shown in chapter 2, only low numbers of travellers have concerns relating to any perceived lack of confidentiality when extended services are offered in community pharmacies.

Statement 8i and 9a to 9i examined the perceptions of MPs and TAs towards some current and potential roles of pharmacists in the area of travel medicine. In regard to statements 8i, 9a and 9b, the TA group overwhelming agree/strongly agree that pharmacists are capable of advising travellers about common travel related conditions (91.3% statement 8i) and the contents of travel first aid kits (82.6% statement 9a) and the majority (67.4%) of the TAs agree/strongly agree that they are capable of advising travellers about insect bite prevention methods (statement 9b). Although generally the MPs were in agreement with the TAs on these points, the percentage that agreed/strongly agreed with the statements was significantly lower than those of the TAs (65.4%, 43.6% and 45.5% for statements 8i, 9a and 9b respectively).

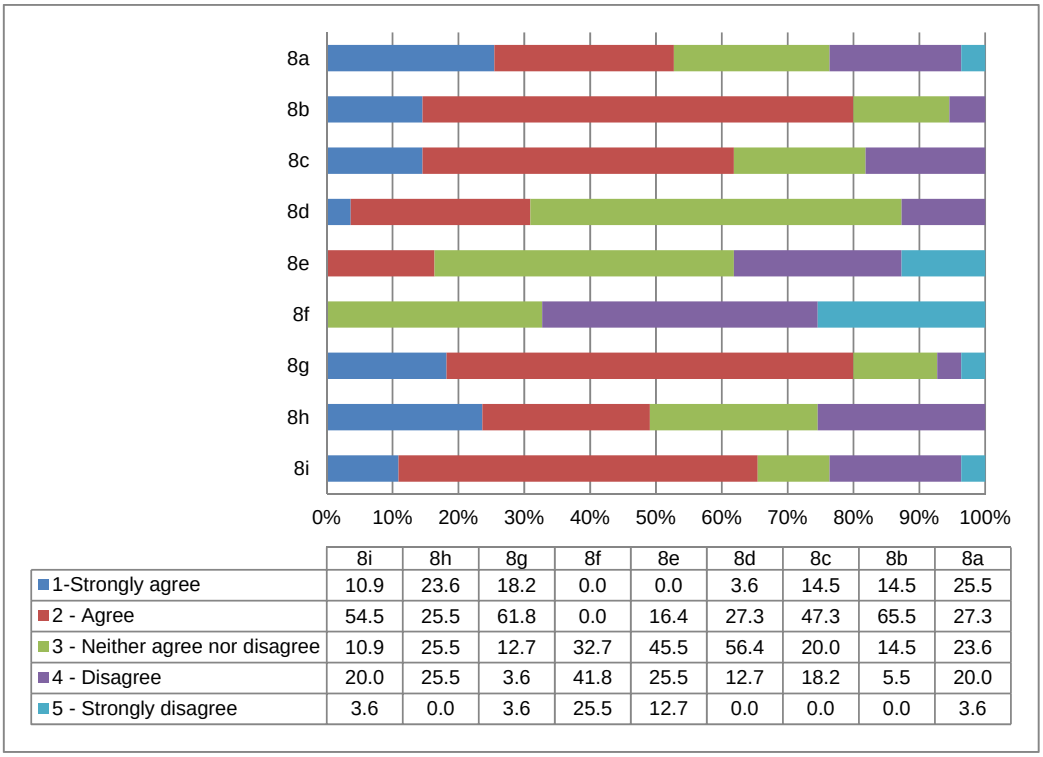
Statement 9c examined the confidence of respondents in the ability of pharmacists to assess travellers prior to travel and refer those needing services not currently available from Australian pharmacies. A difference of opinion was seen as 65.2% of TAs agreed/strongly agreed with the statement whereas although 40% of MPs agreed/strongly agreed and a slightly greater number (43.6%) disagreed/strongly disagreed with the statement. The differences in opinion continued with statements 9d to 9h which examined the perceptions of the MPs and TAs towards pharmacists administering vaccinations and the supply of antimalarials, antibiotics and other medications without prescription. Fig 4.2 shows that 72.8% of the MPs disagree/strongly disagree that people should be vaccinated for influenza vaccinations in community pharmacies (statement 9d) and that the proportion of the MPs that disagree/strongly disagree increases, when the statements mentioned the supply of travel vaccinations (89.1%, statement 9e), antimalarial chemoprophylaxis (90.9%, statement 9f) and travel-appropriate antibiotics (90.9%, statement 9g). Again, travel agents were significantly more positive to these suggestions with over 50% of TAs either agreeing/strongly agreeing with each statement (54.3%, 52.2%, 54.3% and 54.3% for statements 9d, 9e, 9f and 9g respectively). The difference of opinion between the two groups may be because MPs may see these services as impinging upon more traditional medical roles[180 188]. Whereas, the TAs may perceive some benefit or improved convenience for travellers. Unsurprisingly, the majority (81.8%) of MPs agreed/strongly agreed that pharmacists should only supply medications to travellers on the authority of a doctor's prescription whereas, the TAs were more divided and although like the MPs, the largest group of TAs (39.1%) agreed/strongly agreed with statement 9h, 28.3% were neutral and 31.6% disagreed/strongly disagreed.

The final statement in this question (statement 9i) examined whether MPs and TAs had concerns regarding the risks of contradictory advice being given by pharmacists and 70.9% and 56.6% of MPs and TAs respectively agreed/strongly agreed.

Table 4-2 Summary of the average ratings for each statement in Questions 8 and 9.

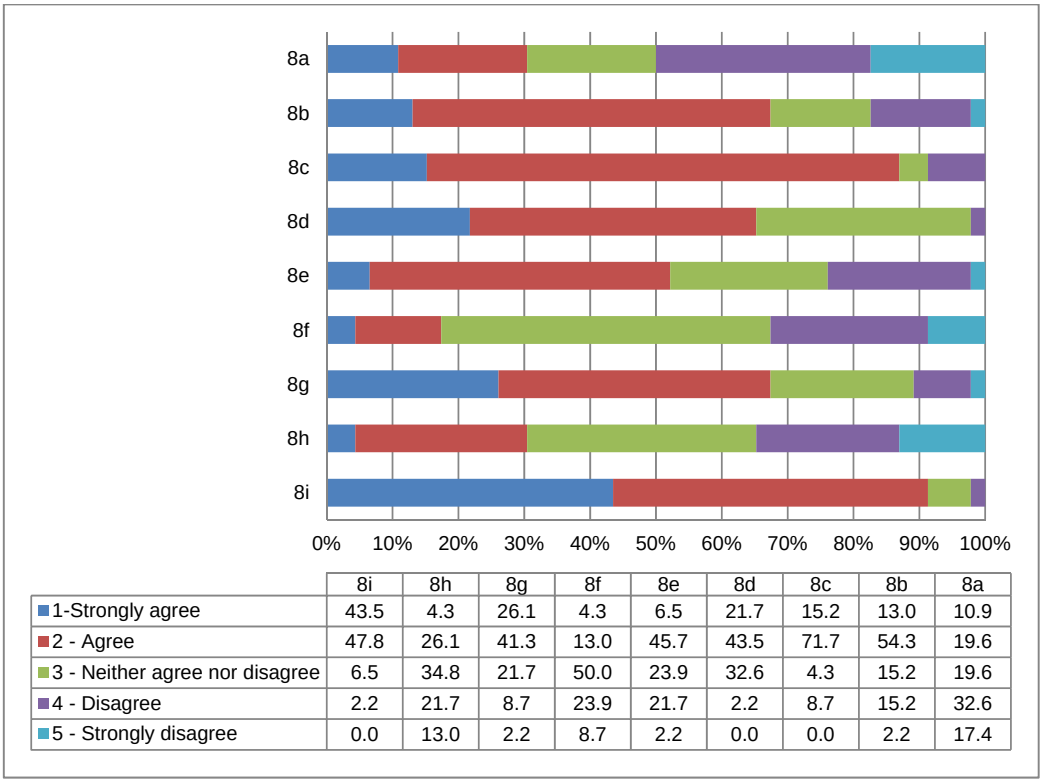
Statement from Survey	Average rating - MPs (Scale 1-5*)	Average rating - TAs (Scale 1-5*)	Mann-Whitney U test (Sig level 0.05 – shaded orange)
8a. Pharmacists should not provide travel health services. It is not an appropriate role for pharmacists.	2.49	3.26	0.003
8b. Many international travellers leaving Australia do not obtain travel-related health advice before their journey.	2.11	2.39	0.176
8c. Most travellers who want travel-related health advice before their journey will visit their GP to obtain advice.	2.42	2.07	0.042
8d. Currently not many travellers seek travel-related health advice from pharmacists.	2.78	2.15	0.000
8e. Travellers would be confident in visiting a pharmacist for travel-related health advice.	3.35	2.67	0.001
8f. Pharmacists currently have adequate training to provide travel health services	3.93	3.20	0.000
8g. Only pharmacists with specialist training and/or a specialist certificate or diploma in travel health should provide travel health services.	2.13	2.20	0.738
8h. Patient confidentiality could be an issue if travel health advice was available from community pharmacies.	2.53	3.13	0.016
8i. Pharmacists are capable of advising travellers about the prevention and treatment of common travel-related health conditions such as diarrhoea, travel sickness and jet lag.	2.51	1.67	0.000
9a. Pharmacists are capable of advising travellers about which medications and medical supplies they should take with them in a first aid kit when they travel.	2.85	1.93	0.000
9b. Pharmacists are capable of advising travellers about the prevention and treatment of mosquito bites and insect-borne diseases such as malaria and dengue fever.	2.85	2.22	0.003
9c. Pharmacists would be able to assess travellers before they travel and identify travellers who require vaccinations, antimalarial medications or more specialised advice, and refer these travellers to their doctor for more specialised treatment. **OR** 9c. Pharmacists would be able to assess travellers before they travel and identify travellers who should be seen by a doctor for more specialist treatment.	3.13	2.41	0.003
9d. People should be able to get influenza vaccinations at their community pharmacy.	3.82	2.65	0.000
9e. Travellers should be able to get appropriate travel vaccinations at their community pharmacy.	4.22	2.80	0.000
9f. Travellers should be able to buy antimalarial chemoprophylaxis over the counter in pharmacies. **OR** 9f. Travellers should be able to buy medications to prevent malaria over the counter (without a prescription) in pharmacies.	4.25	2.65	0.000
9g. Pharmacists should be able to prescribe appropriate antibiotics to travellers to remote areas to use if they get infections.	4.20	2.74	0.000
9h. Pharmacists should be only able to supply medications to travellers on the authority of a doctor's prescription. **OR** 9h. Pharmacists should only be able to supply medications to travellers only if they have a doctor's prescription.	1.93	2.85	0.000
9i. The advice given to a traveller by a pharmacist may contradict the advice given to the traveller by their doctor.	2.13	2.50	0.05

(*Scale: 1-Strongly agree, 2-Agree, 3-Neither agree nor disagree, 4-Disagree, 5-Strongly disagree)



	8i	8h	8g	8f	8e	8d	8c	8b	8a
1-Strongly agree	10.9	23.6	18.2	0.0	0.0	3.6	14.5	14.5	25.5
2 - Agree	54.5	25.5	61.8	0.0	16.4	27.3	47.3	65.5	27.3
3 - Neither agree nor disagree	10.9	25.5	12.7	32.7	45.5	56.4	20.0	14.5	23.6
4 - Disagree	20.0	25.5	3.6	41.8	25.5	12.7	18.2	5.5	20.0
5 - Strongly disagree	3.6	0.0	3.6	25.5	12.7	0.0	0.0	0.0	3.6

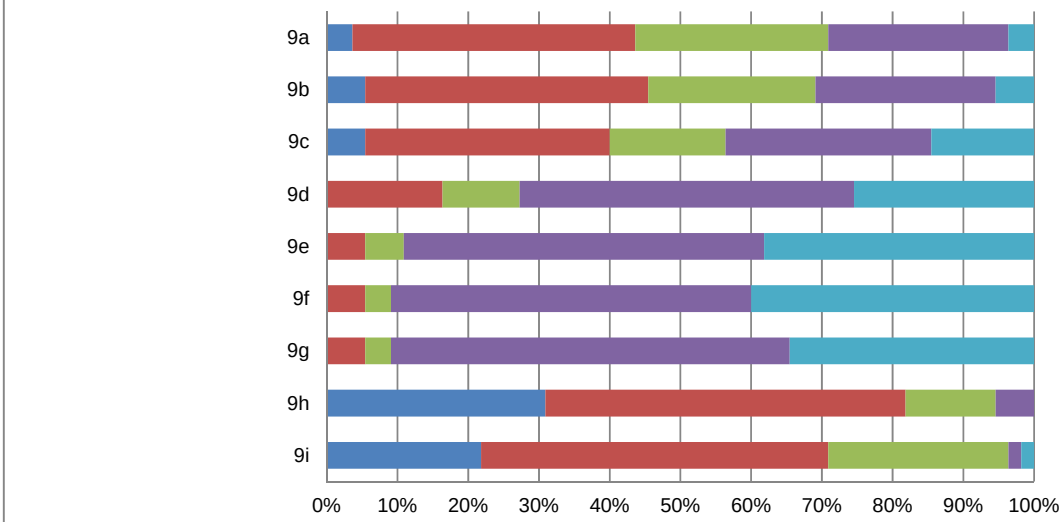
A) Medical Practitioners



	8i	8h	8g	8f	8e	8d	8c	8b	8a
1-Strongly agree	43.5	4.3	26.1	4.3	6.5	21.7	15.2	13.0	10.9
2 - Agree	47.8	26.1	41.3	13.0	45.7	43.5	71.7	54.3	19.6
3 - Neither agree nor disagree	6.5	34.8	21.7	50.0	23.9	32.6	4.3	15.2	19.6
4 - Disagree	2.2	21.7	8.7	23.9	21.7	2.2	8.7	15.2	32.6
5 - Strongly disagree	0.0	13.0	2.2	8.7	2.2	0.0	0.0	2.2	17.4

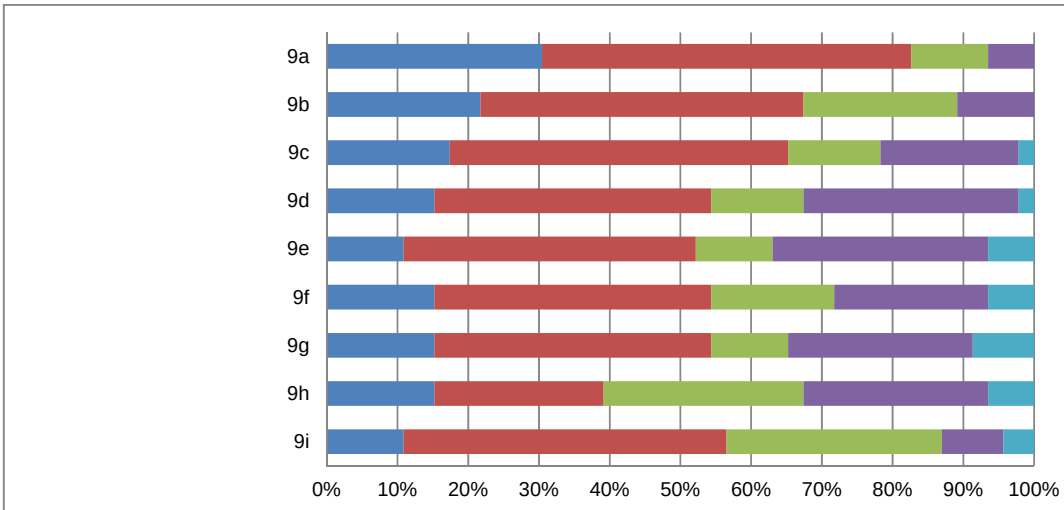
B) Travel Agents

Figure 4-1 Percentage ratings of how frequently medical practitioners and travel agents agreed or disagreed to statements in question 8 (current and future roles for pharmacists in travel health)



	9i	9h	9g	9f	9e	9d	9c	9b	9a
1-Strongly agree	21.8	30.9	0.0	0.0	0.0	0.0	5.5	5.5	3.6
2 - Agree	49.1	50.9	5.5	5.5	5.5	16.4	34.5	40.0	40.0
3 - Neither agree nor disagree	25.5	12.7	3.6	3.6	5.5	10.9	16.4	23.6	27.3
4 - Disagree	1.8	5.5	56.4	50.9	50.9	47.3	29.1	25.5	25.5
5 - Strongly disagree	1.8	0.0	34.5	40.0	38.2	25.5	14.5	5.5	3.6

A) Medical Practitioners



	9i	9h	9g	9f	9e	9d	9c	9b	9a
1-Strongly agree	10.9	15.2	15.2	15.2	10.9	15.2	17.4	21.7	30.4
2 - Agree	45.7	23.9	39.1	39.1	41.3	39.1	47.8	45.7	52.2
3 - Neither agree nor disagree	30.4	28.3	10.9	17.4	10.9	13.0	13.0	21.7	10.9
4 - Disagree	8.7	26.1	26.1	21.7	30.4	30.4	19.6	10.9	6.5
5 - Strongly disagree	4.3	6.5	8.7	6.5	6.5	2.2	2.2	0.0	0.0

B) Travel Agents

Figure 4-2 Percentage ratings of how frequently medical practitioners and travel agents agreed or disagreed to statements in question 9 (current and future roles for pharmacists in travel health)

4.5.3 Comparison of the perceptions of medical practitioners and travels agents regarding a proposed model for a pharmacy-run travel health advisory service

Chapter 6 describes the implementation and evaluation of a service model for a pharmacy-run travel health service. The model intends to work within current legislative and pharmacy practice restrictions in Australia, and is intended to assess all travellers presenting to the service and to provide basic travel-related health advice to low risk travellers who would not normally visit their GP or travel health specialist before travelling. If higher risk travellers are identified i.e. travellers requiring vaccinations, antimalarial medications or more specialist advice, these travellers would be referred to their medical practitioner.

Question 10, a rating scale question, presented both the TAs and MPs with a brief description of this model and 7 related statements. Using a 5-point Likert scale, respondents were asked to rate their level of agreement or disagreement with each statement. Table 4.3 gives the respondents' average rating for each statement, the results of the Mann-Whitney U tests performed on the distribution of ratings between the two groups and also, acts as a key for figure 4.3 which summarises the distribution of ratings to the statements in question 10 for both MPs and TAs.

Table 4.3 shows that the TAs were significantly more positive towards statements 10a, 10d, 10f and 10g than the MPs. However, the mean ratings listed in Table 4.3.and the distribution of ratings shown in figure 4.3 shows that many of the MPs still agreed/strongly agreed with many of the other statements. The majority of both TA (89.1% and 76%) and MP (65.5% and 67.3%) respondents agreed/strongly agreed with statements 10a and 10b respectively. This infers that they thought that the service model would be useful as it targets travellers who would not normally visit their doctor before travel and also identifies and refers travellers who require vaccinations or more specialist services, which potentially could increase the numbers of travellers receiving pre-travel health advice and visiting their doctor for vaccinations. The MPs were particularly positive towards statement 10c with 94.5% agreeing/strongly agreeing that they would be happy to receive referrals for vaccinations from pharmacists and no MPs disagreed/strongly disagreed with this statement. 78.3% of TAs also felt that doctors would be happy to accept referrals for vaccinations from pharmacists. Interestingly, when considering whether the service model would potentially reduce the workload of doctors, the rankings of the MPs to statement 10d were evenly divided between agree/strongly agree (32.7%), neutral (32.7%) and disagree/strongly disagree (34.5%), whereas the majority of TA respondents (71.8%) agreed with the statement. There appears to be some conflict of opinion between the two groups as to whether the services offered by pharmacists will not be to the same standard as those offered by GPs or travel clinics. The opinions of the TAs to statement 10e were fairly evenly distributed between agree/strongly agree (34.8%), neutral (34.8%) and disagree/strongly disagree (30.4%). Whereas, the largest group of MPs (47.3%) agreed/strongly agreed with the statement suggesting they feel that pharmacy-run services will not be to the same standard. However, 32.7% were unsure about the quality of service and 20% disagreed/strongly disagreed with the statement.

A large percentage of TAs thought that the service would help to reduce the risk of health problems in Australian travellers (71.8% of TAs agreed/strongly agreed with statement 10f) and that the service would be more convenient than visiting their GP (80.5% of TAs agreed/strongly agreed with statement

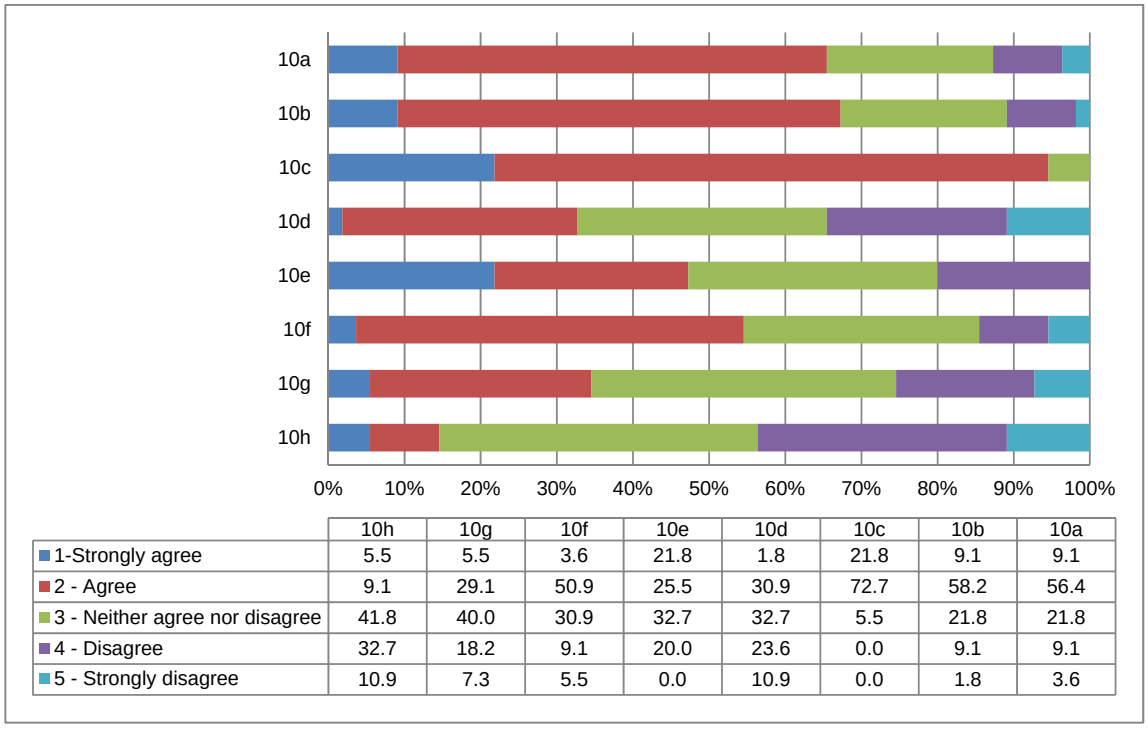
10g). Again, MPs were less positive towards the pharmacy-run service model with 54.5% of MPs agreeing/strongly agreeing that the service could help reduce the risk of health problems in Australian travellers and with 30.9% being unsure. However, only 34.6% of MPs thought that a pharmacy-run service would be more convenient than visiting their GP thereby contradicting the views of the TAs, although a large proportion of the MP respondents (40.0%) were unsure.

It has been discussed that, to maintain profitability, some travel doctors may rely on the throughput of relatively larger numbers of low risk travellers to help subsidise the longer consultations required for more complicated cases, and that if pharmacists provided services to large numbers of low risk travellers that it may become uneconomical for doctors to offer travel health services[193]. Statement 10h referred to this to see if the MPs agreed or disagreed (the TAs were not asked to rate this statement). Although quite a large number (41.8%) were unsure about the statement, the largest group (43.6%) disagreed or strongly disagreed with the statement whereas, only a relatively small number of the MPs (14.6%) agreed/strongly agreed. Therefore, this demonstrates that most MPs with a firm and definite opinion felt that a pharmacy-run service would not impact on their own profitability, although a large number of MPs were also unsure.

Table 4-3 Summary of the average ratings for each statement in Question 10

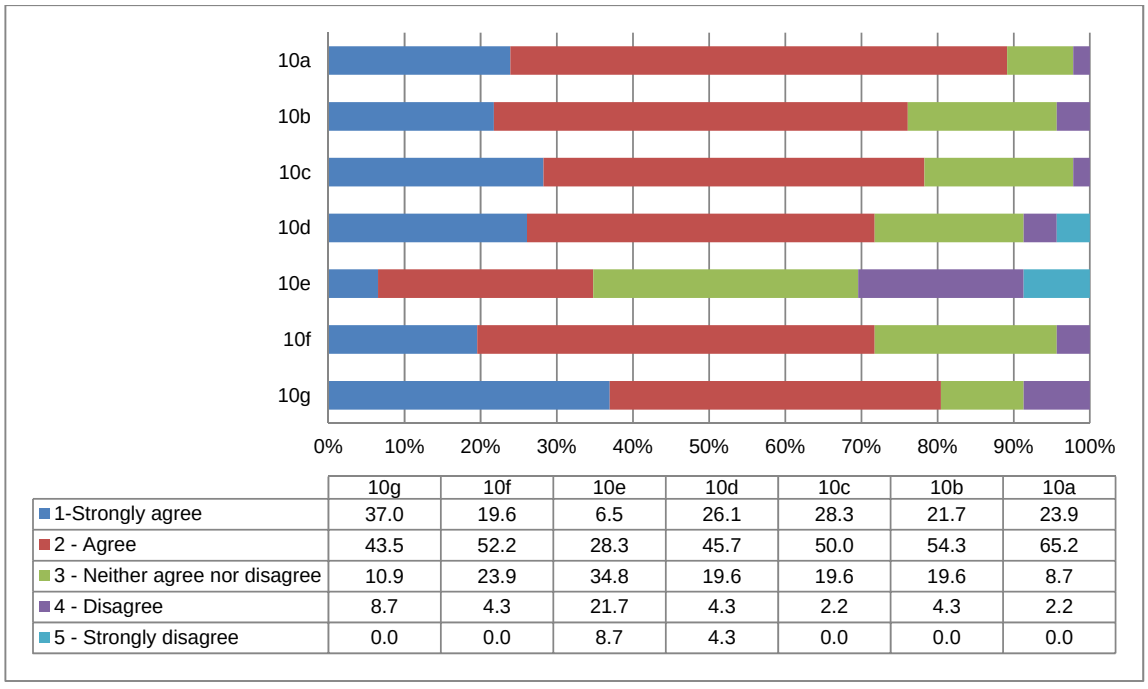
Statement from Survey	Average rating - MPs (Scale 1-5*)	Average rating - TAs (Scale 1-5*)	Mann-Whitney U test (Sig level 0.05– shaded orange)
10a. This service is useful because it targets travellers who would not normally visit their doctor before their journey, and so will increase the overall number of travellers receiving travel-related health advice before their journey.	2.42	1.89	0.002
10b. This service will identify travellers who need vaccinations and will refer them to their doctor. This will increase the number of travellers who visit their doctor for vaccinations.	2.36	2.07	0.088
10c. I would be happy to have a pharmacist refer a traveller who needs vaccinations or more specialised advice to my surgery **OR** 10c. Doctors would be happy to have a pharmacist refer a traveller who needs vaccinations or more specialist advice to them	1.84	1.96	0.498
10d. This service would be useful to doctors, as it will reduce their workload.	3.11	2.15	0.000
10e. The service and advice offered by pharmacists will not be to the same standard as those offered by general practitioners or travel medicine clinics.	2.51	2.98	0.052
10f. This service would help reduce the risk of Australians suffering health problems while they are overseas.	2.62	2.13	0.009
10g. This service would be more convenient for travellers than visiting their GP.	2.93	1.91	0.000
10h. Some doctors say that low risk travellers are more profitable than the more complicated cases. They say that they rely on the low risk travellers to help subsidise the longer consultations of the more complicated cases. Therefore, if pharmacists provided services to low risk travellers it may make it uneconomical for doctors to offer travel health services and doctors may stop offering these services.	3.35		

(*Scale: 1-Strongly agree, 2-Agree, 3-Neither agree nor disagree, 4-Disagree, 5-Strongly disagree)



	10h	10g	10f	10e	10d	10c	10b	10a
1-Strongly agree	5.5	5.5	3.6	21.8	1.8	21.8	9.1	9.1
2 - Agree	9.1	29.1	50.9	25.5	30.9	72.7	58.2	56.4
3 - Neither agree nor disagree	41.8	40.0	30.9	32.7	32.7	5.5	21.8	21.8
4 - Disagree	32.7	18.2	9.1	20.0	23.6	0.0	9.1	9.1
5 - Strongly disagree	10.9	7.3	5.5	0.0	10.9	0.0	1.8	3.6

A) Medical Practitioners



	10g	10f	10e	10d	10c	10b	10a
1-Strongly agree	37.0	19.6	6.5	26.1	28.3	21.7	23.9
2 - Agree	43.5	52.2	28.3	45.7	50.0	54.3	65.2
3 - Neither agree nor disagree	10.9	23.9	34.8	19.6	19.6	19.6	8.7
4 - Disagree	8.7	4.3	21.7	4.3	2.2	4.3	2.2
5 - Strongly disagree	0.0	0.0	8.7	4.3	0.0	0.0	0.0

B) Travel Agents

Figure 4-3 Percentage ratings of whether medical practitioners and travel agents agreed or disagreed to statements in question 10 (proposed model for a pharmacy-run travel health advisory service)

4.5.4 Thematic analysis of question 11

Question 11 was an open answer question that gave respondents the opportunity to comment about current and/or future roles for pharmacists in travel health. Firstly, an initial assessment was made regarding the overall tone of the each respondent's statements and whether they were subjectively positive or supportive of enhanced roles for pharmacists in the area of travel health or negative or hostile. Some statements were long and contained both positive and negative elements, if so they were subjectively categorised based on the predominant tone in the statement. 23 MPs (41.8%) and 19 TAs (41.3%) chose not to comment. 13 MPs (23.6%) made subjectively positive or supportive statements towards the role of pharmacists in travel health and 17 MPs (30.9%) made negative or hostile statements. The comments of 2 MPs (3.6%) were considered to be neutral. In contrast, again the TAs appeared subjectively more positive towards pharmacy-run travel health services than the MPs, as 20 TAs (43.5%) made positive statements, only 6 TAs (13.0%) made negative statements and one TA (2.2%) was considered neutral. The statements were then reduced to a total of 127 individual comments or elements (MPs 71 comments and TAs 56 comments) and a thematic analysis was performed. 7 major themes with subcategories were identified.

4.5.4.1 Training-related issues

A total of 30 comments referred to training or accreditation issues and 6 MPs and 11 TAs made positive comments revolving around a theme of supporting greater pharmacist involvement in travel health if the pharmacist has been appropriately trained for the role. For example:

> *"If pharmacists are appropriately trained in travel medicine it would be advantageous to the public...."* (TA 2)

> *"Any assistance in disease prevention and health promotion is to be applauded and no reason why pharmacists cannot provide travel advice if appropriate training and .... is available..."* (MP 26)

Some of these respondents also felt that the training should involve a level of accreditation and/or specialisation and that the travel health knowledge of pharmacists needs to remain current:

> *"I can see the benefit of pharmacists providing travel health advice, but I strongly believe specialist training needs to be provided"* (TA 15)

> *"Only a pharmacist, who is specially trained or has a certificate in travel medicine should be providing advice to travellers* (MP 28)

Some MPs and TAs highlighted the lack of, or depth of, training from a more negative perspective or used a more negative tone. 7 MPs highlighted concerns with the level of knowledge of pharmacists and either suggested areas of concern and/or used it to infer that travel health was not an appropriate role for pharmacists and that only MPs have the required breadth knowledge:

> *"Pharmacists do not have the experience or skills to advise a malaria preventative which is complex - ever changing."* (MP 14)

Likewise, 6 TAs also made negative comments about the perceived lack of knowledge of pharmacists such as:

"I don't agree Pharmacists should be giving advice on medication and immunisations for overseas travel as they are inadequately trained...." (TA 42)

Whereas others also mentioned that the perceived lack of training or knowledge would limit their confidence in a pharmacy-run travel health service, its competence and then in turn, whether they should refer their clientele to the service:

"....we feel more confident referring our clients to a GP/travel clinic .... Our clients trust us to refer them to competent organisations and we must feel comfortable they are receiving good advice." (TA 3)

Finally, one TA questioned whether the qualifications and competencies of pharmacy-run travel health services are also recognised by other bodies and one MP commented that they were unsure of the current level of training of pharmacists in travel health:

"The qualifications and competencies of the Pharmacist are not recognised as quickly as the Dr and GP for advice of medical requirements for travelling overseas. All of the government advisory notices state to check with a GP or medical practitioner. The Pharmacist is not mentioned as far as I am aware…" (TA 22).

"It is difficult to comment because I have no idea of the level of training or assessment or continuing education that pharmacists undertake in this area...." (MP 29)

4.5.4.2 Confident in pharmacy-run service and referrals to and from service

Six MPs and 11 TAs expressed some confidence in the ability of pharmacists and made comments that were positive and supportive of either greater inclusion of pharmacists in the area of travel health or the provision of pharmacy-run services:

"I consider it would be great for pharmacists to become involved in travel health." (TA 4)

Some comments reflected a recognition that pharmacists already do offer some travel health advice and one MP again highlighted, that with training, this could be extended:

"I think and feel they play an important role in assisting with travel health advice." (TA 42)

"I think pharmacist already provide a level of travel health advice. With travel health training this could be extended..." (MP 15)

Some of these TAs also commented how they would be happy to refer their clients to pharmacists or pharmacy-run services and some MPs made comments that they would be happy to accept referrals for services such as vaccinations from pharmacists. Examples include:

"If a travel health advisory service was introduced I would definitely refer my clients if they were travelling to high risk areas..." (TA 5)

"In my opinion it would be a good idea for pharmacists to identify if patients do require specific vaccinations for the area they intend travelling and refer them onto their doctor for further management." (MP 31)

One MP also reinforced the importance pharmacist training and that they felt that people with medical problems should still see their GP and those with more complex issues should have input from a travel health specialist. Another MP highlighted that a formal referral process involving direct communication between the pharmacist and doctor, not reliant upon third parties, is required:

> *"With travel health training this could be extended but patients with medical problems still need to see their GP and complicated travel itineraries need specialist travel health management."* (MP 15)

> *"There needs to be a formal communication from the pharmacist to the GP regarding advice/medications given that is not dependent on patient delivery."* (MP 45)

Finally, one MP appeared supportive and not threatened by pharmacy-run travel health services:

> *"I would be interested in a travel health advisory service in my local pharmacies. I would see this as a complimentary service not competition."* (MP 56)

4.5.4.3 Perceptions of potential advantages of pharmacy-run travel health services

The respondents did identify some potential advantages of pharmacy-run travel health services and these included:

4.5.4.3.1 Increased numbers of travellers obtaining pre-travel health advice

4 TAs and 2MPs highlighted that some travellers were not being adequately advised and that pharmacy-run services could potentially increase the number of travellers obtaining pre-travel health advice:

> *"...I also agree that there are travellers who are not being adequately advised and vaccinated by limitations/expense of GP consultations."* (MP 36)

> *".....this would increase the number of people who seek advice..."* (TA 27)

And that this in turn would increase awareness of the health issues and risks associated with travel:

> *"I feel pharmacists offering travel advice would generally increase awareness of risks and help prevent illness in travellers."* (MP 53)

4.5.4.3.2 Convenience and reducing the costs of travel

TAs were aware of the costs associated with obtaining travel health advice, that some travellers do require interventions and as a result, that some travellers do not obtain pre-travel health advice:

> *"We regularly refer travellers to see their GP – but this is expensive as GPs do not bulk bill – and often the destinations require no extra medications – but travellers have to pay to get this advice..*" (TA 11)

TAs thought that pharmacists would be a cheaper, more convenient and accessible option, and these are often given by both pharmacists and patients as advantages for extended pharmacy services. However it has also led to the misconception that extended services would be free and the perception amongst pharmacist that it would be difficult to charge for extended services[180]:

"I think it may be a good idea, as I spent a lot to go to a travel doctor. It would allow budget travellers to make informed decisions without costing them an arm and a leg in GP fees." (TA 21)

"...I think that having a pharmacist advising on travel health would increase travellers awareness of health issues because pharmacists are always more accessible." (TA 28)

One TA implied that the pharmacist would act as a filter, referring those travellers that needed more specialist care, and one TA thought a pharmacy-run service would be useful when medical staff are not available:

"....it would be advantageous to the public especially in remote areas where private Drs are not always available easily." (TA 2)

Finally, one TA inferred that some doctors sometimes supply unnecessary medications to travellers, a complaint that is often made of pharmacists by MPs:

"I believe that doctors can oversell medication for some areas" (TA 29)

4.5.4.3.3 Reduce medical workloads

Two TAs felt that pharmacist-run travel health services could free up medical time and therefore allow the medical staff to concentrate on other services:

"...it would also free up these doctors for people who are sick." (TA 2)

However, none of the MPs addressed this issue.

4.5.4.3.4 Travel health advice for travellers without a GP

One MP thought that a pharmacist-run travel health service may be beneficial for travellers who do not have a regular GP:

"…Could be a role for those who don't have a GP" (MP 54)

4.5.4.3.5 Provision of first aid kits

Finally, one TA recognised that the production of travel first aid kits was a suitable role for pharmacists

"I think comprehensive first aid kits should be available in pharmacies." (TA 15)

4.5.4.4 Do not support the extended role of pharmacists in travel health and/or prefer the status quo

A number of TAs and MPs did not appear to support the extension of the pharmacist's role into the area of travel health. The 4 TAs that made comments related to this theme thought that pharmacists should continue supplying medications on the authority of a doctor's prescription, the labelling of OTC medication and that they should supply advice but should not supply injections, antibiotics or antimalarials without prescription:

"Our perception is pharmacist should only dispense travel advice if they receive a prescription from a GP..." (TA 3)

"Pharmacist should only give general advice, not injections (they may interfere with other medications), not antibiotics (they may interfere with other medications), not malaria (they may interfere with other medications)" (TA 26)

One TA suggested that pharmacists should work collaboratively with doctors but not alone:

"I think Pharmacists and doctors could work together, but I don't think travellers should only see a pharmacist." (TA 40)

Likewise, the 10 MPs who made comments with this theme also suggested that pharmacists should continue the supply of OTC medications for minor ailments. However, they were not supportive of extended or more complex roles for pharmacists especially the supply of antimalarials without prescription and immunisations, which they viewed as a medical role:

"I would be concerned if such a service were to prescribe medications other than OTC preps or vaccinations as I think this should remain the role of the GP or specialist as co-morbidities and regular therapy needs to be considered." (MP 56)

They also suggested that enhancement of the pharmacists role placed the pharmacist in direct competition with doctors, with the consequence that it could result in a loss in income for MPs. Other MPs questioned that if there is a public need for pharmacists to provide extended services then perhaps there is potentially a need for greater numbers of doctors or, as stated by one respondent, that if pharmacists really want these types of roles that they themselves should train as doctors:

"Train more doctors, don't support bodgie service." (MP 2)

"If pharmacists want to be doctors then do the MBBS. Otherwise we shall start dispensing!" (MP 11)

"Patients who are travelling to low risk countries tend to ask advice tacked onto a normal "short" appointment. So there would be loss of income to a GP, just less talking in a limited time!" (MP 12)

Finally, another MP suggested that another potential consequence of the introduction of pharmacist-run travel health services could resulted in fragmented healthcare. However, they did not state exactly how this could occur:

"This will further fragment healthcare." (MP 57)

4.5.4.5 MP perceptions of practical problems associated with pharmacist-run travel health services

In their comments several of the MPs mentioned potential limitations, concerns or issues relating to the provision of travel health services through pharmacies. Several themes were present in the comments are these are:

4.5.4.5.1 Privacy and confidentiality issues

Maintaining patient privacy and confidentiality while interviewing and discussing private health issues in a busy pharmacy was again expressed by 6 MPs:

"Patient confidentiality is a major concern in a pharmacy setting...." (MP45)

"Currently pharmacists only appear to have a limited role in advice on travel health – this is good in that they have in general no private areas for in depth discussions of personal matters....." (MP 50)

The MPs felt that they can provide privacy and confidentiality and would expect pharmacists to do likewise by using private interview rooms. One MP also highlighted that patients also complain to them about the lack privacy when being counselled in pharmacies:

"Now patients complain that pharmacists ask them too many questions in the "open"..." (MP 57)

As shown in chapter 2 this appears to be less of a concern for travellers and in recent years, due to the standards of the Pharmacy Guild of Australia's Quality Care Pharmacy program (QCPP)[194], increasing numbers of Australian pharmacies do have private counselling areas or counselling rooms.

4.5.4.5.2 Conflicts of interest between the provision of advice and the supply of medication

Six MPs appeared concerned about a perceived conflict of interest between providing advice to patients and the sale or supply of medications, suggesting that pharmacists may recommend and profit from the sale of products that the traveller does not need:

"Pharmacists have a vested interest in selling all sorts of things for medical first aid kits that are highly inappropriate, as well as vaccinations" (MP 14)

"I would be concerned that retail pharmacists like to sell product (it is a business). May suggest more or more expensive medications that are required." (MP 41)

The MPs felt that there should be a clear delineation between the supply of medication and supply of advice or information:

"Keep the advice and suppliers separated. Conflict of interest issues are a major concern. Or, pharmacists could do the clinics and we could sell the vaccines we administer to avoid conflict of interest! Hang on, that's a great idea...." (MP 2)

4.5.4.5.3 Facilities and training to give vaccinations

The comments of 6 MPs raised concerns relating to the safety of administering vaccines in a community pharmacy and in particular the risk of anaphylaxis:

"Can pharmacy deal with rare but possible severe adverse effects i.e. anaphylaxis? Pt safety is a primary objective." (MP 22)

One MP commented that the actual risk of anaphylaxis with some travel vaccinations is low. However, if it did occur, it would require rapid treatment and there was a concern that this would not be available in a pharmacy:

"Vaccinations in pharmacies will be safe in most cases. If a patient develops anaphylaxis they would not have immediate treatment as would occur in the surgery." (MP 37)

Therefore the MPs felt that pharmacies would require an observational area, resuscitation equipment and personnel trained in the administration of vaccines and the management of anaphylaxis:

> *"Vaccinations should never be offered unless appropriate resuscitation equipment is available and personnel to use it."* (MP 45)

One MP suggested that a specialist nurse would have to be employed by the pharmacy, to manage these situations, but did not mention whether pharmacy staff could be trained to deal with them:

> *"Vaccinations in the community would require a specialist nurse = cover for adverse reactions."* (MP 41)

Finally, one MP admitted that they thought that all vaccinations should be performed under the supervision of a MP and was not comfortable about vaccination outside the environment of a medical clinic:

> *"...I also believe that vaccinations should be undertaken under the supervision of a doctor – vaccination is still a procedure that is not without risk. I would not wish to be vaccinated or have my family vaccinated outside a medical clinic..."* (MP28)

Anaphylaxis with vaccinations is a valid concern, and all health professionals offering vaccination services should be aware of, and be able to manage, anaphylactic reactions. However, in practice the incidence is very low. In one survey of 1,266 pharmacists offering immunisation services in the USA, although the pharmacists reported a number of local reactions such as redness, swelling and/or rash, and a small number of systemic reactions such as fever, muscle aches or fainting, there were no reports of anaphylaxis[195].

4.5.4.5.4 Inadequate risk assessment of travellers

MPs raised two concerns about pharmacists performing pre-travel risk assessment on travellers. Firstly, 4 MPs highlighted that currently pharmacists do not have access to the full health records of the traveller and therefore cannot take into consideration all of their medical conditions and make an accurate risk assessment:

> *"All details of the patient's health may not be available to the pharmacist and could lead to inappropriate prescribing e.g. Recent abx, renal or liver function etc."* (MP 37)

> *"I am concerned that pharmacists may not be aware of full medical history."* (MP 44)

Secondly, 3 MPs highlighted concerns that pharmacists would be unable to perform a thorough pre-travel risk assessments on travellers. Their main concerns were that they believed that pharmacists were not fully aware of all travel-related health risks, may not make a detailed assessment of the traveller and finally, one of the MPs also stated that they considered the patient's GP to be the best person to carry out these assessments:

> *"The ability to take a detailed history with reference to the patient's past medical history, current examination findings, social history is still something that I believe that the patient's GP is best qualified to do."* (MP28)

4.5.4.5.5 Miscellaneous problems or concerns

A number of isolated, but still valid comments were made by a small number of MPs expressing practical issues or concerns with pharmacist-run travel health services. Two MPs highlighted that by extending pharmacy services, pharmacists are increasing their risk of litigation and this has been recognised as a disadvantage by indemnity insurers and pharmacy professional bodies.

> *"Even if they offered courses for more advanced/complicated advice I feel that medico-legally they are putting themselves at risk of litigation."* (MP 33)

One MP identified that to provide a quality service that pharmacists would also have to have access to current information services:

> *"Advice would need to be standardised and evidence-based, such as from a recognised advice provider service along the lines of MASTA."* (MP 4)

And finally, one MP and one TA questioned whether pharmacists really have time to provide a quality travel health service:

> *"...(Do chemists really want to take the patient out the back for half an hour because that's what it takes?)..."* (MP 2)

> *"I question whether pharmacists have the time to do travel health consultations."* (TA 40)

One MP questioned whether a traveller who hadn't thought it necessary to see their doctor before travelling would actually seek the advice of a pharmacist:

> *"Pharmacists have no role in providing information to travellers. Most patients who don't think of seeing a GP (until the last minute if at all) would also not think of seeing a pharmacist."* (MP 14)

4.5.4.6 Greater use of travel health specialists

A number of MPs and TAs questioned whether both GPs and pharmacists should provide travel health services or whether travellers should be referred to travel health specialists. Common themes in their comments were that generalist doctors and pharmacists would be unable to stay as current as a specialist and do not have the same level of education. One TA also highlighted that if the traveller visited a pharmacist and then a doctor it places an additional step in the process:

> *"I don't think GPs or pharmacists will be able to stay up to date with world health issues and travellers should only seek advice from travel doctors. General doctors and pharmacists seem far too busy to be well informed especially in high risk areas."* (TA 12)

> *"Vaccination risk and protection is a complex issue and should not be dealt with by GPs but even restricted to approved travel medicine clinics or doctors who have had approved education and training."* (MP 36)

> *"Even GPs have very poor travel health skills."* (MP 23)

4.5.4.7 Lack of self-promotion by pharmacists

As with the travellers interviewed in chapter 2, two TAs stated that they did not know that pharmacists offered extended services:

"..pharmacists may need to promote themselves and the services they provide more...." (TA 3)

4.6 Limitations and Recommendations for Further Work

There are some limitations to the study. Firstly only Queensland medical practitioners and travel agents were included in the study. This was intentional, however it must be considered when attempting to extrapolate findings across the general MP and TA populations. Secondly, the response to both surveys was low. Reminder letters could have been sent to the medical practitioners and travel agents to encourage them to return completed surveys and post-survey focus groups utilised to further investigate themes present in the survey results. However, the low response rate may potentially introduce a level of bias into the results and this must be considered.

4.7 Summary

This study showed that both travel agents (TAs) and medical practitioners (MPs) were aware that many Australians do not obtain travel health advice before their journey and that few Australians use pharmacists to obtain travel health advice. Despite this awareness, only 23.6% of MPs supported greater pharmacist involvement in the provision of travel health services and 52.8% of MPs opposed greater involvement. Generally, travel agents were more supportive of pharmacist involvement in the area of travel health, with the main opposition of MPs being towards pharmacists administering vaccines or providing travel-related antibiotics and antimalarials without prescription.

Both parties were supportive of the proposed model for a pharmacy-run travel health service, although again travel agents were more positive than medical practitioners, and recognised that the service would target, and be helpful for, travellers who may not normally visit their GP for travel health advice, resulting in less travel-related health problems. Issues were raised in relation to training of pharmacists, confidentiality, privacy and the conflict in combining advice and supply roles

Both travel agents and medical practitioners highlighted the need for greater specialist training for pharmacists and this agrees with the concerns raised by the pharmacists themselves in chapter 3. The next chapter describes a travel health subject delivered as an elective to final year BPharm students with the scope for further development and use in the future as a continuing professional development module for registered pharmacists interested in developing travel health services.

Chapter 5 Comparison of Team-based and Web-based Learning in a BPharm Travel Health Elective Subject.

5.1 Introduction

In recent years, many universities have moved away from teaching health students solely with traditional didactic, lecture-based learning (LBL) models and have introduced a variety of newer, student-centred learning models. Factors which have driven these changes include: greater awareness of the limitations of LBL, attempts to increase student engagement, better prepare them to cope with complex clinical problems, and to introduce greater flexibility in training and education[196-199].

5.1.1 Lecture-based learning

Although its limitations are well-known, traditional, didactic, lecture-based learning (LBL) continues to be the most frequently used learning method in many universities because it is one of the most efficient methods of delivering large amounts of up-to-date information to student groups of varying size[200 201]. However, LBL is not a student-centred approach, the main foci of the model are the teacher and the course content[201], with the main aim being the transfer of information from the teacher to the student[201]. Students are presented with a current, concise summary of the most pertinent information prepared by the teacher[200 201], however the students' role is passive, with an emphasis being placed on the student to listen, memorise and repeat information, and less emphasis being placed upon the understanding and application of that information to practical or clinical situations[200 201]. There are concerns that LBL encourages students to become passive learners, who become dependent on others to "evaluate, synthesise, organise, package, and deliver information for them"[200].

Therefore, in an attempt to encourage active-learning among students, many institutions educating health professionals have evaluated other learning models notably; problem-based learning and team-based learning and are increasingly introducing these learning methods into their curricula[196 199-201].

5.1.2 Problem-based learning

The term problem-based learning (PBL) has been used to describe both a type of curriculum and a teaching or learning process[202]. It was first introduced into medical schools in the 1960s[199 202 203], both as an adjunct and as an alternative to didactic LBL, and has been used increasingly in many health professional training programs since. PBL is a student-centred, learning process that places a greater emphasis on clinical reasoning and the development of problem solving skills[199 203 204]. A typical PBL model would be involve students initially discussing problems in group settings and then generating issues and topics for further self-directed study, after which the group reconvenes, discusses and synthesises their findings with the aid of the facilitator[199]. Alternatively students may be guided through the problem-solving process with a series of progressive disclosures during the learning session[196]. A small number of lectures may also be included in the PBL module, which are typically delivered after the self-directed learning and final group discussion[199]. PBL appears to be popular and is often preferred over LBL by students and academic staff [203]. Students taught predominantly by PBL have been found to make more use of information resources, have better retention of clinical knowledge,

are better able to apply basic science concepts to clinical situations[203]. They are also better prepared to become life-long learners[203]. With pharmacy students in particular, Hogan and Lundquist[202] found that PBL better prepared graduating students for tasks on clinical placement involving the retrieval of medical information and the discussion of disease states, drug therapies and the evaluation of medication regimens[202].

5.1.3 Team-based learning

Team-based learning (TBL) is also a team-orientated, active learning strategy. It has been introduced into health professional education in an attempt to promote active learning and to enhance critical thinking, problem-solving and teamwork skills[196 201]. Although some variations on a theme exist, most versions of TBL have similar characteristics, with students working in small groups of 5-7 students with one facilitator simultaneously guiding multiple teams[199]. The TBL process can be divided into 3 phases;

Phase 1: Pre-team session study. Students are presented with learning objectives for each module and compulsory preparatory readings or materials for individual study[200 201].

Phase 2: Readiness assurance phase. Students first complete an individual readiness assurance test (IRAT) which usually consists of MCQs focussed more upon the recall of factual information rather than its application[200 201]. The IRAT gives each student an individual assessment grade and also gives an incentive to students to prepare for the session. After the IRAT is completed, students then complete the same test as a group exercise (Team readiness assurance test (TRAT) or Group readiness assurance test (GRAT))[200 201].

Phase 3: Application exercises. In their teams, students are then attempt to solve application exercises or clinical problems based around the content of the module[200 201]. Teams are given identical problems, although some may have multiple solutions, and after a fixed period they simultaneously present their findings. Teams may be asked to defend their response to other teams and these inter-team discussions and feedback are moderated by the facilitator[200 201].

TBL is described as a 'learner-centred, teacher-directed, instructional approach for entire classes of students who are divided into small teams of 5-7 students to solve authentic problems[199]'. As discussed by Dolmans et al[199] and Ofstad and Brunner[196], there are some similarities between PBL and TBL, however there are also some key differences. Both learning methods are based on constructivist learning theory and have students learning in small groups with learning revolving around professionally-relevant, clinical problems and both methods place an emphasis on developing clinical reasoning, problem-solving and teamwork skills[196 199-201]. However, firstly, the role of the facilitator differs. In PBL, each small group works separately with a separate facilitator, who is present for each group discussion. In contrast, although TBL students also work in small teams, all teams work simultaneously in one large room with one facilitator guiding several teams at the same time[196 199]. Secondly, PBL students are only introduced to new content in the self-directed learning phase after initial group discussions about the problems and they are not given preparatory materials. In contrast, TBL students are given comprehensive preparatory materials before being presented with the problems or application exercises, and in the process of completing the IRATs and TRATs, the TBL

students' prior knowledge of the content is assessed and both confirmatory and corrective feedback can be given by both peers and the facilitator. As their prior knowledge is assessed, students are held accountable for their own learning and because of competition between teams, students are more motivated to participate fully in group discussions[196 199]. Finally, PBL students identify their own issues for self-directed learning (SDL), whereas TBL facilitators decide on the topics for the students' SDL and the level of explanation and feedback given based upon the problems the students have been set and their test results [196 199].

TBL has been used in a number of healthcare programs, more commonly in schools of medicine and nursing[205-209]. However, it is also being increasingly used in pharmacy programs. Letassy et al[200] describe the evaluation of a pilot TBL endocrine module that was converted from a LBL format to promote active learning in pharmacy program in Oklahoma. They estimated that the use of TBL would reduce the time spent by academic staff in the delivery of content by 40%, thereby freeing more time for application exercises without detriment to student outcome[200]. Student performance was evaluated with multiple assessments during TBL sessions and in examinations, and the students also evaluated each TBL session and the module as a whole. In summary, course grades were higher for students using TBL than LBL and IRAT and TRAT scores accurately predicted overall grades[200]. The students readily accepted the change in course format and staff felt that the level of student engagement increased. However, some students were challenged by the increased accountability and workload. They concluded that TBL is an effective active-learning strategy for students with large student:staff ratios[200]. Other studies in pharmacy programs report similar findings[210 211]. Most studies appear to be in pharmacy schools in the USA, however two recent papers report the use of TBL from a UK perspective[212 213]. Tweddell[212] describes the implementation of a TBL model at Bradford School of Pharmacy. TBL was implemented to develop students' negotiating and critical-thinking skills and to increase the students' confidence levels. It was reported that feedback from students and teachers and comparisons with traditional methods were positive and that the results of the final year written examinations increased by an average of 13%[212]. Hall et al[213] describe use of TBL at Manchester University and found that 77% of responding students thought the TBL sessions were a more effective than lectures on topics such as the professional code of conduct. 80% of respondents agreed it was useful to hear others' opinions during the TBL discussions and 79% agreed the application exercises used were relevant to real life.

5.1.4 Web-based learning

Many pharmacy schools are increasingly employing distance learning techniques within their programs, often supported by web-based learning (WBL) or online learning methods and technologies. Until recently, distance learning programs tended to be employed mainly in the delivery of postgraduate coursework degrees or continuing professional development of qualified, practising health professionals. However, increasingly these techniques are being applied to undergraduate or pre-registration level courses. This appears to be more common in the USA, where until recently, an inability of pharmacy schools to train sufficient students to meet demand led to a pharmacist shortage[197]. Due to the high costs of starting new programs and the shortages of qualified academic staff, some US pharmacy schools started to develop distance learning programs or introduced

distance learning components into their pharmacy programs[197]. Other drivers are that increasingly, many students wish to have greater flexibility in their studies and to be able to study at a time and in a style of their choosing[197].

WBL can incorporate a variety of multimedia technologies and is an effective and efficient way of delivering learning to students[197]. Students can view lectures and other materials at a time of their choosing, can study at their own pace, instructions and learning materials can be reviewed multiple times, class material is more accessible and study time is spent more efficiently[197 198]. However, the lack of interaction with other students and academic staff can be a disadvantage, although as technology improves this is becoming less of an issue[197]. Other potential benefits of WBL include reductions in the need for classroom attendance and space, student travel and potentially staff workload[198]. Ried and Byers[197] used a crossover research design to compare students preferences and academic performance using two different content delivery platforms. WBL has been found to be an effective way of teaching pharmacy students, although it may be more popular and convenient for practising pharmacists and non-traditional students who, due to work commitments and time restrictions, are prohibited from attending traditional lectures[198]. Chisholm[198] noted that traditional pharmacy students can, and do, allocate time in their schedule for lectures and other class learning activities. Therefore, they are sometimes less amenable to WBL, although they appear less comfortable with having to be an independent learner than the WBL method per se, and a combination of WBL and face-to-face teaching is recommended for traditional pharmacy students[198].

Although WBL has been used to deliver a number of pharmacy topics, there does not appear to be any published evaluations of the perceptions of students comparing two methods of delivery (TBL and WBL) for a travel health subject. Therefore, this study aims to compare and examine students' perceptions of TBL and WBL in the delivery of a Travel Health elective.

5.2 Contribution

My estimated contribution in this study was 100%.

5.3 Research Question and Aims

The research question for this chapter is:

> ***What is the preferred delivery method for travel health educational material to level 4 Bachelor of Pharmacy students, team-based learning (TBL) or web-based learning (WBL)?***

The main objectives of this chapter are to:

1. develop and deliver a level 4 Bachelor of Pharmacy (BPharm) elective subject (PC4104:03 Pharmacy Project (Travel Health) that introduces students to the epidemiology, causes, preventative measures and management strategies for common travel-related health issues
2. develop and evaluate a series of team-based learning (TBL) and web-based learning (WBL) workshops, both of which incorporate problem-based learning (PBL) exercises, within the elective subject

3. assess student preferences for TBL or WBL before and after completion of the elective subject and to determine any changes in preference
4. compare the academic performance of students receiving the two delivery methods (TBL and WBL) and the student workload to obtain the achieved grades using the two delivery methods
5. compare the staff workload and costs involved in the preparation and delivery of the elective via TBL and WBL.

5.4 Methods and Processes

A cross-over research model, adapted from the method used by Ried and Byers[197], was used to obtain the perceptions of students and compare team-based learning (TBL) and web-based learning (WBL). Both methods incorporated problem-based learning (PBL) exercises.

5.4.1 Inclusion criteria

To be included in the study, participants had to be a level 4 (final year) undergraduate student registered in the Bachelor of Pharmacy (BPharm) pathway at James Cook University (JCU) and enrolled in the elective subject PC4104:03 Pharmacy Project (Travel Health). The study was performed in semester 1 (February-July) 2010. To obtain informed consent, participants were given a verbal explanation of the study's aims, methodology and their rights not to participate or withdraw. They then read a participant information sheet (Appendix 5.1) and were given the opportunity to ask questions. If they were still willing to participate, they were given a consent form (Appendix 5.2) to sign.

5.4.2 Design of Elective Subject

The JCU pharmacy elective subjects have a similar overall format including a combination of taught modules (sometimes with practical components) and a self-directed learning (SDL), literature review-type research project. The main learning objectives of the travel health subject were for students to:

- develop an understanding of the current major health risks faced by modern travellers and a better understanding and awareness of the range of expertise required by travel health professionals
- understand the importance of, and to be able to perform comprehensive pre-travel risk assessments
- understand the relative incidence and risk to travellers of the major tropical diseases, vaccine-preventable diseases and common travel-related health risks and conditions
- be aware of the advantages and disadvantages of common vaccines used to prevent travel-related illnesses
- develop an understanding of the advantages and disadvantages of the various methods of malarial prophylaxis and treatment

- be aware and able to discuss the causes, prevention and treatment of common travel-related illnesses
- gain practical experience in searching and utilising information obtained from appropriate travel health, drug information and therapeutic information sources.

The subject consisted of a combination of 6 taught modules (Travel Health 1-6), delivered either by WBL or TBL, and a SDL research project. Table 5.1 summarises the subject outline, content and assessment tasks and Figure 5.1 summarises the format of the TBL and WBL modules. Pre-module readings were posted on LearnJCU at least 7 days prior to the start of each module to give students sufficient time to familiarise themselves with the material. (LearnJCU is the JCU course management system and utilises the Blackboard Learning System® supplied by Blackboard Inc®). The materials for each module were prepared in both WBL and TBL formats and, other than the mode of delivery, were identical in content. The TBL modules required compulsory attendance at a workshop session. At the start of each TBL workshop, students completed an IRAT. The IRAT test papers were collected and students then completed the same test as a team exercise (TRAT). Each team was given only one TRAT paper and team members were required give a consensus response for the whole team. The IRATs and TRATs are assessed and their grade included in the student's overall grade for the subject, feedback was given to the students. The students then attempted a series of application exercises which were usually in the form of problem-based cases studies or clinical problems. Again, as with the TRAT, each team had to decide on a consensus response for each problem, which was submitted for assessment, feedback was given after submission.

The WBL modules used the same tests and application exercises as their equivalent TBL module. However, they were distributed to students completely via LearnJCU. In each WBL module, students again completed the IRAT, but not the TRAT. They also submitted answers to the application exercises online. Feedback was sent to students after the IRAT and application exercises had been assessed.

5.4.3 Study process

After giving informed consent, students were allocated to one of two groups. Student numbers were expected to be small. Therefore, an attempt was made to match the two groups with regards to their age, gender, previous grade point average (GPA) in the BPharm program. A cross-over research model was used to allow students to gain equal exposure and to assess their views of both learning methods (Figure 5.2). Depending on their group allocation, students were assigned to take the first 3 modules by TBL and the last 3 modules by WBL (Group 1) or vice versa (Group 2). After completing the modules the students then worked individually on their self-directed learning projects to complete the academic requirements of the subject.

5.4.3.1 Comparison of the learning methods

A combination of pre and post-subject surveys and a focus group were used to elicit the students' perceptions of the two learning methods. A comparison of the grades achieved by students using the

Table 5-1 Summary of PC4104:03 Pharmacy Project (Travel Health) (Semester 1 2010)

Week	Session	Summary of topics covered	Course Assessments	Study Assessments
1	Generic Library Session	Faculty Librarian - Generic session for all pharmacy elective students covering the use of search engines and completing a literature search.	None	
2	Introduction	Formal Introduction to PC4104:03 Pharmacy Project (Travel Health) and this study. Introduction to the aims and objectives, teaching methods and assessment criteria of the subject. Introduction to the study, participation rights and requirements and the consenting process	None	Pre-teaching Questionnaire
3	Travel Health 1	Epidemiology of travel-related diseases and illness. Pre and post-travel risk assessments	TBL or WBL assessments	
4	Travel Health 2	General travel health advice (Motion sickness, Sun protection, Thromboembolism and Jet lag)	TBL or WBL assessments	
5	Travel Health 3	Travellers' diarrhoea and other diseases transmitted by food and water	TBL or WBL assessments	
6	Travel Health 4	Malaria and non-malarial diseases transmitted by insects	TBL or WBL assessments	
7	Travel Health 5	Environmental infections, STIs, Vaccines and Vaccine-preventable diseases	TBL or WBL assessments	
8	Travel Health 6	Travelling with chronic medical conditions, whilst pregnant or with medications. Buying medications overseas	TBL or WBL assessments	Post-teaching Questionnaire
Lecture Recess				
9	SDL - Project	Self-directed learning (SDL) – Project		Focus Group
10	SDL - Project	Self-directed learning (SDL) – Project		
11	SDL - Project	Self-directed learning (SDL) – Project		
12	SDL - Project	Self-directed learning (SDL) – Project	Submission of project report	
13	SDL - Project	Self-directed learning (SDL) – Project	Oral project presentation	
Assessment criteria		Overall subject grading was composed of On-course assessments (TBL and WBL assessments) (20%), Project report (50%) and Project oral presentation (30%). Students were required to have a satisfactory performance (50% or greater) in all components.		

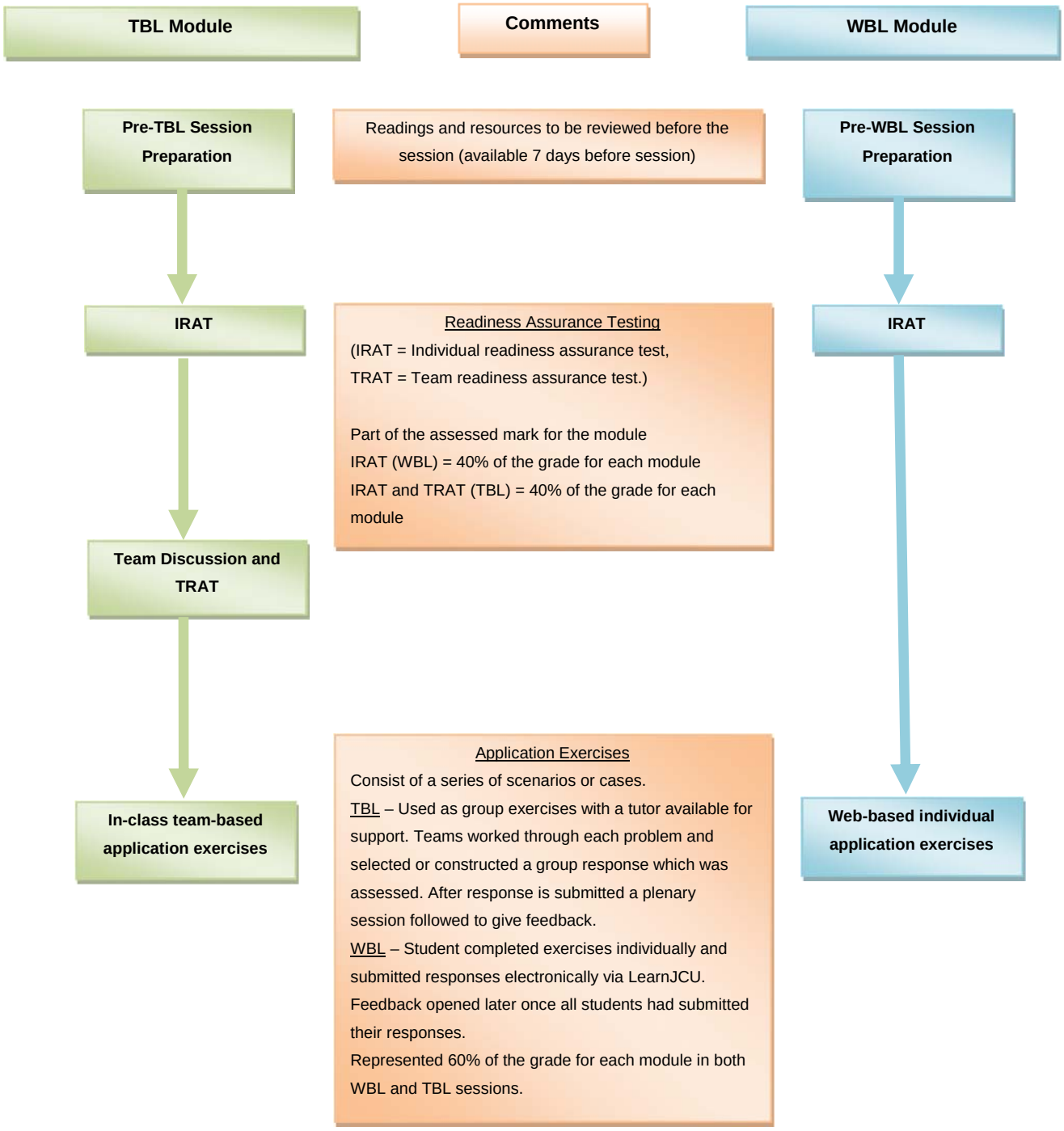


Figure 5-1 Standard format of the TBL and WBL modules in PC4104:03 Pharmacy Project (Travel Health) elective subject

two learning methods was also performed, as was a comparison of the academic workload involved in the preparation of materials for each module.

5.4.3.1.1 Pre-subject survey

In week 2, all students attended a formal introduction to the subject and the study and gave informed consent. In the process, the two learning methods were also introduced to the students, including the processes involved and the format of the modules and assessments. So that students were not influenced by the views of staff, any pre-conceptions regarding potential advantages or disadvantages of the two learning methods or personal preferences were not discussed with the students during the course of the subject. The students were then asked to complete the pre-subject questionnaire (Appendix 5.3). This was a self-completion questionnaire composed of 4 sections. Sections A and B each consisted of a rating scale question containing 8 statements relating to their perceptions of TBL and WBL respectively. Students were asked to rate their level of agreement or disagreement with each statement using a 5-point Likert scale. Section C consisted of another rating scale question, students were asked to consider 20 teaching aims and grade which of the two learning methods would be superior for each aim using a 5-point Likert scale. Finally, Section D consisted of 3 open answer questions, which asked students to state, in their own words, what they thought would be the main advantages and disadvantages of the two learning methods and, with a MCQ, state which they thought would be their preferred method of learning. Students responses were then collated in Microsoft® Excel® Spreadsheets. An interpretive thematic analysis was performed, using the methods and techniques described by Braun and Clarke[106], Liamputtong and Serry[107] and Liamputtong[108], on the responses to the open answer questions.

5.4.3.1.1 Post-subject survey

After completing the 6 modules, and before attending the focus group, the students were asked to complete the post-subject questionnaire (Appendix 5.4). This was also a self-completion questionnaire composed of 4 sections with some question statements being comparable with the pre-subject questionnaire. The same format was used, however the rating scale questions in sections A and B contained a greater number of statements (16 statements), with the additional statements focussing on specific aspects of the student's experiences with the two learning methods. Some of the statements relating to PBL and TBL were adapted from statements used by Antepohl and Herzig[203], and some statements relating to WBL were adapted from statements used by Chisholm et al[198]. Section C was identical to the equivalent section in the pre-subject questionnaire, whereas although section D again asked what they thought were the main advantages and disadvantages of the learning methods (now that they have finished the modules), it also asked them to state approximately how many hours they had spent either preparing for the TBL sessions, or to complete the WBL modules. Finally, an open answer question was also added asking students to give their opinion about how the subject could be improved. The students' responses were collated and analysed in the same manner as those from the pre-subject questionnaire.

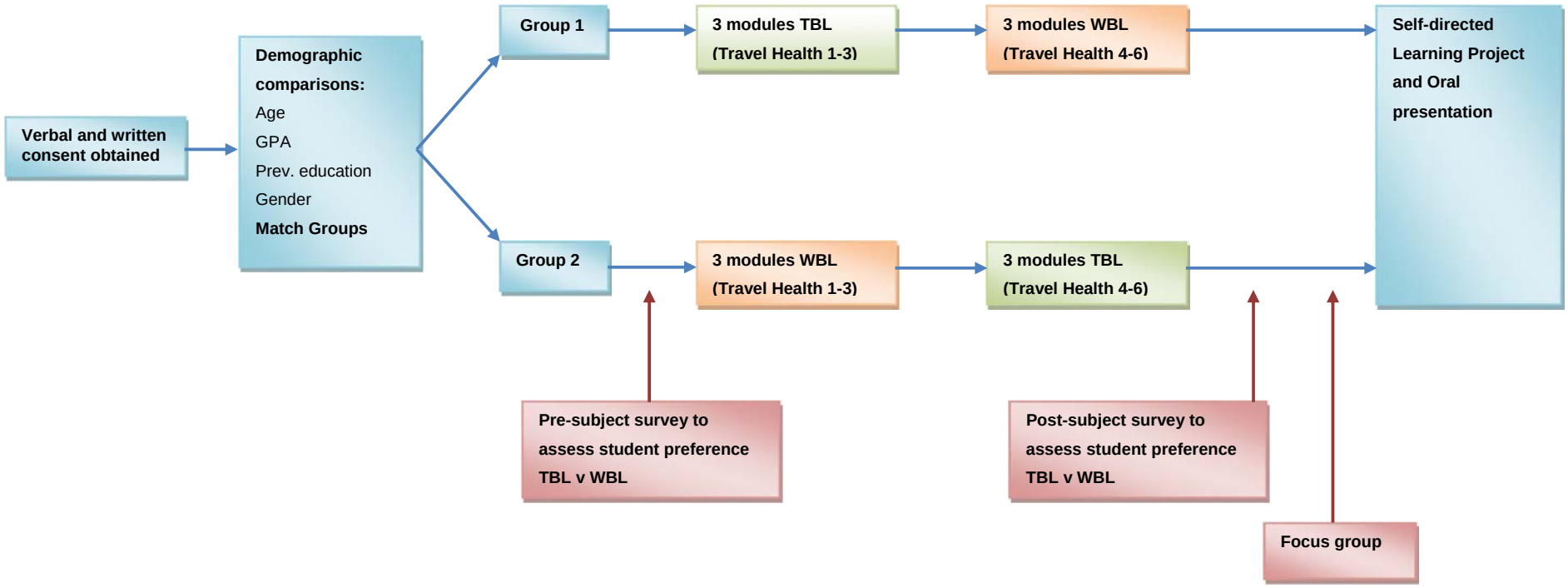


Figure 5-2 Diagram showing the cross over method used in the study

5.4.3.1.2 Post-subject focus group

An initial data analysis was performed to identify the main trends and themes from the students' responses to the pre and post subject surveys. From these themes, and using the method recommended by Davidson et al [214], a list of topics for further investigation was developed and an initial question route was designed. This was then further refined and edited, moderator notes and instructions were added, and a data collection template for use by the moderator in a student focus group was prepared (Appendix 5.5). The focus group then met, and using the method recommended by Davidson et al [214] and the data collection template, a semi-structured discussion followed. The moderator took notes during the group session and the meeting was also audiotaped. Following the meeting, and using the audiotape and moderator's notes, a verbatim transcription of the focus group discussion was prepared which was then coded using a conceptual framework. An interpretive thematic analysis was then performed to identify and report on patterns within the data using the methods and techniques described by Braun and Clarke[106], Liamputtong and Serry[107] and Liamputtong[108].

5.4.3.1.3 Comparison of the students' grades

The marks grades for each student in each module were collected, collated and compared.

5.4.3.1.4 Comparison of academic workload

The academic workload associated with the two learning methods was estimated with a manpower survey. This involved recording the details of activities directly relating to the development and delivery of the 6 modules, and the time taken to complete them, in a log book. (Other tasks relating to the supervision and assessment of the SDL project report and presentation were not included). The total time spent preparing and delivering resources using the two learning methods was then calculated and compared.

5.4.4 Ethical approval

The study was conducted under ethical approval H3516 granted by the James Cook University Human Research and Ethics Committee (JCU HREC) (Appendix 1).

5.5 Results and Discussion

5.5.1 Group composition

An attempt was made to match the two student groups as closely as possible. However, although it was possible to match the average age of the two groups, a low and odd number of students (7 students in total, 6 females and 1 male) meant that it was not possible to match the gender distribution and the average GPA of the two groups. All students had previously experienced WBL, but none had previous experience of TBL. The demographic distribution of the two groups is summarised in table 5.2.

Table 5-2 Summary of the demographics of the two student groups

Group	Student	Gender	Age	GPA	Average Age	Average GPA
Group 1	A	F	21yrs 2m	6.4	21yrs 2m	5.4
	B	F	22yrs 10m	5.5		
	C	M	20yrs 8m	4.9		
	D	F	20yrs 2m	4.7		
Group 2	E	F	21yrs 0m	6.4	21yrs 2m	5.7
	F	F	22yrs 2m	5.5		
	G	F	20yrs 5m	5.1		

5.5.2 Comparison of TBL and WBL – Pre-subject and post-subject surveys (Sections A and B – Student perceptions of TBL and WBL)

Sections A and B of the pre and post-subject questionnaires consisted of rating scale questions examining the students' perceptions of TBL and WBL respectively. Students were asked to rate their level of agreement or disagreement to each statement using a 5-point Likert scale. The students' ratings of each statement in both questionnaires were collated into Microsoft Excel® spreadsheets and the average rating and the percentage distribution of ratings were calculated for each statement. Where direct comparisons could be made between statements, related-samples Wilcoxon Signed Rank tests were performed on the data using IBM® SPSS® Statistics (Version 22) to test for significant differences in the students' perceptions. Comparisons between the pre-subject perceptions of TBL and WBL, the post-subject perceptions of TBL and WBL and the changes in perception between the pre-subject and post-subject survey for each of the two learning methods were made and are summarised and discussed below.

5.5.2.1 Comparison of pre-subject perceptions of TBL and WBL

A comparison of the students' pre-subject perceptions of TBL and WBL was performed by comparing the ratings for each statement in section A of the pre-subject survey with the ratings for equivalent statements from section B of the pre-subject survey. These findings are summarised in table 5.3.

It can be seen that only the responses to statements a) and h) in both sections were significantly different. The responses to statement a) in sections A and B show that prior to starting the modules that all students were interested in the concepts of both TBL and WBL, as all students agreed/strongly agreed with statement a) in both sections. However, students appeared significantly more interested in TBL (average rating 1.29) than WBL (average rating 2.00) ($p=0.025$). Likewise, the percentage of students that agreed/strongly agreed with statement h) show that the majority of students expected to get more feedback from TBL (100%, 7/7 agree/strongly agree) and WBL (57.1%, 4/7 agree/strongly agree) than they would from LBL and that significantly more students expected to get more feedback from TBL than WBL (average ratings 1.57 and 2.71 respectively, $p=0.039$).

The other trends noted in the data were not significant and the student numbers were low. However, the responses to the other statements in sections A and B show that the students were also expecting to enjoy using both learning methods (statement c), and thought that both methods would be a good way of learning about travel health (statement d), although expectations appeared slightly greater with TBL than WBL. A slight majority felt that they would learn more with TBL (statement g), but were unsure whether it would take more time than LBL (statement f). Whereas, students were unsure whether they would learn more with WBL (statement g), but a slight majority were expecting WBL to take less time than LBL (statement f). The majority of students thought that neither TBL nor WBL would be inconvenient (statement e). Finally, students appeared divided over whether TBL or WBL would be easy (statement b).

5.5.2.2 Differences between the students' pre-subject and post-subject perceptions of TBL

A comparison of the students' pre-subject perceptions of TBL with their post-subject perceptions of TBL was performed by comparing the ratings for each statement in section A of the pre-subject survey with the ratings for equivalent statements from section A of the post-subject survey. These findings are summarised in table 5.4, and it can be seen that none of the trends were significant.

However, comparison of the responses to statement b) in the pre-subject questionnaire and statements a) and b) in the post-subject questionnaire showed that students thought the TBL sessions to be neither too easy nor too challenging. After completing the taught modules, a slightly larger number of students enjoyed the TBL sessions (statement c), thought that TBL was a good way to learn about travel health (statement d) and did not find TBL to be an inconvenient way to learn (statement e), nor that it took longer than traditional LBL (statement f). Finally, the same number of students agreed/strongly agreed in the post-subject survey than the pre-subject survey that they learnt more (statement g) and got more feedback (statement h) with TBL than LBL.

Statements i) to p) were only present in the post-subject questionnaire, and all students thought that the TBL exercises gave good illustrations of clinical concepts (statement p) and that the IRAT and TRAT tests were not too easy (statement j). All students also thought that the tutor conveyed an interest in TBL and the subject matter (statement o), and a slight majority thought that they did not strongly steer the group (statement n). A majority of students also thought that the IRATs and TRATs gave useful feedback (statement i), that TBL was an effective learning style for them personally (statement k) and that working in a group helped the learning process. Importantly 71.4% (5/7) of the students agreed/strongly agreed that they would recommend TBL to others (statement m) and none disagreed/strongly disagreed with the statement.

5.5.2.3 Differences between the students' pre-subject and post-subject perceptions of WBL

A comparison of the students' pre-subject perceptions of WBL with their post-subject perceptions of WBL was performed by comparing the ratings for each statement in section B of the pre-subject survey with the ratings for equivalent statements from section B of the post-subject survey. These findings are summarised in table 5.5, and it can be seen that none of the trends were significant.

Table 5-3 Pre-subject comparison of TBL and WBL

Statements from questionnaire	Section A Pre-subject Questionnaire (TBL)				Section B Pre-subject Questionnaire (WBL)				Related Samples Wilcoxon Signed Rank Test (Sig. level is 0.05 – shaded blue)
	Ave rating (Scale 1-5*)	Strongly agree or agree (%)	Neither agree or disagree (%)	Strongly disagree or disagree (%)	Ave rating (Scale 1-5*)	Strongly agree or agree (%)	Neither agree or disagree (%)	Strongly disagree or disagree (%)	
a) I am interested by the idea of TBL/WBL	1.29	100.0	0.0	0.0	2.00	100.0	0.0	0.0	0.025
b) TBL/WBL will be easy	3.43	14.3	42.9	42.9	3.14	28.6	28.6	42.9	0.680
c) I think I will enjoy TBL/WBL	2.00	85.7	0.0	14.3	2.43	57.1	42.9	0.0	0.408
d) TBL/WBL will be a good way of learning about Travel Health	1.86	85.7	14.3	0.0	2.43	57.1	42.9	0.0	0.102
e) Having to attend TBL sessions will be inconvenient , or WBL will be inconvenient	3.86	14.3	14.3	71.4	4.14	14.3	0.0	85.7	0.157
f)TBL/WBL will take more time than traditional lectures	3.00	42.9	14.3	42.9	3.29	28.6	14.3	57.1	0.581
g) I will learn more with TBL/WBL than traditional lectures	2.00	57.1	42.9	0.0	2.71	28.6	42.9	28.6	0.180
h) I will get more feedback from my lecturers with TBL/WBL than traditional lectures	1.57	100.0	0.0	0.0	2.71	57.1	14.3	28.6	0.039

(*Scale: 1-Strongly agree, 2-Agree, 3-Neither agree nor disagree, 4-Disagree, 5-Strongly disagree)

However, comparison of the responses to statement b) in the pre-subject questionnaire and statements a) and b) in the post-subject questionnaire showed that students thought the WBL sessions to be neither too easy nor too challenging. After completing the taught modules, a lower number of students stated the had enjoyed the WBL sessions (statement c), with a greater number agreeing/strongly agreeing that WBL was an inconvenient way to learn (statement e) and that WBL took more time than traditional LBL (statement f) than was expected before starting the modules. However, a greater number of students still thought WBL was a good way to learn about travel health (statement d) after completing the modules. Finally, the same number of students thought they got more feedback from WBL than LBL (statement h), however a greater number agreed/strongly agreed that they learnt more with WBL than traditional lectures (statement g).

Again, statements i) to p) were only present in the post-subject questionnaire, and a majority of students thought that WBL resources gave useful feedback (statement i), and were not too easy (statement j). A majority of students also agreed/strongly agreed that working online at their own pace helped the learning process (statement l), that WBL was an effective learning style for themselves (statement k), and that they would recommend WBL to other students (statement m). Most students agreed/strongly agreed that they did not lack direction when studying online (statement n), however they agreed/strongly agreed that a strong personal interest in the subject material was required to drive their study (statement o). Finally, a majority of students also agreed/strongly agreed that the WBL cases gave good illustrations of clinical concepts (statement p).

5.5.2.4 Post-subject comparison of TBL and WBL

A comparison of the students' post-subject perceptions of TBL and WBL was performed by comparing the ratings for each statement in section A of the post-subject survey with the ratings for equivalent statements from section B of the post-subject survey. Comparisons could only be made between statements that were either directly comparable or where the wording was similar (statements a to h and statements j, k, m and p). These findings are summarised in table 5.6.

Statement h was the only statement where there was a significant difference between the two learning methods. The majority of students agreed/strongly agreed that they got more feedback from TBL and WBL than LBL, however all students (100%, 7/7) agreed/strongly agreed that they received more feedback from academic staff with TBL than traditional LBL which was significantly more than the number of students (57.1%, 4/7) who agreed/strongly agreed that they got more feedback from WBL.

The other trends noted in the data were not significant and the student numbers were low. However, it was noted that, after completing the modules, whereas, all and most students thought that TBL and WBL were good ways of learning about travel health respectively (statement d), it appeared that more students enjoyed TBL than WBL (statement c). A potential reason for this trend was that although, a similar number of students disagreed/strongly disagreed that both TBL and WBL were inconvenient learning methods (statement e), a large number of students (71.4%, 5/7) agreed/strongly agreed that

Table 5-4 Summary of the pre-subject and post-subject rating results of section A (TBL)

Statements from questionnaire	Pre-subject Questionnaire				Post-subject Questionnaire				Related Samples Wilcoxon Signed Rank Test (Sig. level is 0.05)
	Ave rating (Scale 1-5*)	Strongly agree or agree (%)	Neither agree or disagree (%)	Strongly disagree or disagree (%)	Ave rating (Scale 1-5*)	Strongly agree or agree (%)	Neither agree or disagree (%)	Strongly disagree or disagree (%)	
a) I am interested by the idea of TBL (Pre) or b) I found the TBL sessions too challenging (Post)	1.29	100.0	0.0	0.0	4.00	0.0	0.0	100.0	
b) TBL will be easy (Pre) or a) I found the TBL sessions too easy (Post)	3.43	14.3	42.9	42.9	4.00	0.0	14.3	85.7	0.194
c) I think I will enjoy, or I enjoyed, the TBL sessions	2.00	85.7	0.0	14.3	1.86	100.0	0.0	0.0	0.705
d) TBL will be a good way, or I found that TBL is a good way, of learning about Travel Health	1.86	85.7	14.3	0.0	1.71	100.0	0.0	0.0	0.564
e) having to attend TBL sessions will be inconvenient , or TBL was an inconvenient way to learn	3.86	14.3	14.3	71.4	3.71	0.0	42.9	57.1	0.655
f)TBL will take, or took, more time than traditional lectures	3.00	42.9	14.3	42.9	3.57	14.3	14.3	71.4	0.334
g) I will learn more, or I learnt more, with TBL than traditional lectures	2.00	57.1	42.9	0.0	2.43	57.1	28.6	14.3	0.317
h) I will get more, or I got more, feedback from my lecturers with TBL than traditional lectures	1.57	100.0	0.0	0.0	1.57	100.0	0.0	0.0	1.000
i) I found the IRAT and TRAT tests gave useful feedback					2.57	71.4	0.0	28.6	
j) I found that the IRAT and TRAT tests were too easy					4.14	0.0	0.0	100.0	
k) I consider TBL to be an effective learning style for myself					2.29	85.7	0.0	14.3	
l) Working in a group helped the learning process					1.71	85.7	14.3	0.0	
m) I would recommend TBL to other students					2.00	71.4	28.6	0.0	
n) The tutor strongly steered the group					3.57	14.3	28.6	57.1	
o) The tutor conveys interest in TBL and the subject material					1.57	100.0	0.0	0.0	
p) The TBL cases give good illustrations of clinical concepts					1.71	100.0	0.0	0.0	

(*Scale: 1-Strongly agree, 2-Agree, 3-Neither agree nor disagree, 4-Disagree, 5-Strongly disagree)

Table 5-5 Summary of the pre-subject and post-subject rating results of section B (WBL)

Statements from questionnaire	Pre-subject Questionnaire				Post-subject Questionnaire				Related Samples Wilcoxon Signed Rank Test (Sig. level is 0.05)
	Ave rating (Scale 1-5*)	Strongly agree or agree (%)	Neither agree or disagree (%)	Strongly disagree or disagree (%)	Ave rating (Scale 1-5*)	Strongly agree or agree (%)	Neither agree or disagree (%)	Strongly disagree or disagree (%)	
a) I am interested by the idea of WBL (Pre) or b) I found the WBL sessions too challenging (Post)	2.00	100.0	0.0	0.0	3.86	0.0	14.3	85.7	
b) WBL will be easy (Pre) or a) I found the WBL sessions too easy (Post)	3.14	28.6	28.6	42.9	3.57	0.0	42.9	57.1	0.334
c) I think I will enjoy, or I enjoyed, the WBL sessions	2.43	57.1	42.9	0.0	2.71	42.9	42.9	14.3	0.157
d) WBL will be a good way, or I found that WBL is a good way, of learning about Travel Health	2.43	57.1	42.9	0.0	2.00	85.7	14.3	0.0	0.083
e) WBL will be inconvenient , or WBL was an inconvenient way to learn	4.14	14.3	0.0	85.7	3.57	28.6	14.3	57.1	0.257
f) WBL will take, or took, more time than traditional lectures	3.29	28.6	14.3	57.1	2.29	71.4	0.0	28.6	0.157
g) I will learn more, or I learnt more, with WBL than traditional lectures	2.71	28.6	42.9	28.6	2.14	71.4	28.6	0.0	0.317
h) I will get more, or I got more, feedback from my lecturers with WBL than traditional lectures	2.71	57.1	14.3	28.6	2.71	57.1	28.6	14.3	1.000
i) I found the WBL resources gave useful feedback					2.57	57.1	28.6	14.3	
j) I found that the WBL assessments were too easy					3.71	0.0	28.6	71.4	
k) I consider WBL to be an effective learning style for myself					2.14	85.7	0.0	14.3	
l) Working online at my own pace helped the learning process					2.14	71.4	14.3	14.3	
m) I would recommend WBL to other students					2.14	85.7	14.3	0.0	
n) I lacked direction when working online					4.00	0.0	14.3	85.7	
o) I needed to have a strong personal interest in the subject material to drive my study					2.43	71.4	14.3	14.3	
p) The WBL cases give good illustrations of clinical concepts					2.29	71.4	28.6	0.0	

(*Scale: 1-Strongly agree, 2-Agree, 3-Neither agree nor disagree, 4-Disagree, 5-Strongly disagree)

Table 5-6 Post-subject comparison of TBL and WBL

Statements from questionnaire	Section A Post-subject Questionnaire (TBL)				Section B Post-subject Questionnaire (WBL)				Related Samples Wilcoxon Signed Rank Test (Sig. level is 0.05 – shaded blue)
	Ave rating (Scale 1-5*)	Strongly agree or agree (%)	Neither agree or disagree (%)	Strongly disagree or disagree (%)	Ave rating (Scale 1-5*)	Strongly agree or agree (%)	Neither agree or disagree (%)	Strongly disagree or disagree (%)	
a) I found the TBL/WBL sessions too easy	4.00	0.0	14.3	85.7	3.57	0.0	42.9	57.1	0.180
b) I found the TBL/WBL sessions too challenging	4.00	0.0	0.0	100.0	3.86	0.0	14.3	85.7	0.317
c) I enjoyed the TBL/WBL sessions	1.86	100.0	0.0	0.0	2.71	42.9	42.9	14.3	0.063
d) I found that TBL/WBL is a good way of learning about Travel Health	1.71	100.0	0.0	0.0	2.00	85.7	14.3	0.0	0.414
e) TBL/WBL was an inconvenient way to learn	3.71	0.0	42.9	57.1	3.57	28.6	14.3	57.1	0.655
f)TBL/WBL took more time than traditional lectures	3.57	14.3	14.3	71.4	2.29	71.4	0.0	28.6	0.059
g) I learnt more with TBL/WBL than with traditional lectures	2.43	57.1	28.6	14.3	2.14	71.4	28.6	0.0	0.480
h) I got more feedback from my lecturers with TBL/WBL than traditional lectures	1.57	100.0	0.0	0.0	2.71	57.1	28.6	14.3	0.034
j) I found that the IRAT and TRAT tests/WBL assessments were too easy	4.14	0.0	0.0	100.0	3.71	0.0	28.6	71.4	0.180
k) I consider TBL/WBL to be an effective learning style for myself	2.29	85.7	0.0	14.3	2.14	85.7	0.0	14.3	0.785
m) I would recommend TBL/WBL to other students	2.00	71.4	28.6	0.0	2.14	85.7	14.3	0.0	0.655
p) The TBL/WBL cases give good illustrations of clinical concepts	1.71	100.0	0.0	0.0	2.29	71.4	28.6	0.0	0.102

WBL took more time than LBL, whereas the same number of students thought the opposite about TBL (statement f). That said, slightly more students felt that they learnt more than LBL with WBL compared to TBL (statement g). Similar numbers of students found that both TBL and WBL were effective learning styles for themselves (statement k), and would recommend the methods to others (statement m). The responses to the other statements show that slightly more students disagreed/strongly disagreed that the TBL sessions were too easy compared to the WBL sessions (statement a), and similar numbers disagreed/ strongly disagreed that they were too challenging (statement b).

Interestingly, slightly less students appeared to consider the TBL assessments to be too easy (statement j) and slightly more students thought the TBL cases to be good illustrations of clinical concepts (statement p) than their WBL counterparts. However, the actual cases and assessments used were identical, and it was only their mode of delivery that differed. This suggests that the social interaction associated with working in a group may have made the sessions appear more relevant, interesting or even, enjoyable. However, again, student numbers were low and the trends were not significant.

5.5.3 Comparison of TBL and WBL – Pre-subject and post-subject surveys (Section C – Students' perception of which is the superior method)

Section C of both the pre and post-subject questionnaires asked students to rate which learning method they considered to be superior for 20 learning objectives and the results are summarised in table 5.7.

5.5.3.1 Pre-subject perceptions

From table 5.7, before starting the modules, it can be seen that a majority of students thought that TBL would be the superior/far superior learning method for half (50%, 10/20) of the learning objectives, and that WBL was expected to be the superior/far superior learning method for only one (5%, 1/20) of the learning objectives. Students thought that WBL would be the superior/far superior learning method for encouraging self-directed learning (objective a), whereas, TBL was thought to be the superior/far superior learning method for obtaining feedback from academic staff (objective b) and feedback and peer review from fellow students (objectives c and e). TBL was also thought to be superior/far superior for providing high quality learning (objective f) and that TBL would encourage participation and engagement with the subject material(objectives i and j), which in turn would increase the student's level of interest and satisfaction (objectives q and p). Finally, and importantly, TBL was also thought to be the superior/far superior learning method for developing the student's communication skills and preparing them for clinical practice (objectives t and k).

5.5.3.2 Post-subject perceptions

Prior to starting the taught modules the students were either unsure or graded both learning methods equal for nine of the learning objectives. However, after completing the taught modules, and after experiencing the two learning methods, it can be seen that the students' preference for the superior/far superior learning method had changed for seven of the learning objectives. Overall, many of the changes in preference were a move away from selecting both learning methods as being equal in the

Table 5-7 Summary of the pre-subject and post-subject rating results of section C

Statements from questionnaire	Pre-subject Questionnaire				Post-subject Questionnaire				Related Samples Wilcoxon Signed Rank Test (Sig. level is 0.05 – shaded blue)
	TBL far superior or superior (%)	Both methods equal (%)	WBL far superior or superior (%)	Superior method	TBL far superior or superior (%)	Both methods equal (%)	WBL far superior or superior (%)	Superior method	
a) Teaching method encourages self-directed learning	0.0	28.6	71.4	WBL	14.3	14.3	71.4	WBL	0.516
b) Student obtains feedback from academic staff	85.7	14.3	0.0	TBL	71.4	28.6	0.0	TBL	0.334
c) Student obtains feedback from fellow students	100.0	0.0	0.0	TBL	100.0	0.0	0.0	TBL	1.00
d)Student is able to monitor their own progress in the subject	28.6	57.1	14.3	Equal	0.0	57.1	42.9	Equal	0.157
e) Student obtains peer-review from fellow students	100.0	0.0	0.0	TBL	85.7	14.3	0.0	TBL	0.480
f) Student receives high quality learning	57.1	42.9	0.0	TBL	71.4	14.3	14.3	TBL	1.00
g) Student receives learning at an appropriate level	28.6	57.1	14.3	Equal	14.3	85.7	0.0	Equal	1.00
h) Teaching method enhances the student's ability to solve clinical problems	42.9	57.1	0.0	Equal	42.9	28.6	28.6	TBL	0.414
i) Teaching method encourages student participation in the subject	71.4	28.6	0.0	TBL	42.9	42.9	14.3	Equal/TBL	0.279
j) Teaching method encourages student engagement with the material being taught	57.1	42.9	0.0	TBL	28.6	57.1	14.3	Equal	0.317
k) Teaching method better prepares the student for clinical practice	57.1	42.9	0.0	TBL	57.1	28.6	14.3	TBL	0.739
l) Teaching method promotes active learning	14.3	57.1	28.6	Equal	14.3	28.6	57.1	WBL	0.450
m) Student learns to think critically	28.6	71.4	0.0	Equal	14.3	57.1	28.6	Equal	0.180
n) Teaching method does not increase the workload of academic staff	0.0	57.1	42.9	Equal	14.3	57.1	28.6	Equal	0.396
o) Teaching method does not increase the workload of the students for the same outcome as traditional teaching methods	0.0	85.7	14.3	Equal	85.7	14.3	0.0	TBL	0.020
p) Teaching method enhances student satisfaction with the subject material	71.4	28.6	0.0	TBL	57.1	14.3	28.6	TBL	0.414
q) Teaching method increases the student's level of interest in the subject material	57.1	42.9	0.0	TBL	42.9	28.6	28.6	TBL	0.180
r) Teaching method stimulates student to obtain more information about the subject material	14.3	42.9	42.9	Equal/WBL	0.0	14.3	85.7	WBL	0.059
s) Teaching method is the most effective teaching method available	42.9	42.9	14.3	Equal/TBL	57.1	42.9	0.0	TBL	0.480
t) Teaching method aids the development of the student's communication skills	100.0	0.0	0.0	TBL	100.0	0.0	0.0	TBL	0.317

pre-subject questionnaire towards selecting a specific superior learning method in the post-subject questionnaire. However, as discussed below, some changes in preference were in the other direction. Only one of the changes in preference was significant.

WBL was still considered to be the superior/far superior method for encouraging self-directed learning (objective a). However, after completing the taught modules, WBL was also considered to be superior/far superior for a further two objectives: for promoting active learning (objective l) and for stimulating students to obtain more information about the subject material (objective r).

After completing the taught modules the number of learning objectives that TBL was considered to be superior/far superior method had also increased slightly to 11 (55%). TBL was still considered the superior/far superior method for providing feedback and peer review from academic staff and students (objectives b, c and e), and for providing high quality learning and enhancing student satisfaction and level of interest in the subject material (objectives f, p and q), as well as developing the student's communication skills and preparing them for clinical practice (objectives t and k). However, in addition, TBL was also thought to be the superior/far superior learning method for helping the student to solve clinical problems (objective h) and for not increasing the student's workload for the same outcome as traditional teaching methods (objective o). As shown in table 5.7, the change in preference for objective o was found to be significant. Importantly, the students also thought that TBL was the most effective teaching method available (objective s).
Although the overall number of learning objectives that students thought TBL was superior/far superior increased slightly, there were two learning objectives that students thought both methods were equal or the response was divided whereas TBL had been thought to be superior/far superior far in the pre-subject questionnaire. These were encouraging student participation and engagement in the subject (objectives 1 and j).

5.5.4 Comparison of TBL and WBL – Pre-subject and post-subject surveys (Section D: Additional questions)

Section D of the pre-subject questionnaire presented students with two open answer questions and one MCQ. The open answer questions asked the student to state their initial perceptions of the main advantages and disadvantages of each teaching methods, and the MCQ asked the student to state which was their preferred method of learning; LBL, TBL or WBL. These questions were also repeated in section D of the post-subject questionnaire and two other questions were added; students were also asked to state the amount of time taken to prepare for TBL sessions and complete WBL sessions and finally, students were asked to give suggestions on how the subject could be improved. Answers to open answer questions were collated into Microsoft® Excel® spreadsheets. Longer responses containing multiple themes or topics were reduced into their individual comments or elements and an interpretative thematic analysis was applied to all responses.

5.5.4.1 Pre-subject Perceptions

All seven students made comments about their initial perceptions of the advantages and disadvantages of TBL and WBL.

5.5.4.1.1 Pre-subject perceptions of the advantages of TBL

A total of 21 individual comments were received, which were categorised into three main themes with some miscellaneous comments. Firstly, as with the findings of Hall et al[213], students felt that by learning in teams they would learn collaboratively, better understand the perspectives of others and also, be challenged by their ideas:

"Having your ideas challenged by your peer group…" (S1)

"Getting the perspective of other students, ideas, points of view…." (S3)

Secondly, students thought that TBL would encourage and teach students how to work better in a group or team, which in turn, would then make them better prepared for the workplace:

"Working together – reiterating importance of teamwork." (S6)

"Learning to 'solve' clinical problems in a team, like the workforce…." (S7)

Another group of students thought that TBL would help to improve their communication skills and allow better interaction with academic staff:

"Communication skills and verbalisation of thoughts (and drug names)." (S1)

"Small group interaction with the lecturer." (S3)

Finally, there were a number of standalone or miscellaneous comments that did not fit into any of the above themes, including:

"Professionalism and confidence." (S1)

"Allows you to have a deeper thought into you own answer" (S4)

5.5.4.1.2 Pre-subject perceptions of the disadvantages of TBL

A total of 13 comments were received and 3 main themes were present in the responses with a small number of miscellaneous comments. The most prevalent theme was that students had concerns about the effect of dysfunctional group dynamics in a TBL situation, with particular concerns being the effects of having dominant personalities in the group or people not fully contributing to the discussion, yet benefitting from the work of others:

"If some people in your group don't want to make comments or don't take it seriously" (S4)

"Some people may be more dominant than others, may be hard to have your point of view heard" (S7)

Some students expressed reservations that not all students learn at the same pace and this may cause issues for some students:

"Might feel a bit rushed on time" (S2

"Working at a pace that is suitable for everyone can sometimes be a challenge" (S4)

And some students were concerned about potential communication issues within the group:

"If there are communication barriers within your group" (S1)

"If you just don't like communicating with people or certain people (hate them etc)" (S2)

Miscellaneous comments included that the students have to attend the sessions and that TBL does not promote self-directed learning:

"…harder to access as need to be physically present" (S2)

"…and does not promote self-directed learning" (S6)

One student could not envisage any disadvantages with TBL:

"I don't currently see any significant disadvantages" (S4)

5.5.4.1.3 Pre-subject perceptions of the advantages of WBL

A total of 17 individual comments were received which were categorised into two main themes with a number of miscellaneous comments. The most prevalent theme or perceived advantage of WBL was the convenience of studying at a time of their choosing:

"Student can do it at a convenient time….." (S3)

"Do it in the time you wish to, over and done with when you like" (S4)

Some suggested that studying in their own time would allow them to further research the topic or study more widely. Examples include:

"Students can read wider and deeper with regards to a topic than what may be presented in a traditional lecture" (S3)

"Doing the readings and working on case studies will hopefully/probably influence me to further research the topics and broaden my knowledge" (S5)

And other perceived advantages for WBL were:

"…will cross over to maintaining knowledge for practice…" (S6)

"Promotes self-directed study …" (S6)

5.5.4.1.4 Pre-subject perceptions of the disadvantages of WBL

A total of 13 comments were received which contained 2 main themes and some miscellaneous statements. As also reported by Chisholm[198], the most prevalent theme in the students' responses was the perceived lack of interaction, discussion and/or feedback with other students and academics with WBL:

"Might not quite understand what the question is asking, you have nobody to check with straight away" (S4)

"Not having face to face contact with lecturer if having problems" (S7)

The other theme present in the comments were that students had concerns regarding the reliability of technology:

"Too reliant on the internet and computer…." (S2)

"Technology problems with crashing or knowing if all your answers submitted" (S4)

Miscellaneous comments included that although self-directed study and the ability to study more widely were seen as potential advantages by some students, one student expressed concerns that they may become less focussed:

"More time to work through problems; may not be focussed as what would be in TBL" (S7)

Another raised the issue that students could just copy answers directly from readings:

"Student 'copies' answers from readings." (S6)

Implying that they may learn less with WBL, and finally, one student suggested that WBL may become tiresome:

"Might get boring being so independent" (S2)

5.5.4.2 Post-subject perceptions

After completing the teaching modules, all seven students made comments about their current perceptions of the advantages and disadvantages of TBL and WBL.

5.5.4.2.1 Post-subject perceptions of the advantages of TBL

A total of 18 individual comments were received which were categorised into 7 main themes. Some themes were consistent with those found in the responses to the pre-subject survey. Again the most prevalent theme was that a major perceived advantage of TBL was that students obtained different perspectives and understanding from the views of others:

"Getting other peoples' thoughts/ideas" (S2)

"Allows you to take in others thoughts/opinions on treatment etc." (S3).

Other themes consistent with the findings of the pre-subject questionnaire were that TBL improves communication skills:

"Learn to communicate with colleagues….." (S6)

That the student obtains more feedback from peers and academics:

"You know you get the right answer at the end of the day as you are working in a group to give reasonings for the best answer" (S3)

And that TBL helps to build or improve teamwork skills

"It was useful working in a team as one person could look up CDC website, one could read AMH and one could read other references…" (S4)

However, some new themes were present in the students' responses to the post-subject questionnaire that were not present in their responses to the pre-subject questionnaire and these included that they learnt more and/or that they had retained more information from the TBL sessions:

"More pressure to actually learn material (rather than use it as a reference guide) because of need to discuss it and do tests without full access to readings" (S5)

"Student learns more by working with students and tutor" (S7)

And a number of students found that TBL was actually quicker and more convenient to do than WBL:

"Quicker to do" (S1)

"It's over and done with in one session" (S3)

Finally, one student also implied they found the TBL sessions to be less stressful:

"….more laid back" (S2)

However, they did not expand on this comment.

5.5.4.2.2 Post-subject perceptions of the disadvantages of TBL

A total of 14 comments about the perceived disadvantages of TBL were received. Again, as with responses to the pre-subject survey, a common perception was that poor group dynamics may have an impact on the TBL sessions and students outcomes. In particular, issues relating to workload not being shared evenly within the group were raised:

"…. can be slack at times (rest of group does the work)" (S1)

And disagreements and personality clashes within the group appeared to be a concern, although one student appeared to be discussing it as a hypothetical issue:

"Arguing among members at times" (S2)

"Possibly (not in this situation) could be in a group where you don't get along with someone or a group member doesn't assist in discussion" (S3)

Two students also implied that the thoughts or ideas of the individual student may be swamped by the more dominant personalities in the group:

"Does not reflect individual knowledge" (S7)

"…. Views can be overridden by other colleagues" (S6)

Whereas some students expressed comments suggesting that an advantage of TBL was that they learnt more and/or that they had retained more information from the TBL sessions. Others suggested the opposite:

"I think I learnt less/retained less information in the TBL sessions" (S4)

"…. and also I don't think that I have the same level of knowledge with the TBL topics as with the WBL topics." (S4)

Two students made specific comments about the IRAT tests, one felt that they did not help them learn the material and the other felt that not having access to their reading materials meant that their grades suffered:

"IRAT test – I don't feel like it helps me learn" (S3)

"With less time and a restriction on the use of readings in the IRAT test I found it more difficult to do well in the TBL activities….." (S4)

Finally, one student commented that the group did not perform as well when they were unsure of the material:

"Less effective if group as a whole aren't too sure of the topics…" (S2)

Thereby highlighting that some members of the group were perhaps less well prepared than others and it may be an issue if all members are equally unprepared.

5.5.4.2.3 Post-subject perceptions of the advantages of WBL

A total of 14 comments about the perceived advantages of WBL were received and categorised into 3 main themes. Again, as in the responses to the pre-subject survey, a perceived major advantage of WBL was the convenience of being able to study at a time and place of their choosing:

"Can do it at own convenience" (S1)

"Do it whatever time you please, so if you don't feel motivated at a particular time you can do it later" (S3)

The most prevalent theme in the students' comments related to the advantages or benefits of self-managing the amount of time given to their studies. Some students said that managing their own time allowed them to study at the own pace and therefore obtain the best outcome for each student:

"Working at my own pace to answer the questions comprehensively and to the best of my ability" (S4)

Whereas others thought that managing their own time allowed to use the resources more when answering case studies and allowed for more in depth study or further research:

"Having enough time to read the readings well and use them to answer questions" (S4)

"If you are genuinely interested in the subject matter you have time and computer to look further into it straight away" (S5)

However, one student also recognised that because they have the readings on hand that they do not have to learn material prior to attempting the case studies:

"…did take a little less time as readings could be skimmed over then looked up when answering questions." (S5)

Finally, students stated that a perceived advantage was that WBL developed self-guided learning practices and critical thinking and CPD skills that could help in future practice:

"Developed critical thinking skills" (S6)

"Strongly promotes self-guided learning and further continual learning out in practice" (S7)

5.5.4.2.4 Post-subject perceptions of the disadvantages of WBL

A total of 13 comments were received. One prevalent theme that was not mentioned in the responses of the pre-subject survey, was that although students stated that WBL was convenient, it was also found to be more time consuming:

"It was very time consuming" (S4)

"Takes a lot more time to complete the case studies" (S6)

And whereas, students' comments in the pre-subject questionnaire focussed on a perceived lack of interaction, discussion or feedback, after completing the WBL sessions, only two students specifically highlighted this issue in their responses to the post-subject survey:

"Sometimes would like to have someone to discuss answers/your opinions with" (S3)

"It was more difficult not being able to compare answers with peers or ask the lecturer questions" (S4)

Other comments focussed on the actual problems and issues experienced by students studying in isolation, and this theme can be further broken down into 2 subthemes. Firstly, some students described problems associated with a lack of focus or direction to their studies, which one student implied was a reason why it had taken a huge amount of time to complete the WBL activities:

"Can go off on tangents when answering questions in the case" (S1)

"With virtually no time limit for the work, I found myself spending a huge amount of time on the WBL activities" (S4)

Secondly, some students complained of motivation issues when studying topics that they found to be less interesting, and one student suggested that time limitations on activities may help resolve these issues:

"Solely based on oneself. Hard to get motivation if bad topics that one doesn't like." (S2)

"If you don't want to learn or aren't interested, you really have no pressure to, as you can just look it up. Having a time limit on quizzes would avoid this." (S5)

A small number of miscellaneous comments relating to problems associated with studying in isolation were also recorded. One suggested that you weren't as challenged when studying by WBL, and another suggested that they missed out of other learning experiences such as learning pronunciation:

"Only self-directed broadening of views i.e. no one there to challenge your beliefs and make you explain why you chose one way over another" (S5)

"Student does not learn pronunciation of disease states" (S7)

Interestingly, whereas some students mentioned technology-related concerns in their responses to the pre-subject questionnaire, none made similar comments in the post-subject questionnaire suggesting that none eventuated.

5.5.4.3 Preferred method of learning (Comparison of pre-subject and post-subject questionnaire)

With a MCQ, student were asked to state an overall preferred learning method. In the pre-subject survey, 85.7% (6/7) of students stated that they would prefer TBL, 14.3% (1/7) would prefer traditional LBL and no students said they would prefer WBL. However, in the post-subject survey, a dramatic

change was seen with equal numbers of students (42.9%, 3/7) now preferring traditional LBL and TBL and still only one student preferring WBL. This, and other trends, were investigated further in the focus group.

5.5.4.4 Average time taken to prepare for, and to complete TBL and WBL sessions

Responses to other parts of the two surveys indicated that the students thought that WBL was more time consuming than they had initially thought. However, when students were asked to estimate the time taken to complete the WBL modules, the average time was calculated to be 3.54 hours (range 2.5 – 5 hours). Whereas, the average time taken to prepare for and complete the TBL module was found to be 4.36 hours (range 3 - 5.5 hours).

5.5.4.5 Student recommended changes

The final question of the post-subject survey was an open answer question to allow students the opportunity to suggest potential improvements to the subject. One student did not comment. The remaining students made very specific comments directed at specific aspects of the subject and therefore there were no general themes.

One student implied that a greater proportion of the subject material could have involved more of the medication-related aspects of travel health:

> *"More focus on medications"* (S1)

However, the main intention of the subject was to introduce the student to the overall topic of travel health including the epidemiology, pathophysiology, prevention and management of the more common travel-related health conditions, not just the medication-related aspects.

Two students made specific comments about the TBL sessions, one implying that more of the sessions should be taught with TBL or that students should be offered a choice, and the other student implied that the TBL sessions should be longer, and they also made recommendations regarding the focus of questions in the IRATs:

> *"TBL should be a larger portion of the subject or give students the choice of TBL and WBL"* (S2)

> *"More time for the TBL sessions. Greater emphasis on important concepts (symptoms/treatments etc) of the diseases/conditions in the IRAT tests rather than very specific facts and statistics"* (S4)

The one WBL-specific comment recommended placing a time limit on the WBL quizzes so that students have an incentive to learn more of the material prior to attempting the quiz:

> *"Consider limit on WBL quizzes so readings have to be remembered to some degree."* (S4)

Finally, two students made comments relating to the pre-module readings used in both the TBL and WBL modules. On student highlighted the workload associated with reading these readings, suggesting that they contained too much detail. However, they also seemed confused about the role of these readings, mentioning that there was a lot of detail when they had not been "taught" the information. When actually the role of the pre-module readings is to provide students with the factual component of the subject that would otherwise have been taught in lectures:

"Workload of readings. Not so much that there is a lot to read, but it is a lot to reinforce stats/percentages etc when you haven't been "taught" the material" (S3)

The second student suggested that other forms of media could be used to provide the factual content of the subject. The ability to utilise multimedia technology is an advantage of WBL[197], however, as this was a pilot project, the resources used were limited:

"Weekly readings should be of variable media." (S7)

5.5.5 Comparison of TBL and WBL – Focus group

All 7 students participated in the focus group, the discussion was recorded, a verbatim transcription was prepared and an interpretative thematic analysis performed. The focus group discussion revolved around 6 main topics:

5.5.5.1 Students' perceptions that WBL was more time consuming

Students stated in their survey responses that an advantage of WBL was that it was convenient because they studied at a time of their choosing. However, many students also felt that it took longer to complete the WBL activities than the TBL sessions. It was suggested that the main reason for this was related to the fact that students were studying at their own pace or were using a more self-directed learning approach. They were also able to repeatedly refer to reference materials, self-check questions and answers and take greater care in answering questions, all of which took time. Other suggestions were that because they were not rushed to complete work, and were working at their own pace, they could take more time in order to formulate their answers to maximise their grade or could just be more thorough in their studies:

"Yeah, you could refer to your actual articles and, I don't know, I guess, to take your time to do it as best as you possibly could rather than rushing through it or, you know, look at something and go back to it." (S2)

"I guess you were a little more pedantic with web-based learning as well….." (S3)

Another reason given was that because students were studying the WBL sessions independently, and had no one to directly refer to, they had to cover all of the materials themselves, which in turn increased the amount of time spent completing the study materials:

"You'd like to see what they (the other students) have as well, but you have to cover all of the points yourself." (S3)

The final reason or theme in the discussion was that teamwork speeds up learning

"It (TBL) is a lot quicker with everyone chipping in ideas." (S4)

5.5.5.2 Students' experiences of problems with TBL group dynamics

Students had initial concerns about the effects of poor group dynamics in TBL. The focus group explored whether students had actually experienced issues, and if so, how these issues were dealt with or whether the study had alleviated any preconceived anxieties.

No students mentioned that they had actual problems, although they may not have wanted to discuss issues in front of their peers. However, a number said that it may still be a potential issue with other or larger student groups:

"We didn't find it to be an issue, but it could possibly if there was a larger group" (S1)

"Yes, if there was a whole class, then you would not get exactly the same group of people that is here." (S2)

The students' had two main concerns with group dynamics were unchanged from the surveys. Firstly, the effect of having overly dominant people in the group and secondly, having group members who do not do their share of the work.

"It is really easy to let more dominant people take the reins and just sort of get going on it" (S3)

"Some people just like to float along and just get the answer." (S4)

The group's main issue with the second comments was that more intelligent students carried the load and inflated the grades of poorer students:

"It would be easier for people to disappear inside it (the group). Like, if you had one reasonably smart person in every group, everything would be artificially inflated. You would really lose the knowledge of who is actually struggling and who is going well" (S1)

When asked how they would deal with these problems, some responded by saying that they would just work alone:

"I would probably just do my own work anyway." (S4)

Some would make an attempt at conciliation, however if this did not work, concern about their own grade would mean that they would again attempt to work alone:

"If it was for marks I would try and ask, you know, what do you think about this? But, I mean, if people want to sit there and say nothing that's fine for them but I care about me and what I do. So I would just sort of keep going." (S3)

However, some students also realised that this may be difficult because of the team-related assessments:

"Wouldn't that kind of defeat the purpose of team work?" (Doing your own work) (S7)

"You would still only have one answer sheet anyway" (S2)

In response, some students suggested they would just become "token" members of the group:

"Well, I would just keep out of it and think, well I can research this myself and then you know, do a little bit of team work." (S4)

Whilst others said that they would become annoyed:

"I think it would annoy me a lot. If they weren't doing anything, I would probably get a bit angry about it." (S6)

5.5.5.3 Students' preferences for the best learning method for knowledge retention and dealing with clinical problems

The focus group addressed the conflict of opinion in the survey responses about which is the best method for learning and knowledge retention. Some students had suggested that TBL was superior, as they felt that they had to learn the pre-module readings to be able to discuss them in the TBL group sessions. However, others felt that they learnt less in the TBL sessions, and had learnt more with WBL. Whereas, others had said that WBL simply allowed students just skim through readings in search of the answers to the assessment questions and ignore the rest of the content and therefore, had learnt less with WBL. These themes were further explored in the focus group.

Initially, the majority seemed to agree that WBL was the superior method for knowledge retention. Reasons given were that with WBL, as the student was working in isolation, the students were required to read materials multiple times and to do further research using the internet. This raised the suggestion that repetition (with WBL) improves learning, whereas discussion (TBL) did not improve learning, but may help to better solve clinical problems. With TBL, some students suggested that they could also rely on other group members to bring out different views and therefore, were not required to learn all of the information:

> *"…I found that having to prepare so much for those things (the WBL sessions) …..(pause)…. Like reading it beforehand, reading it while you are doing it, developing your answers, putting your answers on line …..(pause)…..just I guess the repetition of it all. I felt I learnt it better."* (S1)

> *"I think actually finding the answers as well. You had to search a little bit deeper than I guess the team-based. Because (in TBL) you relied on the other team members to bring out different points that you may not have thought about."* (S2)

Discussion then followed about what type of information is best learnt by WBL. Students again raised the issue that because they were using wide internet searches to obtain information that they occasionally went off track and therefore were unsure whether WBL was the best method of learning material in depth or for examinations:

> *"I was actively searching out other resources and so I thought it was a way to better learn the material. But I'm not sure whether it is better to learn it for exams, because I know, with me a couple of times I thought, am I going off track?.....and so I'm not quite sure whether it is better for an exam."* (S3)

Other students agreed that it is possible to merely scan readings and materials searching for answers to the assessments and not learn data in depth for WBL:

> *"That's what I thought. …… but web-based learning was good to get a broad idea about the subject ….I remember general stuff and probably more broad, but not as specific (with WBL)"* (S4)

The students also discussed how question type may also have an influence their perception of which is the superior learning method. The consensus appeared to be that TBL was the superior learning method when dealing with clinical cases or scenarios as the group could better analyse the case from a variety of perspectives and also students felt that it better replicated the work situation:

"Team-based I think. Just that you get to discuss it with people and find other things that you wouldn't have thought of yourself and then analyse them and come up with a second opinion I guess." (S5)

"In the work force you are really working in a team and so I guess it is preparing you for that as well, being able to discuss different opinions on the same topics…" (S6)

Therefore, students concluded that WBL was in some ways superior when learning broad concepts, however TBL was superior when students were dealing with clinical based cases or scenarios.

5.5.5.4 Which method stimulated students to further research the topic

Results from the post-subject survey suggested that students were more likely to search for additional resources to answer assessment questions related to the WBL sessions rather than the TBL sessions. In the focus group, students were asked if this was actually the case, and if so, was it more a matter of reading the suggested readings more thoroughly before attempting the WBL modules than they did for the TBL modules or did they actually do more background research to find further readings.

One student did not comment. However, among the remaining students the discussion was evenly divided. Three students mentioned that they did search for additional readings to help answer the assessment questions in the WBL modules. However, some only did so if the assessment question had been allocated a significant number of marks:

"Just in case, when you were answering the question, that you felt that there wasn't enough in the readings, that you just needed to go elsewhere to justify what you read." (S2)

"When I felt that with the marks that were allocated to each question..(pause).. if I felt that the readings weren't enough to give me the full marks I then went out outside (the suggested readings)." (S3)

The other students only used the recommended readings:

"…I though the readings were sufficient." (S4)

"Yeah, I didn't do any research at all." (S5)

Therefore, it appears that the level of searching for additional resources to complete assessment tasks associated with the WBL modules was limited.

5.5.5.5 Why did the IRAT and TRAT marks very between the methods

Two grading-related issues were discussed with the students, firstly that the average IRAT test marks for the WBL modules were higher than those for the equivalent TBL module, and secondly, that in the TBL modules, the average mark for each TRAT was always higher that the corresponding average IRAT mark.

With regard to the first point, all of the students were in general agreement that WBL allowed students to peruse questions at their own time, think more about individual answers and also refer to their readings before submitting them (which they could not do in the TBL sessions):

"I used my resources more." (S1)

"Yeah, there was no real time limit so you could really just make sure you got the right answer…." (S2)

With regard to the second point, students thought that the average TRAT mark was higher as they were working more closely as a team and examining different perspectives which may be helpful if an individual had misconstrued a question:

"Yes it helps, you can discuss and analyse I guess, and take a majority vote-type thing or …. (pause)… but usually that wasn't the case, like usually you'd be able to come to one consensus." (S1)

"…. also sometimes realising that….. (pause) …maybe if you read the question wrong." (S3)

5.5.5.6 Students preferences for learning methods

Prior to starting the modules, the majority of students (85.7%) preferred TBL, however after completing the modules, there was a switch in preference back towards LBL. The reasons for this switch were investigated, and it appeared that a key reason was that LBL was most familiar to them:

"Maybe also it's the fact that we are doing this in our last year of uni and we've always done it the traditional way. So, we're a bit sort of set in that, and now if you maybe introduced it earlier in the course, if that was possible at all, maybe people would take to it a bit better." (S2)

"I guess after 4 years you are used to sitting in lectures, getting all of the information that you need and then reviewing it at your own pace. Compared to not getting taught the material with you, as such, and then teaching yourself." (S3)

They also appeared more comfortable with the guidance and structure that is given to them through lectures as opposed to being handed a series of readings:

"I like being presented with the lecture material because I feel that it structures what I need to learn, and I like being able to take notes, and I like tutorials that reinforce the traditional lecture material. I just feel that it (traditional lectures) structures me more, I prefer it." (S5)

And the guidance and structure given in LBL appeared particularly useful with regard to examination preparation:

"It depends on the assessment. For exams, I think lectures are great, because the lecturer says this is what you need to know for the exam …. (pause)…but not in as many words…" (S6)

It seemed that some students would prefer a hybrid model between LBL and TBL, with lectures instead of readings to give them baseline information combined with TBL-type tutorials:

"I think traditional is somebody teaching it there to you, you get the main points across. And then, I would like to see team-based then used to review or backup what you have already just learnt with somebody else teaching it to you." (S1)

As PC4104 is an elective subject, students were asked what would be their preferred method of learning for a core BPharm subject. Three students explicitly said that if they had to choose an exclusive learning method that they could not choose one. After some discussion, the hybrid method of lectures plus TBL-based tutorials was preferred. When asked whether WBL would have any role in a core subject, most students could not envisage a role other than playing a supportive role as revision materials for topics taught by other methods:

> *"I think it would work …maybe as revision or the like. Say that one week you did team-based learning or for the last three topics you'd learn in class, and then the following week you did a web-based session for revision."* (S2)

These results are not unusual and mirror some of the findings of other studies. Novak et al[204] examined the learning styles of second year pharmacy students before and after a PBL teaching experience and noted that "avoidant" mean scores increased and "participant" scores decreased after completing the PBL experience. They concluded that the results reflected the difficulties that many students had in switching from a didactic, LBL style of learning to the group learning experience of PBL and suggested that it can take up to 2 years for students to adjust. Letassy et al[200] also noted that the increased accountability associated with more active learning strategies, such as TBL and PBL, also take students more used to more didactic methods out of their comfort zone, which can affect students' rating of courses and if given a choice that some students may elect to remain with traditional LBL. Finally, Chisholm[198] also noted that pharmacy students more used to traditional didactic learning expressed that they were less amenable to WBL, as they were less comfortable with learning independently, especially when they knew they would be graded on the material and a hybrid model combining elements of WBL and face to face learning was also suggested .

5.5.6 Comparison of academic performance in the modules

The assessment grades for each student were calculated, collated and are summarised in Table 5.8. Independent Samples Mann-Whitney U tests were performed using IBM® SPSS® Statistics (Version 22) to test for significant differences between the grade distribution of the two learning methods.

Table 5.8 shows that the average IRAT score for the WBL group was always higher than the corresponding score for the TBL group for all six modules. Moreover, the average IRAT score across all six WBL modules (92.7%) was significantly higher than that of the six TBL modules (78.9%) ($p<0.01$). This was most likely because students studying via WBL have full access to pre-subject reading materials throughout the IRAT and are able to take as much time as they wish to complete the test. The time taken for each student to complete the WBL IRATs was monitored using the Blackboard® learning delivery system and the average time for the group was calculated as

Table 5-8 Summary of academic results

(Note: The order and numbering of students within each group differs from that of Table 5.2 to ensure that student's individual grades remain confidential)

Group 1	Module 1				Module 2				Module 3				Module 4				Module 5				Module 6			
Student No	IRAT %	TRAT %	Case %	Grade %	IRAT %	TRAT %	Case %	Grade %	IRAT %	TRAT %	Case %	Grade %	IRAT %		Case %	Grade %	IRAT %		Case %	Grade %	IRAT %		Case %	Grade %
1.1	66.7	83.3	96.0	87.6	83.7	95.3	97.8	94.4	78.2	90.9	87.7	86.4	88.9		90.5	89.9	75.0		92.0	85.2	100.0		90.0	94.0
1.2	72.9	83.3	96.0	88.9	93.0	95.3	97.8	97.6	94.5	90.9	87.7	89.7	88.9		68.3	76.6	90.0		96.0	93.6	95.0		73.3	82.0
1.3	72.9	83.3	96.0	88.9	79.1	95.3	97.8	93.4	83.6	90.9	87.7	87.5	91.1		92.1	91.9	95.0		96.0	95.6	100.0		90.0	94.0
1.4	77.1	83.3	96.0	89.7	95.3	95.3	97.8	96.7	Student absent				95.6		87.3	90.5	95.0		84.0	88.4	100.0		80.0	88.0
Average Grade	72.4	83.3	96.0	88.8	87.8	95.3	97.8	95.5	85.5	90.9	87.7	87.9	91.1		84.5	87.2	88.8		92.0	90.7	98.8		83.3	89.5
Group 2	**Module 1**				**Module 2**				**Module 3**				**Module 4**				**Module 5**				**Module 6**			
Student No	IRAT %		Case %	Grade %	IRAT %		Case %	Grade %	IRAT %		Case %	Grade %	IRAT %	TRAT %	Case %	Grade %	IRAT %	TRAT %	Case %	Grade %	IRAT %	TRAT %	Case %	Grade %
2.1	93.8		90.0	91.5	100.0		100.0	100.0	94.5		89.2	91.3	57.8	97.8	84.1	81.6	80.0	95.0	92.0	90.2	95.0	95.0	73.3	82.0
2.2	87.5		86.0	86.6	100.0		100.0	100.0	96.4		98.5	97.5	66.7	97.8	84.1	83.4	80.0	95.0	92.0	90.2	95.0	95.0	73.3	82.0
2.3	77.1		78.0	77.6	93.0		93.3	93.2	90.9		80.0	84.4	75.6	97.8	84.1	85.2	65.0	95.0	92.0	87.2	65.0	95.0	73.3	76.0
Average Grade	86.1		84.7	85.2	97.7		97.8	97.7	93.9		89.2	91.1	66.7	97.8	84.1	83.4	75.0	95.0	92.0	89.2	85.0	95.0	73.3	80.0

	TBL Sessions
	WBL Sessions

38.9 minutes (range 12-85 minutes). whereas, the TBL sessions students were only given approximately 20 minutes to complete the IRAT before moving onto the TRAT.

The TBL in-class, team-based application exercises and the WBL web-based individual application exercises were identical, and consisted mainly of case studies. Table 5.8 shows that neither learning method was superior (in terms of higher average case study score) to the other for all six modules. In fact, it can be seen that the average case study score for TBL was higher than that of WBL for only one module (module 1). For 2 modules (modules 2 and 5), the average case study score for TBL was the same as that for WBL and finally, for 3 modules (modules 3, 4 and 6) the average case study score for TBL was less than that for WBL. When the results of all six modules are combined it was found that the average case study score for each student across all six modules was 89.3% for TBL and 88.3% for WBL, however this difference was not significant (p=0.676).

Finally, when the average final percentage grade for each module was calculated we can see from table 5.8 that in 5 of the modules (modules 2-6) the average final percentage for each module was greater for the WBL group as opposed to the TBL group. Only for one module (module 1) was the average final percentage grade greater for the TBL group than the WBL group. The average final score across all six modules for each student was calculated to be 87.9% for TBL and 90.1% for WBL, however the difference was not significant.

5.5.7 Comparison of academic workload

Using a manpower survey approach the academic workload of the development and delivery of the six modules was estimated and is summarised in table 5.9.

Table 5-9 Summary of the academic workload associated with the development and delivery of modules 1-6.

TBL/WBL	Activity	Time Taken (Hrs)
TBL-specific	Delivery of materials, assessment and providing feedback	14
WBL-specific	Tailoring items for web-based delivery, loading resources onto Blackboard, Assessing items, providing feedback	18.5
Both TBL & WBL	Developing, writing teaching resources for use by both TBL and WBL	83.25
Total		115.75

There were no major differences in the estimated academic workloads for TBL and WBL. However, if has to be noted that the estimated workload only includes all activities used for the development and delivery of modules 1-6. It does not include the workload associated with the supervision and assessment of students for the project component of the subject. It also has to be remembered that this was a pilot project, therefore the resources used for the WBL component were relatively rudimentary, many being simple internet adaptations of the TBL resources. The WBL component could have been significantly more complex including on-line tutorials and webinars etc, all of which would have increased the academic workload.

5.6 Limitations and Recommendations for Further Work

The study has several limitations. First being the number of students. Secondly, the two groups were not isolated, and students mixed in lectures for other subjects and at other events. WBL modules opened on the day that TBL students took the module. As feedback was given to TBL students in the module there was a risk that they may discuss modules with WBL students afterwards. Although it appears that students took the trial seriously and did not discuss modules, it cannot be guaranteed. Finally, as with all surveys and focus groups there is a risk that participants gave the responses that they thought that the researchers wished to hear. It would be useful to repeat the project on a core BPharm subject to obtain the perception of a greater number of students.

5.7 Summary

The study examined the students' perceptions of, and preferences for, two different learning methods, web-based learning (WBL) and team-based learning (TBL). Initially students found the concept of TBL significantly more interesting than WBL, and thought that they would get significantly more feedback from peers and academic staff with TBL. They perceived the main advantages of TBL to be working and collaborating in teams, and being challenged by the ideas of others, however the effects of dysfunctional group dynamics and that all students do not learn at the same pace were initially seen to be the main concerns of the students with TBL. Whereas, the convenience of studying at a time and pace of their choosing and the ability to search for and examine other information resources were initially seen as the advantages of WBL by students, although they also recognised the lack of feedback, interaction and discussion with academics and peers and potential reliability issues with the internet or technology as being disadvantages of WBL.

When asked which learning method was superior for a range of learning outcomes, students selected TBL for over half, notably for the development of the student's communication skills, feedback from academics and other students, peer review and giving high quality learning and enhancing student satisfaction, solving clinical problems and preparing students for clinical practice. Students suggested that WBL was superior for self-directed learning and active learning.

Finally, when asked to state their preferred learning method, whereas the majority of students initially preferred TBL, after completion of the modules, there was a movement in preference from TBL back towards lecture-based learning (LBL). Reasons for this switch were discussed in the focus group, where students felt that a major factor for the switch was their greater familiarity with LBL and that they perceived WBL to be better for learning broad concepts with TBL being better for dealing with clinical-based scenarios. The students concluded that a hybrid approach would be preferable with LBL being used for the transfer of pre-module, background knowledge.

The next chapter describes a pilot study of a pharmacy-run travel health advisory service (THAS) in North Queensland. Many of the learning resources developed for use in the BPharm elective subject were used as training aids for the pharmacists operating the pilot THAS.

Chapter 6 Development, Implementation and Evaluation of a Travel Health Advisory Service Operated from a Community Pharmacy in North Queensland

6.1 Introduction

All destinations are associated with some level of inherent health risk to travellers and yet, large numbers of travellers still do not obtain any pre-travel health advice before travelling overseas[55-58]. Pharmacies are ideal sites from which travel health services can operate, as they are accessible, have a well-trained and skilled workforce, and often have extended opening hours[72 74 75 80]. Thus community pharmacy-run travel health services may be attractive to some travellers, including potentially those travellers who may not normally obtain pre-travel health advice from other sources. A greater availability of these services may, in turn, assist in decreasing the number of international travellers not obtaining pre-travel health advice[72 74 75 80].

Different models of travel health services, including pharmacist-run services, have been developed. This chapter focusses on the operation of travel health services, the resources required to operate them and how other pharmacist-run services have been evaluated, including the risk management approach to travel health recommendations for the pre- and post-travel assessment of travellers.

6.1.1 The risk management approach to travel health

The main aims of a travel health service are to prevent and/or minimise the health or other risks associated with travel for each individual traveller, and to manage any problems that may occur during their journey[2]. Therefore, the utilisation of a risk management approach in the assessment of travellers is considered to be an integral and essential component of both pre and post-travel health services[2 3 18 115 116 173 215]. Other key elements of a high quality travel health advisory service have been identified as[2 3 18 115 116 173 215]:

- A formal and thorough, pre-travel health risk assessment analysing the itinerary and full medical history, to identify both general and specific travel-related health risks for each individual traveller.
- An individualised, risk management strategy for each traveller utilising, if appropriate, a combination of vaccines, medications, education and guidance to prevent and/or reduce the risk of travel-related health issues at their planned destination(s)
- A process of risk communication providing reliable, current and evidence-based, written and verbal, information which is understandable by the traveller in an appropriate manner.
- A formal and thorough assessment system for returning travellers to identify travel-related health problems and ensure the appropriate treatment of any health problems
- And finally, that the care and advice given to the traveller is documented and recorded, and that records are maintained and stored for an appropriate length of time[2 3 18 115 116 173 215].

6.1.2 Recommendations for the pre-travel assessment and management of travellers

The main aims of pre-travel consultation, a fundamental component of the clinical, decision-making process in travel health[116], are to prepare the traveller for their journey and to minimise and manage the health risks they will face with an appropriate combination of education, vaccinations and/or medications[215]. To do this thoroughly may involve a single or multiple visits[2], take a significant amount of time[18 116] and should be performed at least 4-8 weeks before travel to allow for full vaccination courses, medication trials and education as required[3 116 216]. It is recommended that a systematic approach is used, and the use of standardised questionnaires, interview schedules and/or data collection tools may expedite the process, help to maintain a consistent approach and aid in the recording of findings[3 215 216].

The first stage of the pre-travel consultation is a formal risk assessment to identify the potential hazards of the journey, highlight any pre-existing contraindications or precautions to vaccinations or medications and to identify pre-existing health issues that may either, increase the risk of travel-related health problems, or may be severely affected by travel-related health issues[3 18 116 173 215]. Traveller-specific information is usually gathered directly from the traveller by interview or using a combination of interviews and questionnaires. Itinerary or destination-specific health information is usually obtained from a range of recognised information resources[3 116 215]. Table 6.1 lists some of the key points that need to be considered when performing a risk assessment on a traveller.

Table 6-1 Important Information to be gathered and/or considered during the pre-travel health consultation when performing a risk assessment[3 18 116 173 215]

Itinerary-related data	Traveller-related data
• Countries and regions to be visited including any stopovers • Region (e.g. capital city, major metropolitan area, rural area etc) • Date and length of travel in each area or region (including the season at the destination) • Purpose of travel (e.g. tourism/leisure, business, visiting friends and relatives) • Modes of transport that will be used • Planned or possible activities (especially activities with an increased risk such as diving, mountain climbing etc) • Type of accommodation at each destination • Potential exposures to disease at each destination.	• Age and gender • Vaccination history • Full medical and medication history and history of allergy • Whether the traveller is either pregnant or breastfeeding (or plans to be in the near future) • Any planned surgery or medical care during the travel (medical tourism), before travel or close to travel • Attitudes or traits of the traveller that may influence the willingness of the traveller to accept advice (e.g. cultural background, peer group, language ability, attitude towards vaccination) • Budget of traveller.

Importantly, the risk assessment should also identify travellers with any special risk factors who may need additional or more specialised risk management interventions or advice[3 116]. Key examples of higher risk travellers would include[3 116 217-220]:

- Children or the elderly

- Pregnant or breastfeeding women or women considering pregnancy in the near future
- Travellers with pre-existing chronic diseases such as diabetes, cardiac disease, respiratory disease and others
- Travellers who are immunosuppressed or taking immunosuppressive medication
- Travellers visiting friends and relatives (VFRs)
- Travellers visiting countries currently experiencing major disease outbreaks
- Long-term travellers such as some backpackers, expatriates and healthcare volunteers

An individualised risk management plan or strategy should be developed for each traveller, which will be composed of a range of interventions tailored to meet the specific needs of each traveller and will include combinations of vaccinations, prophylactic medications or emergency self-treatment medications (to be used in the event of illness), and counselling or educational materials on a range of topics[3 18 116 215]. Spira[18] suggested a series of obligatory topics about which all travellers should be educated and optional topics about which, based on their risk assessment or planned destination, only certain travellers would be educated, these are summarised in table 6.2.

Table 6-2 Topics for discussion or inclusion into the risk management plans for travellers[18]

Obligatory counselling or education topics	Optional counselling or education topics
Insect bite prevention and precautions Malaria chemoprophylaxis Food and water precautions Traveller's diarrhoea and self-treatment Current disease outbreaks at the planned destinations Environmental risks from water and vector-borne diseases, climate and jet lag Potential trauma from MVAs General health and routine illness Clothing and footwear; Travel-specific medications Routine medications; Sexual activity First aid kits; Local medical care at the destination. Post-travel assessments; Travel insurance	Environmental risks from altitude, marine or diving associated disorders, extremes of heat or cold, motion sickness, health risks associated with adventure travel Specific advice for pregnant women, children, the immunocompromised and the elderly Specific pathogens for specific destinations Parasites Zoonoses Illicit drug use.

Likewise, the UK National Travel Health Network and Centre (NaTHNaC) [3] recommends 10 key priority areas with subtopics that should be considered when developing a risk management plan for each traveller. In summary, the main priority areas and some of the subtopics suggested by NaTHNaC are[3]:

- Medical preparation

  Ideally, travellers should begin their preparations 4-6 weeks before travelling and a dental check-up prior to travel should be considered for long term travellers or those travelling to remote areas. Other considerations for discussion include the need and contents of a

traveller's medical kit, a full assessment of any chronic disorders, advice on travelling with medications and/or the risks associated with obtaining medications while overseas[3].

- Journey risks

  The traveller's fitness to fly is important and considerations include the risk and prevention of DVT/VTE, motion sickness, jet lag and that lower cabin pressures can exacerbate some chronic medical problems[3].

- Safety risks

  Travellers are visiting unfamiliar environments and need to be warned and educated about the risks associated with those environments, and how to reduce those risks[3].

- Environmental risks

  Travellers from temperate, developed countries may be physically and mentally unprepared for the more extreme environmental hazards, such as extremes of temperature and altitude, and need to be educated about the nature of the risks involved, how to prepare for them and how to reduce those risks to a minimum[3].

- Food and water-borne risks

  Travellers need to be aware of the risk of the diarrhoeal diseases and other food and water-borne illnesses. It is also essential that travellers take precautions both before and during travel, and that they carry appropriate treatments with them and know how to manage the condition, should it occur on their journey[3].

- Vector-borne risks

  Many serious and life threatening conditions are transmitted by insect or animal vectors including malaria, yellow fever, Japanese encephalitis and rabies. Travellers need to be aware of the risks of such diseases at their destination, the importance of using personal protection measures and the need for vaccination and/or chemoprophylaxis, as appropriate, for each disease. Therefore, an important aspect of the risk assessment process involves trying to assess the level of understanding of the traveller[3].

- Air-borne risks

  Respiratory infections such as the common cold and influenza are also common in travellers. NaTHNaC recommends that travellers are advised of any personal protection methods to prevent infection, are vaccinated if appropriate, and are advised on the use of OTC medications for mild conditions and the warning signs for when to seek medical care for more serious conditions[3].

- Sexual Health and blood-borne viral risks

  Travellers often take greater risks while abroad and the incidence of STIs and blood-borne viral diseases are higher in travellers than the general population[3]. Travel health providers should discuss with travellers measures to reduce contact with blood and body fluids including

contact with non-sterile needles in tattooing, body piercing, acupuncture and injecting drug use[3].

- Skin health

  Exposure to excessive sun, heat or cold may exacerbate pre-existing skin conditions such as eczema or psoriasis. Some commonly used prophylactic medications, such as doxycycline and acetazolamide, may also cause photosensitivity or other reactions. Fungal and bacterial skin infections are also common in tropical climates[3]. If travellers are prescribed prophylactic medications which may cause photosensitivity or other cutaneous reactions they need to be appropriately advised about the reaction, what precautions, if any, may reduce the risk, and what to do if the reaction occurs[3].

- Psychological health

  Travel can be stressful. Stressors include the general anxieties associated with the journey and travel itself, through to a severe fear of flying and even culture shock when the traveller has difficulties adjusting to an unfamiliar culture. Therefore, initially discussing these issues in the pre-travel consultation is important and the traveller may then be directed to an appropriate source of further support if required[3].

The use of vaccinations is a key prophylactic intervention, and it is recommended that the travel health provider must assess and develop an appropriate, individualised vaccination plan that meets the needs for each traveller, and can be completed within the timeframe available and within their budgetary limitations[18 116 215 216 221 222]. While performing the risk assessment, the travel health provider will gain an understanding of both the traveller's level of baseline knowledge of travel health issues and their opinion of risk reduction methods. This is important as it may influence how information is best communicated to the traveller[215 223]. However, optimal risk communication usually requires the allocation of sufficient time and the use of both verbal and written information to guide, focus and reinforce the discussion[215]. Finally, it is also important that the care given to the traveller is carefully documented either electronically or using standardised forms[3 215]. Travellers should also be encouraged to keep up to date records of vaccinations and medications and take a copy with them when they travel[215].

6.1.3 Recommendations for the post-travel assessment and management of travellers

Although the pre-travel consultation, vaccinations, prophylactic medications and compliance with disease prevention recommendations will reduce the risk of disease, inevitably some travellers will return ill, or will become ill shortly after their return[224]. Therefore, an important role of a travel health service is also to provide services that will help identify travel-related health problems in returning travellers, and ensure the appropriate treatment of health problems that may have arisen whilst overseas. A detailed clinical history is required, including the pre-travel preventative measures taken by the traveller, the duration of travel and a knowledge of the regions visited, plus a knowledge of the geographic distribution of disease risk at the destination, incubation periods of infections and the

frequency of specific diagnoses in returned travellers[3 225]. Clinicians need to apply a systematic approach in the assessment of the ill returning traveller[3 224 226], and it is recommended that clinicians should establish which diseases have the greatest morbidity and mortality in the geographical area visited, and eliminate those from the differential diagnosis first[224]. NaTHNaC recognises that in developed countries, the initial assessment of most ill returned travellers will initially occur in the primary healthcare sector, and that the diagnosis of some travel-related diseases can be a challenge for GPs who are unfamiliar with particular countries and their endemic health problems[3]. Therefore, NaTHNaC has developed algorithms to aid with the assessment of the ill returned traveller and they recommend the early referral of the traveller to specialist centres for practitioners who are inexperienced with these types of patients[3]. The four commonest syndromes reported in the ill returned travellers are fever, diarrhoea or gastrointestinal problems, dermatological problems and respiratory infections[3 119 120 224 226-229] and are therefore the focus of the NaTHNaC algorithms. Each algorithm is a pathway containing criteria for the assessment and differential diagnosis of the traveller and some advice for the management and further assessment of the traveller[3]. NaTHNaC has also produced algorithms to help the GP in the assessment of the asymptomatic traveller and guide them on which laboratory tests are most appropriate[3].

6.1.4 Information and other resources required to operate a travel health service

The practitioner must have access to a range of suitable information resources. However, these are areas in which recommendations and guidelines are continually changing and therefore, it is recognised that the resources used by the practitioner must be comprehensive, current, easily accessible, easy to use, reliable and professionally recommended and validated[1 174]. But some studies have found that the resources used by some practitioners are limited, for example Leggat and Seelan[174] found that the most useful and accessible resources used by Australian GPs were free resources such as the Australian Immunisation Handbook and Travel Bugs. Travel Health professional bodies such as NaTHNaC recommend the use of a range of information resources usually available from a variety of media such as text books, journals and increasingly internet resources available from a range of providers including professional, government and commercial bodies [3].

6.1.5 Methods used to develop and evaluate pharmacy-run travel health services

There is limited literature describing the roles performed by pharmacists in the area of travel health and only a few references describe the methods used to evaluate pharmacist-run travel health services. Vohra describes the evaluation of a community pharmacy minor ailment (MAS) scheme in Lancashire, England[122], where 20-40% of GPs' time is spent dealing with minor complaints that could be managed by allied health professionals. Therefore, in an attempt to improve patient access to GP services, several community pharmacy-run MASs have been developed as initiatives of some NHS primary care trusts, with the main aim of reducing GP workload and to allow GPs to spend greater time with more complex cases[122]. To inform future development of the MAS, Vohra examined the views of patients with a retrospective, self-completion, postal questionnaire[122]. 3642 patients had used the service in the previous 6 months and although only 303 patients agreed to be sent a questionnaire, a 40% response rate was still achieved[122]. Most patients were supportive of

pharmacists replacing GPs in the management of minor ailments, although one respondent commented that they were actually treated by an assistant not a pharmacist[122]. Some concerns regarding privacy and confidentiality were raised, but all pharmacies offering the MAS had private consulting areas. Many respondents wanted more conditions and a wider range of medications to be available through the scheme, but only a limited range of conditions and a range of evidence-based remedies had been approved for inclusion[122]. One limitation reported for the study was that patients were not asked if they subsequently visited the GP for treatment of the same episode of illness and so it was difficult to estimate the reconsultation rate for the MAS[122].

Goode et al[172] describe the development and evaluation of an immunisation program in the Ukrop's supermarket pharmacy chain in Virginia, USA and the main aim of their study was to assess the growth, expansion and impact of the service. Their study reports a steady growth in the number of influenza and pneumococcal immunisations administered from 5,137 in 1998 to 36,000 in 2005[172]. In 2000, as described by Gatewood et al in 2009[86], the Ukrop's supermarket chain immunisation service was further developed with the addition of a travel health service and a comprehensive immunisation and pre-travel health program was offered. The program assesses over 1000 patients each year[86]. The steps involved in the development of the program are summarised in Table 6.3[86]. Patients are referred to the Ukrop travel service by their GP, health department or by previous users of the service. The initial travel assessment involves a telephone (or face-to-face) interview using a standard travel history form[86]. The pharmacist then consults a variety of information resources and plans the patient's vaccination and travel needs[86]. The patient's GP is then contacted, usually by facsimile, for authorisation for any vaccines and medications not covered by standard protocols, and if medical authorisation is given, the patient is contacted to make an appointment for vaccination and education. If appropriate, the pharmacist will also contact the patient's medical insurer to arrange authorisation and co-payment for vaccines. Patients who are not registered with a GP can only be given standard non-travel immunisations[86]. At the patient's appointment they complete vaccination consent forms and are educated about travel safety and the prevention of non-vaccine preventable diseases as well as being immunised and dispensed prophylactic medications. The patient is also provided with individualised travel-related health information, a standard Ukrop travel education booklet and the pharmacist advises the patient on the purchase of any recommended non-prescription items[86]. Documentation retained after each consultation includes the pre-travel history form, copies of any medical authorisations, immunisation waivers, consent forms and an education checklist. If required, the pharmacist will then follow up with the patient's GP and, if further vaccinations are required, will also have further follow up appointments with the patient. The service was well received by patients, GPs and the local health dept and unpublished patient satisfaction surveys show that 100% of patients were satisfied with the service and the pharmacist's knowledge[86]. However, although formal assessments of the GPs' perceptions of the pre-travel clinic have not been performed, it was reported that GP authorisation rates for immunisations are nearly 100%[86].

Table 6-3 Steps involved in the development of an immunisation travel clinic in a supermarket pharmacy setting (Ukrop's supermarkets, Virginia, USA)[86]

- Determine the potential for travel services based on patient demographic of the locality
- Obtain appropriate authorisation for the administration of vaccines under state law, including approval for yellow fever immunisation
- Establish policies and procedures for the travel service
- Develop a training program for pharmacists involved in the travel service
- Develop a marketing strategy for the travel service
- Set up the ordering of vaccines, especially yellow fever, with suppliers and manufacturers
- Purchase software to allow pharmacists to assess destination/itinerary-specific travel-related needs
- Inform physicians, health departments, and other travel-related organisations of the travel service
- Implement the marketing strategy before starting the travel service
- Implement the travel service
- Perform follow-up evaluations

Hind et al[80] describe the development and evaluation of a pilot community pharmacy travel health service in Northern Scotland and defined a "gold standard" service. All of the pharmacists in the region who provided influenza immunisation services were then invited to attend a two-day travel medicine training course, after which two pharmacies were chosen for the pilot[80]. In the UK, vaccines and many medications are categorised as prescription only medicines (POMs) and can only be supplied by pharmacists either on the authority of prescriber or under a patient group direction (PGD). A PGD is a protocol agreed by the local health authority and therefore PGDs needed to be developed and authorised for a range of vaccines (except yellow fever and Japanese encephalitis) and other medications[80]. The pharmacists were provided with a comprehensive resource pack containing copies of all PGDs and protocols for the administration of vaccines and a variety of other resources required for the service delivery[80]. The pharmacists who operated the service attended a further two-day course provided by Travel Health Related Education and Care (THREC) and a refresher course on the management of anaphylaxis. The clinical records of the patients were also collated to describe the patient population using the service and the service was evaluated using a self-completion, patient satisfaction questionnaire. A response rate of 71% (89/137) was achieved and overall it appears that the service was well received by patients, who felt that it met their needs, was convenient and provided value for money[80].

Hess and colleagues[87] described a review of a travel health clinic in an independent community pharmacy in California, USA. They describe that the clinic operates under a pharmacist-physician collaborative practice protocol, which allows the pharmacist to administer all appropriate travel-related vaccines (including yellow fever) and to supply travel-related medications. Using a retrospective review of clinic records and a prospective survey of patients who made appointments during the study period, the study examined the effectiveness of the clinic by analysing patient acceptance and refusal rates of pharmacist-made recommendations, changes in patient understanding of travel-related issues and patient satisfaction with the travel clinic[87]. It was found that the overall acceptance rate for

pharmacist-made recommendations was 85%, and ranged from 67% for polio and 97% for yellow fever. The main reasons given by patients for not following pharmacist-made recommendations were a perceived low risk for contracting a travel-related illness (52%), cost (14%), or that they were only interested in obtaining vaccination for yellow fever (14%). An increase in the understanding of travel-related issues and high satisfaction scores were noted in survey respondents and a strong correlation between acceptance of the pharmacist-made recommendations and overall satisfaction in the service was reported[87].

Finally, a more recent report by Seed et al[230] describes the integral role played by a pharmacist and pharmacy students in a multidisciplinary travel health service operating within a hospital-based, ambulatory care, outpatient clinic. The multidisciplinary team consisted of an infectious diseases physician, a nurse and a pharmacist affiliated to the Massachusetts College of Pharmacy USA[230]. Pharmacy students also participated in the clinic as part of an advanced pharmacy practice rotation[230]. Both pharmacists and students performed 30 minute counselling sessions with each traveller, which focus on the traveller's itinerary, vaccines to be administered and their potential side effects, malaria prophylaxis and personal protective measures including insect bite prevention, traveller's diarrhoea, personal safety and the prevention of STIs. It was reported that the travellers benefitted in receiving a comprehensive pre-travel assessment by a multidisciplinary team of health professionals, and that pharmacy students were given the opportunity to apply the knowledge learnt from didactic classes in a clinical situation[230].

6.2 Contribution

My estimated overall contribution to this study was 85%.

I developed all materials required for the operation and evaluation of the APharmTHAS™ model and completed the necessary ethics applications. I developed the training resources and trained the staff at the pilot pharmacy in the operation of the APharmTHAS™ model. During the study period, I personally interviewed, assessed and counselled 26% of the travellers who used the APharmTHAS™ service and gave advice to the other pharmacists on travel health-related matters when required. The other travellers were interviewed by the other pharmacists trained in the APharmTHAS™ program namely Mrs Helen Barnes, Mr Christopher Florence and Mr Christopher Mitchell.

6.3 Research Question and Aims

The research question for this chapter is:

> ***Can a Travel Health Advisory Service (THAS), which is compliant with current Australian legal and professional restrictions and practices, be developed and operated from a community pharmacy effectively and be valued and accepted by clients?***

The main aim of this study was to develop, implement and evaluate a travel health advisory service (THAS) operating from a community pharmacy in North Queensland aimed at providing information services mainly for relatively low risk travellers or travellers who may not normally attend pre-existing travel health services.

The main objectives of the study were to:

1. develop and evaluate appropriate pre-travel and post-travel risk assessment and data collection tools to perform pre-travel and post-travel risk assessments on individual travellers
2. develop and evaluate appropriate travel health information resources for distribution from a THAS operating from a community pharmacy
3. develop a referral pathway for higher-risk travellers requiring more specialised advice or services, such as prescription medications or vaccines not currently available from Australian pharmacies
4. evaluate whether travellers would access, utilise and value travel-related health services provided from community pharmacies and to analyse the types of travellers who would utilise those services
5. evaluate whether a THAS would be financially viable in an Australian community pharmacy setting at a pilot site situated in North Queensland.

6.4 Methods and Processes

The development, implementation and evaluation of the travel health advisory service (THAS) involved three stages:

Stage 1: The planning and development of the THAS itself, the resources that were utilised in the operation of the THAS, and the tools that were used to assess and evaluate the service

Stage 2: The establishment, implementation and operation of the THAS at a pilot site in North Queensland

Stage 3: The evaluation of the THAS implemented at the pilot site.

6.4.1 Development of the THAS model, resources and evaluation tools (Stage 1)

The key elements of a quality travel health service and any previous evaluations and reviews of travel health or similar extended pharmacy services were identified from a literature search performed in the electronic databases Medline, Science Direct, CINAHL and International Pharmaceutical Abstracts, supplemented with individual journal searches of key national and international pharmacy practice journals that are not indexed on these databases. Search terms were purposefully broad and are summarised in table 6.4. The key elements of a quality travel health service were identified as a service offering a model of pre-travel care (incorporating a formal pre-travel risk assessment, the development of an individualised risk management plan and a process of counselling or education about the potential risks (risk communication) that may be faced by the traveller on their journey), combined with a similar model of post-travel care, and that all systems and the care provided by the service are fully documented[18 78 115 116 173 220 231-236].

Table 6-4 List of search terms used in the literature search for chapter 6

Search Term	Search Term
Pharmacist and infectious disease	Immunisation and pharmacist
Pharmacist and travel	Vaccination and pharmacist
Pharmacist and management pathway	Management plan and pharmacist
Pharmacist and tropical disease	Care needs and tropical
Pharmacist and education needs assessment	Care needs and travel
Pharmacist and extended role	Pharmacist travel clinic
Infectious disease and pharmaceutical care	Education needs
Tropical disease and pharmaceutical care	Travel clinic
Pharmaceutical risk factor assessment	Educational resource
Clinical pharmacy and infectious disease	Pharmaceutical care needs
Pharmacy and infectious disease	Infectious disease and community pharmacy
Tropical disease and clinical pharmacy	Infectious disease and clinical pharmacy
Tropical disease and community pharmacy	Extended role and infectious disease
Tropical disease and pharmacy	Extended role and tropical disease
Educational needs assessment and infectious disease	Extended role and travel
Educational needs assessment and travel medicine	Care needs and infectious disease
Educational needs assessment and tropical disease	Care needs and tropical
Educational resource and travel	Care needs and travel
Educational tool and travel	Pharmacist travel clinic
Infectious disease and care needs assessment	Education needs
Infectious disease and community pharmacy	Travel clinic
Infectious disease and clinical pharmacy	Educational resource
Extended role and infectious disease	Pharmaceutical care needs
Extended role and tropical disease	Training and pharmacist and travel
Extended role and travel	Training and pharmacist and infection
Care needs and infectious disease	Prescribing and pharmacist
Training and pharmacist and travel	Immunisation and pharmacist
Training and pharmacist and infection	Vaccination and pharmacist
Prescribing and pharmacist	Management plan and pharmacist

On the advice of UniQuest Pty Ltd, the THAS model was given a name and a simple logo. The name given to the THAS was the Australian Community Pharmacy Travel Health Advisory Service (APharmTHAS™), and all documents and resources utilised in the project bore the APharmTHAS™ name and logo. (The suffix ™ was placed after the APharmTHAS abbreviation on the advice of UniQuest to highlight that an application for a Trade Mark was being considered). A confidentiality agreement was also drawn up by UniQuest Pty Ltd (Appendix 6.1), and all pharmacists involved in the project were required to sign the agreement prior to training.

6.4.1.1 Overview of the APharmTHAS™ pre-travel service model

The APharmTHAS™ pre-travel service model was designed to deliver two levels of service:

- Level 1 Pre-travel THAS – This service level was aimed at travellers presenting with relatively simple, isolated questions or queries about travel-related health topics. The traveller did not undergo a full, formal pre-travel health risk assessment.
- Level 2 Pre-travel THAS – This service level was aimed at those travellers requiring a full pre-travel health risk assessment followed by risk communication and counselling, supported with written APharmTHAS™ and/or commercially-available written materials. A risk management strategy for the traveller was then developed.

In the design of the study it was thought that the majority of travellers using the service would be self-referrals, or would be referred directly to the service either by travel agents or a health care provider. The processes involved with both service levels are summarised in figures 6.1 and 6.2.

6.4.1.2 Level 1 APharmTHAS™ pre-travel service model

As shown in figure 6.1, level 1 pre-travel clients are travellers presenting at the pharmacy to obtain information about a relatively simple, one-off travel-related query. These would generally be answered by the pharmacist, who may also supplement their verbal response with some of the APharmTHAS™ Travel Tips Leaflets or other, commercially-available resources. The following resources and assessment tools were specifically developed and used in the operation of the level 1 pre-travel service:

6.4.1.2.1 Service Outcome Record (APharmTHAS™ Leaflet Evaluation) (Level 1 Pre-travel THAS)

The service outcome record (APharmTHAS™ Leaflet Evaluation) (Appendix 6.2) was intended to be a quick and easy to complete checklist for the pharmacist to collect data about the level 1 clients and to record and evaluate the service and the advice given. It consisted of four sections. After counselling the traveller, the pharmacist recorded the traveller's demographic data (section A), their initial question and any additional information obtained (section B), the advice and resources given in response (section C) and the service outcomes and purchases made (section D).

6.4.1.3 Level 2 APharmTHAS™ pre-travel service model

As shown in figure 6.2, the level 2 pre-travel service is intended for travellers requiring a full comprehensive, pre-travel risk assessment. The following resources and assessment tools were specifically developed and used in the operation of the level 2 pre-travel service:

6.4.1.3.1 Initial Traveller Enquiry Form (Level 2 Pre-travel THAS)

If a traveller initially presented at the pharmacy requesting a pre-travel risk assessment when the pharmacist was not available, the traveller was given an appointment to return at a later, and mutually convenient time. If so, before leaving the pharmacy, the client was asked to complete an initial traveller enquiry form (Appendix 6.3). This is intended to give the pharmacist some initial information about the traveller and their journey so that they could prepare for the traveller's appointment. The form consists of 4 sections and asks the traveller to give demographic information about themselves (section A) and details about their destination (section B), their planned activities while travelling (section C), and their travelling companions (section D).

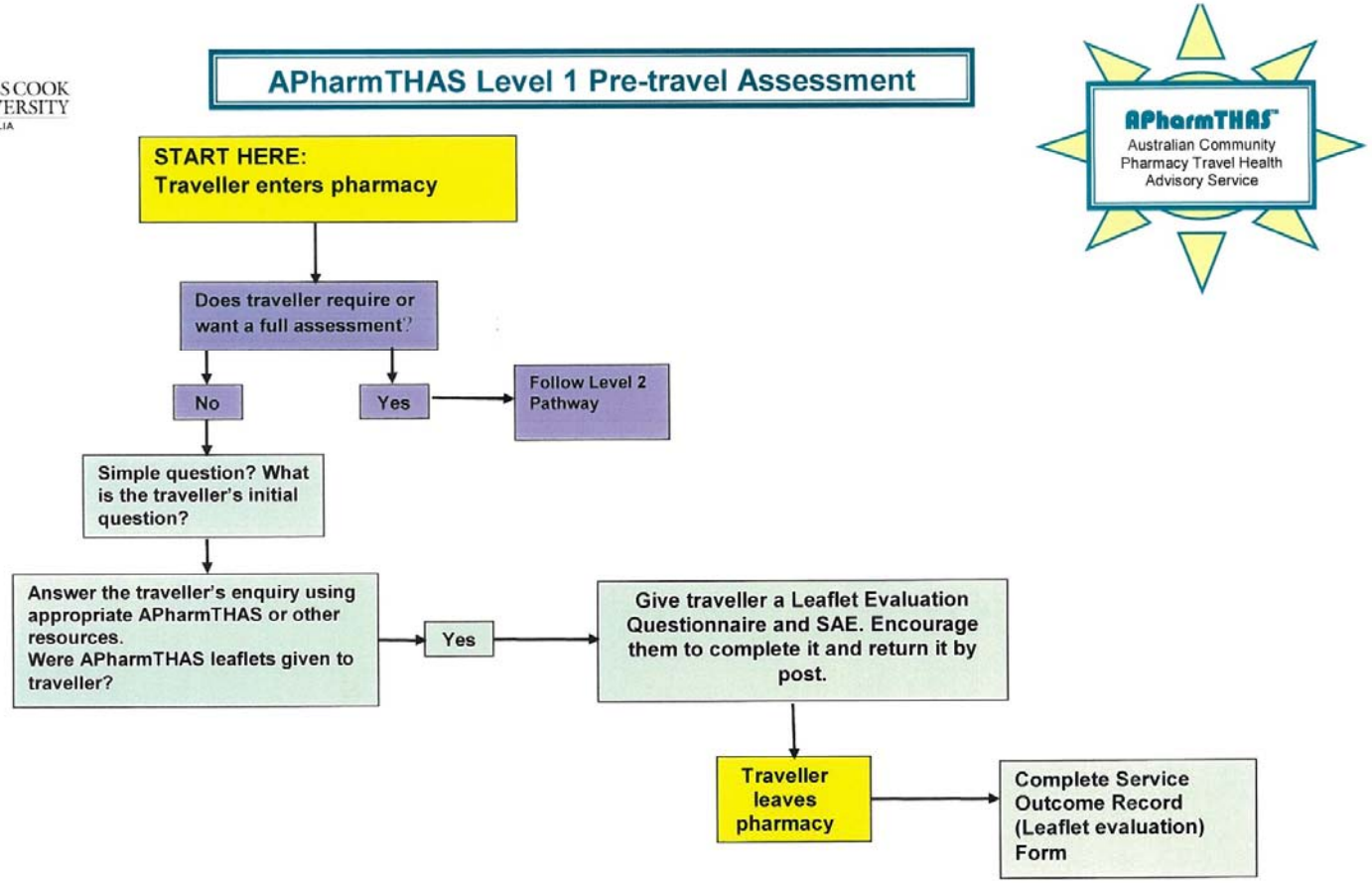


Figure 6-1 Flowchart of the APharmTHAS™ Level 1 Pre-travel Service Model

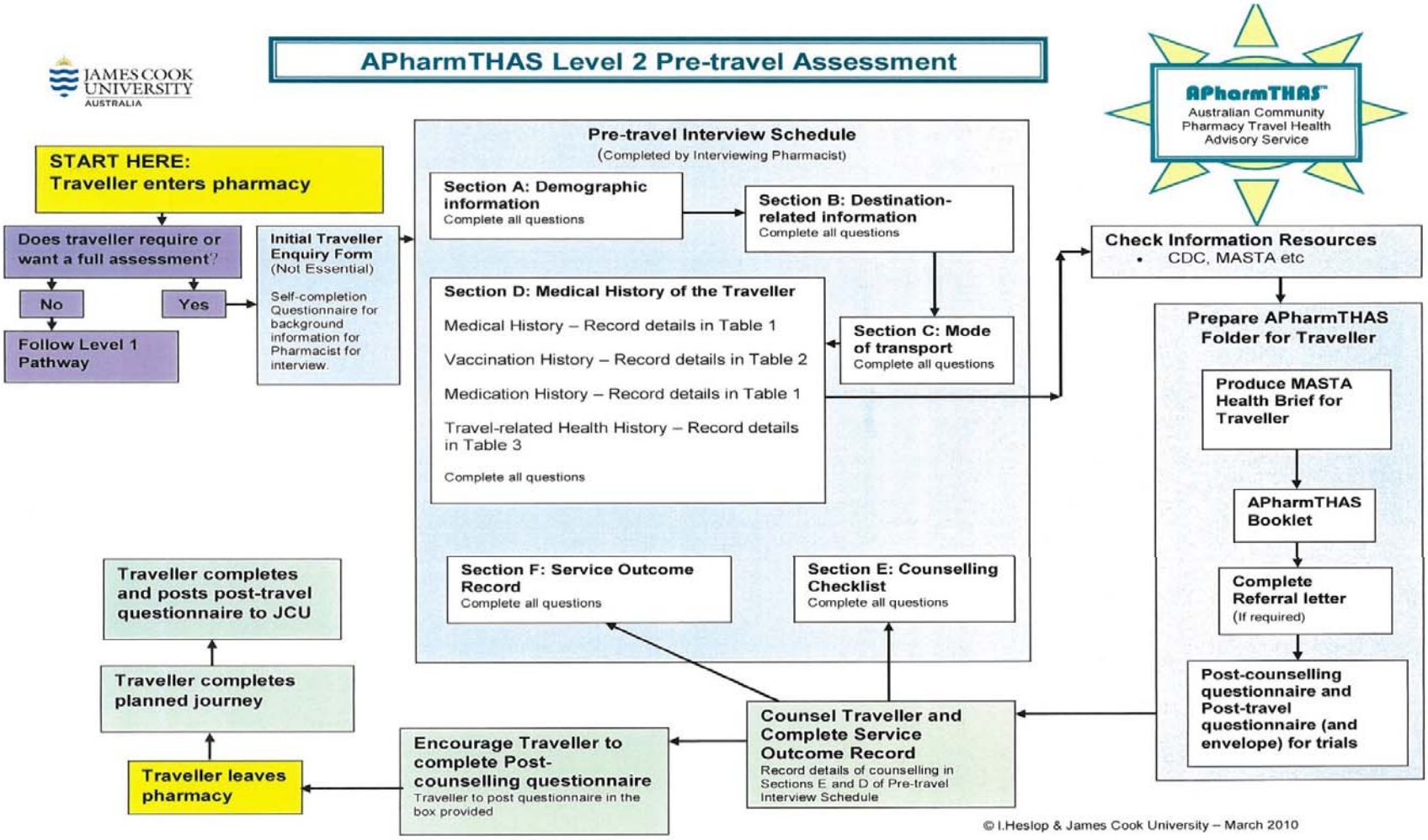


Figure 6-2 Flowchart of the APharmTHAS^{TM} Level 2 Pre-travel Service Model

6.4.1.3.2 Pre-travel Interview Schedule (Level 2 Pre-travel THAS)

When the traveller returned for their appointment, or if the pharmacist was available when the traveller initially presents, the pharmacist interviewed the traveller to perform a formal, systematic, pre-travel risk assessment and to develop an individualised risk management plan. The pre-travel interview schedule (Appendix 6.4) was designed to guide the pharmacist through a standardised, systematic, semi-structured interview of each traveller. Many of the references found in the literature search recommended the use of a standard risk management approach to the assessment of travellers, involving an assessment of the risks associated with the traveller's intended destination and their own personal health status[18 115 116 173 215]. Leggat[115] also recommended that the following points should be considered in the assessment of the traveller; their destination, mode of transport, the medical history of the traveller, the risk of planned interventions and planned follow-up post-travel. In addition, Gherardin[116] also discussed that the assessment process should also focus on the identification of higher risk travellers, and Stringer[173] highlighted the need for a full vaccination history. An example travel history reporting form was used as a base format[236].

The final pre-travel interview schedule used in the study consisted of six sections and also contained a checklist and prompts for counselling points and questions. Firstly, demographic data about the traveller and their companions was collected (section A), followed by information about their destination, planned stopovers, accommodation, planned activities and reason for travel (section B), whilst questions in section C focussed on the modes of transport that they intend to use. Section D consists of a series of questions and prompts to assist the pharmacist in performing a full medical, vaccination and medication history. The initial questions ask the traveller to describe or self-rate their current overall state of health and give a full medical history, thereby allowing the traveller to be assessed for conditions whose control may be affected by travel-related illness, or conversely may increase the risk of developing travel-related health problems. The pharmacist used Table 1 (Summary of Medical and Medication History) to summarise and record the traveller's replies. Section D also helped the pharmacist take a full vaccination history from the traveller (Table 2 Vaccination Summary) and, using a checklist, take a full medication history. The medication checklist contained the main types of medications used in the general population including prescription medications, OTC medications, complementary medications and even social and recreational drugs. It was intended to be used as a series of prompts to ask each traveller about the various types of medications they are taking to ensure they disclose as much information as possible about all of the medications, not just those prescribed by a medical practitioner. Travellers were also about the medications that they intend taking with them overseas. The final questions in section D are related to the traveller's history of travel-related health problems. Section E consists of a checklist of recommended topics for which travellers may or may not require counselling and education and the final section (section F), was intended to be used by the pharmacist to collect data about the interview process that can be used at a later date for service evaluation.

6.4.1.3.3 APharmTHAS™ Portfolio (Level 2 Pre-travel THAS)

After the pharmacist had completed the pre-travel interview and completed sections A to D of the interview schedule, they then consulted a number of recognised, current travel health information resources and developed a risk management plan for each traveller. This was presented to the traveller in the form of the APharmTHAS™ portfolio, which consisted of a green, plastic, wallet folder labelled with the APharmTHAS™ logo and contained the following items:

- MASTA Health Brief specific for that traveller and their journey

Medical Advisory Services for Travellers Abroad (MASTA) is a globally-recognised travel health advisory service providing high quality and up-to-date travel health advice and materials to travel health service providers on a commercial basis. A MASTA health brief (Appendix 6.5) provides both the health practitioner and traveller with a wealth of information about the health risks associated with their destination(s) including information about the vaccination requirements and malarial risk. The health brief also reviews important recent disease outbreaks at each destination and gives advice regarding what recommended items should be taken with them on their journey. It was decided to use MASTA health briefs in the pilot study so that the information provided to travellers was up to date, available quickly and was equivalent to that provided by other service providers.

- APharmTHAS™ Travel Tips Leaflets and Brochure

A series of patient information leaflets were developed and tested. These were used by the THAS in one of two ways. Either in the form of individual leaflets which were distributed when appropriate in response to specific travel-related health questions of the level 1 clients or in the form of a booklet (APharmTHAS™ Travel Tips Brochure) which was placed in the APharmTHAS™ portfolio and distributed to all level 2 clients. The development and testing of these leaflets is discussed in more detail in section 6.4.1.5.

- Pre-travel referral letter

A standard pro forma for a pre-travel referral letter (Appendix 6.6) was included in the portfolio for the pharmacist to complete and give to the level 2 clients if they wished to refer the client to another health practitioner. The letter explains to the client's doctor that they have used the THAS and gives a description of the service and what advice the traveller has received.

- Post-counselling and Post-travel questionnaires, information leaflets and envelopes

During the study period, the portfolio also contained two self-completion questionnaires (APharmTHAS™ Post-counselling Questionnaire and the APharmTHAS™ Post-travel Questionnaire) to evaluate the THAS, these are discussed in more detail in section 6.4.3.

6.4.1.4 Overview of the APharmTHAS™ post-travel service model

In the planning stages of the project it was assumed that the majority of travellers utilising the THAS would request pre-travel health advice and supplies, and that few would request post-travel health advice. Also, due to the limited range of suitable medications that are available in Australia without prescription, the range of potential causes and severity of many post-travel syndromes and the lack of

specialist diagnostic tools in pharmacies, it was also assumed that most patients presenting with a post-travel syndrome to a community pharmacy would be referred either to their GP or to hospital. Figure 6.3 illustrates the pathway that was designed for the management of travel-related health problems in returning international travellers who present at the pharmacy. The following resources and assessment tools were specifically developed and used in the operation of the post-travel service:

6.4.1.4.1 Post-travel interview schedule

The post-travel interview schedule (Appendix 6.7) was designed to allow the pharmacist to conduct a systematic, semi-structured interview and full post-travel risk assessment on returned travellers presenting at the pharmacy. The interview schedule consists of five sections. It was assumed that in most instances where travellers sought assistance from the THAS with post-travel health problems that they would initially present at the pharmacy with either a symptom-based or a product-based request. Therefore, the initial section of the post-travel interview schedule (section A) contained a series of questions based around the standard acronym WWHAM aimed at obtaining a history of the traveller's problem[237]. Sections B and C guided the pharmacist to record the contact, demographic and travel details of the traveller and were similar to comparable sections in the re-travel interview schedule. Section D asks the traveller to report any chronic illnesses, whether they had the appropriate vaccinations for their journey and what chronic medications they currently take or have taken in the last 3 months and a table is provided for the pharmacist to summarise their findings. It is intended that the pharmacist use the final section (section E) to record the outcome of the interview.

6.4.1.4.2 Post-travel referral letter

A pro forma for a standard referral letter (Appendix 6.8) was provided to assist with the referral of travellers to other health professionals when required. The pro forma gives a brief description of the service and allows the pharmacist to summarise the symptoms of the traveller and the pharmacist's concerns and reasons for referral.

6.4.2 Development and testing of the APharmTHAS™ Travel Tips Leaflets and Brochure

A series of written information resources were required to support and supplement the verbal counselling given by pharmacists to the clients of the THAS, and these resources needed to be formatted for use in one of two ways; Firstly, in the form of a series of individual leaflets that could be distributed as appropriate in response to the travel-related health enquiries of the level 1 clients and secondly, in the form of a booklet (APharmTHAS™ Travel Tips Brochure) that would be placed in the APharmTHAS™ portfolio and distributed to all level 2 clients.

A literature review was performed to identify potential models and formats for the written patient information leaflets and to identify recognised and approved methods of pre-clinical testing and validation. A great deal of literature has been published on the topic of health promotion and patient information leaflet design, and a full discussion of this literature is beyond the scope this thesis. However, it was noted among these studies that a number discuss the design and testing of a wide range of patient information leaflets (PILs), consumer medication information (CMI) leaflets and other

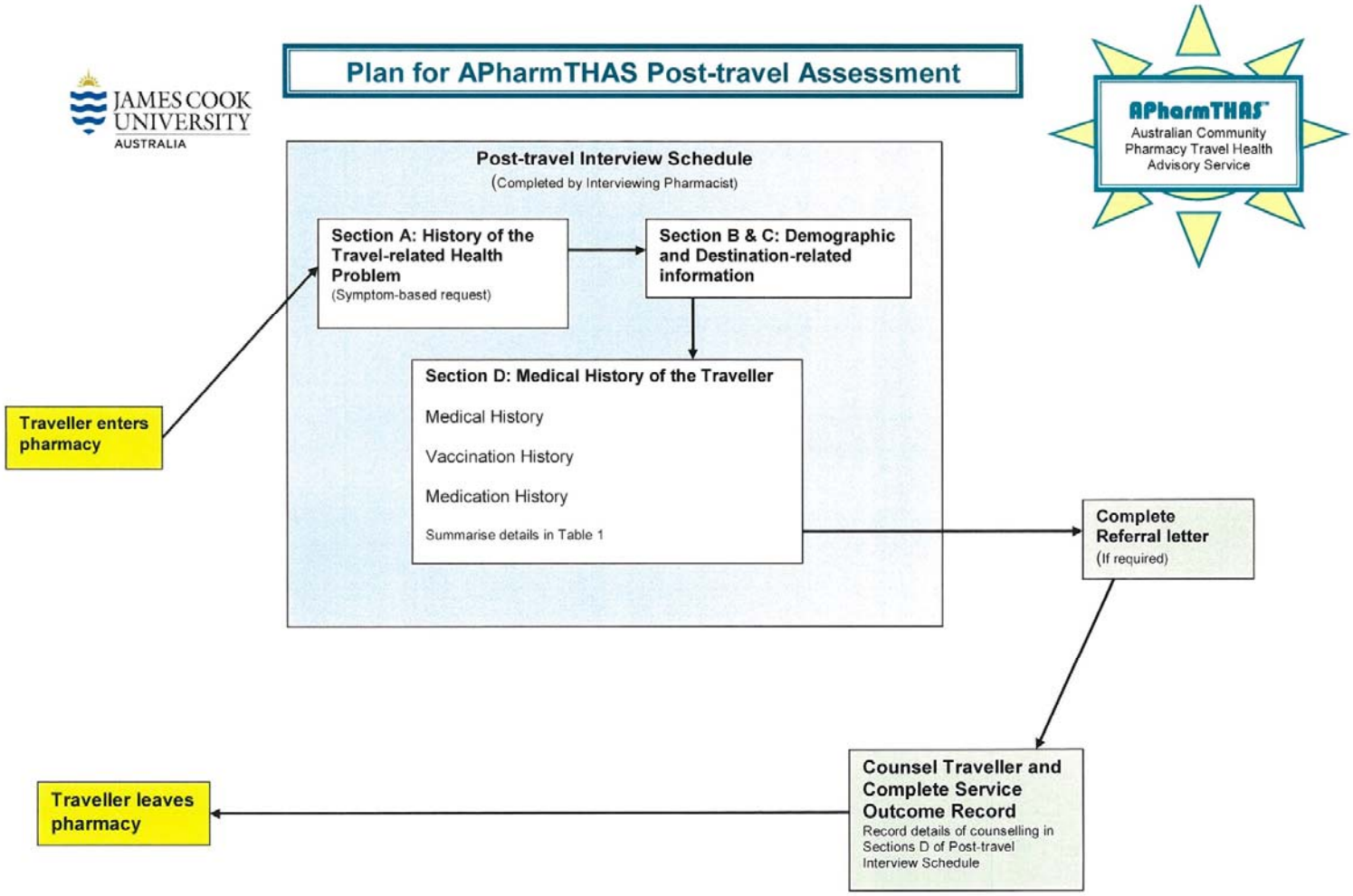


Figure 6-3 Flowchart of the APharmTHAS^{TM} Post-travel Service Model

information sheets. In particular, a number of studies focus on issues relating to the readability, or reading age of leaflets, and the use of readability scores such as the Flesch Reading Ease Score, Flesch Kincaid Grade Level and the Simple Measure of Gobbledygook (SMOG) formula[238-244]. Another approach, which was also evident in the literature was the use of consumer testing[238 244 245], and in particular, the method pioneered and published by the Communication Research Institute of the Australian Self-Medication Industry[246]. This group has produced usability guidelines for the design and testing of CMI leaflets[246] and these guidelines are now accepted as a standard for the testing of CMI leaflets, both in Australia and the European Union[238 244].

In the third edition of these guidelines, Sless and Shrensky[246] gave detailed instructions about the design, writing process, content and layout of CMI leaflets including the headings, format and vocabulary, that should be used to produce standard CMIs. The guidelines also gave examples of statements that should to be used when writing about medication-related issues, a template that can be used to produce CMIs, and a testing protocol based on consumer usability as opposed to solely evaluating leaflets based on readability[246]. Although designed primarily for the production of CMIs, it was decided to adapt this standard and their testing processes for the design of the APharmTHAS™ leaflets and travel tips brochure. The main reasons for this are that CMIs are already placed in many medication packages as inserts, and are also commonly distributed by Australian pharmacists. Therefore, pharmacy users are familiar with their format and layout. Also, these guidelines and testing processes described are standardised and recognised both, nationally and internationally[246]. Therefore, although other authors have highlighted some constraints in the use of Sless and Shrensky's CMI model, such as; the template headings and text structure have not been tested for readability and the leaflets produced are often long[244], it was decided to adopt this model.

The CMI design and testing approach examines and focusses more on what consumers do with the information they are presented with in the leaflet, rather than the more traditional, content-focussed approach, which only focusses on what the health professional wishes to tell the patient about their medication[246]. The performance-focussed approach examines whether English-literate consumers can find and appropriately act on the information within information resources and whether the designers of the resources can demonstrate whether consumers can do this[246]. Once the CMI is designed, it then has to be tested, and an iterative, diagnostic testing process is recommended. This involves the CMI designer asking a series of potential CMI users to perform the tasks they would normally do with the leaflet[246]. How the user searches the leaflet is observed and recorded and the CMI designer questions the user to ensure that they can appropriately use the information they have found whilst recording the users responses[246]. In this way the CMI itself and not the users are tested, no readability, reading age or psychometric instruments are used, and a diagnostic testing interview schedule is devised with questions based around identified critical consumer actions[246].

6.4.2.1 Scoping and preparation for writing

By considering the proposed demographic of potential clients and the service provided, a list of suitable topics for inclusion into the first draft of the APharmTHAS™ Travel Tips Brochure was devised. Topics were chosen to include some common travel-related health conditions that are treatable with OTC remedies or topics that pharmacists may commonly wish to give further information

to travellers and included; Traveller's Diarrhoea, Avoiding Insect Bites, Malaria, Motion Sickness, Venous Thromboembolism, Travelling with Medicines and Buying Medicines Overseas, and First Aid Kits for Travellers. A brief literature review was performed for each topic to identify appropriate information resources or references for each leaflet.

6.4.2.2 Writing the APharmTHAS™ Travel Tips Brochure and Leaflets

Using the template provided, each leaflet or brochure page was designed using the same layout, style, font and typography as the CMIs suggested in the guideline. The only deviation from the guideline was that CMIs are designed to deliver medication-related information, whereas the APharmTHAS™ leaflets were designed to deliver travel-related and/or more disease-related information. As a result, some of the headings to the various subsections of each leaflet were altered from the CMI template to better reflect the actual content of each APharmTHAS™ leaflet. However, the format and typography suggested for the writing of instructions, explanations and disclaimers were identical to that in the template and guideline, as were the tense, sentence structure and vocabulary. A copy of the APharmTHAS™ Travel Tips Brochure containing all of the leaflets is placed in Appendix 6.9.

6.4.2.3 Consumer diagnostic testing of the APharmTHAS™ Travel Tips Brochure and Leaflets

6.4.2.3.1 Design of diagnostic testing interview schedule

A diagnostic testing interview schedule (Appendix 6.10) was designed following the principles of Sless and Shrensky[246], and the process involved in the design is summarised in figure 6.4. Firstly, the main areas to be tested across the whole brochure are identified. Some leaflets within the brochure contained similar information in similar sections, and using the testing principles, if consumers could find and utilise information on one leaflet it was assumed that they can find the equivalent information for all similar leaflets. In this regard, as shown in step 1 of figure 6.4, eight main areas for testing were identified across the whole brochure. The next stage was to identify critical consumer actions for each area and then translate the actions into consumer questions that also cover the main travel-related health topics in the brochure. These questions were then further refined and 15-16 main questions were then formulated into the finished test protocol.

6.4.2.3.2 Interview process

The interview process was performed on 10 volunteers as recommended[246]. Ideally, test subjects should be representatives of the same population who will use the brochure in practice and the APharmTHAS™ travel tips brochure was intended to be distributed to relatively low risk travellers who are potential users of the THAS. JCU pharmacy students were asked if they would like to participate and the first 10 students who responded were used. All 10 participants were aged 18-25 years and were occasional international travellers to a range of relatively low-risk destinations. Participants were firstly given a verbal explanation of the project and then the opportunity to read an information leaflet about the study (Appendix 6.11). If they agreed to participate, and for the interview to be audiotaped, they were asked to sign a consent form (Appendix 6.12). Using the diagnostic testing interview protocol (Appendix 6.10), participants were then given an explanation of the interview process and

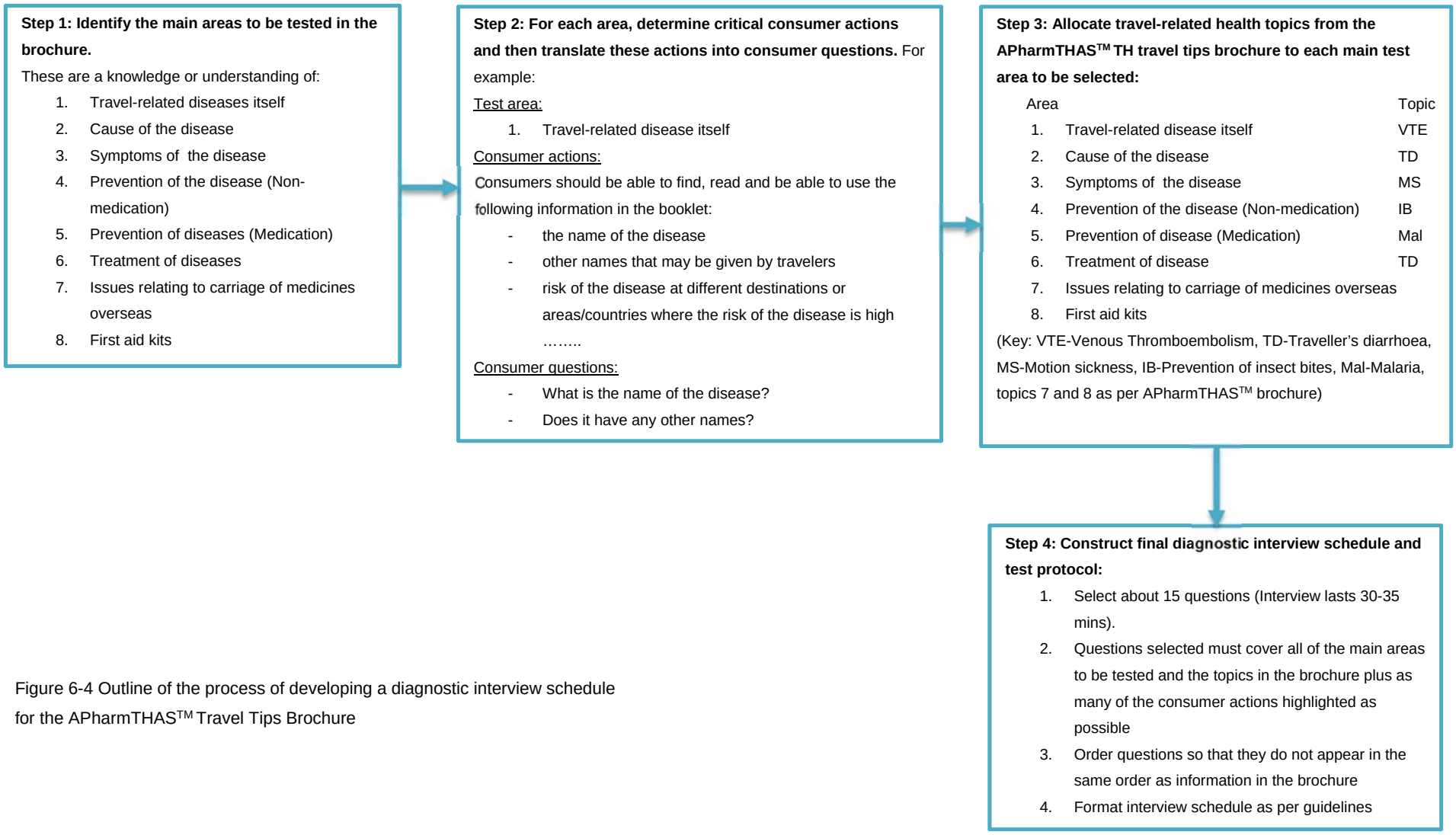


Figure 6-4 Outline of the process of developing a diagnostic interview schedule for the APharmTHAS™ Travel Tips Brochure

asked a series of 11 questions relating to the information contained in the brochure. While answering each question, the researcher observed and noted how the participant searched for the information in the brochure, whether they could find the information and could they explain the information in their own words. They were also asked if they understood, and the researcher noted whether they understood the information and whether they omitted or added any information from the brochure when answering the questions. Finally, the participants were asked a series of 6 open answer questions relating to the presentation of the information, whether instructions were easy to follow and what they thought were the advantages or disadvantages of the brochure and whether improvements could be made. The researcher recorded the participant's responses, but also had access to the audiotape recordings of the interviews if required.

6.4.2.3.3 Data analysis

After the completion of the interviews the data were summarised into a table of responses (table 6.5) as recommended and then reviewed. It can be seen that only two changes were required to the brochure and leaflets after testing (shaded blue). Firstly, an improved index was added to the brochure and the numbering system of the brochure was altered so that pages were numbered consecutively. Secondly, in response to the responses received to question 7 the wording was changed in Leaflet 3: Malaria to highlight and further emphasise the explanation attached to the instruction why doxycycline should not be taken at night. These changes were made to the leaflets and brochure and they were then printed for use in the THAS pilot.

6.4.3 Establishment, Implementation and Operation of the THAS model at a pilot site in North Queensland (Stage 2)

6.4.3.1 Pilot Site for the APharmTHAS™

The pilot site chosen for the project was a medium-sized, modern, shopping centre pharmacy based in Townsville, North Queensland. The pharmacy occupies a site of approximately 220m^2 and dispenses between 250-400 prescriptions per day, with an annual turnover of approximately $4 million. The pharmacy employs 20 staff on a combination of full-time, part-time or casual contracts, including 7 pharmacists. It is open 7 days per week (8am to 8pm Monday to Friday and 8am to 6pm on Saturdays and Sundays). The pharmacy has a private counselling room, in which to interview and/or counsel patients.

6.4.3.2 Staff training and implementation of the APharmTHAS™

A training program was developed for the staff of the pharmacy. The two main aims of the program were to inform and fully orientate staff about the THAS and to provide clinical training and information about a range of common and important travel-related health topics. A two-tiered training program was devised as the learning needs of the pharmacy staff varied depending on their roles within the pharmacy and in the operation of the THAS:

Table 6-5 Summary table of responses to the diagnostic testing interviews

	Participant	1	2	3	4	5
Q1	What is venous thromboembolism, are there different types of venous thromboembolism and does it have any other names?	√	√	√	√	√
Q2	What causes traveller's diarrhoea?	√	√	√	√	√
Q3	When you are suffering from motion sickness, what symptoms will you experience before you actually vomit?	√	√	√	√	√
Q4	You are going bushwalking, what can you do to prevent tick bites?	√	**?** Discussed general bite avoidance measures, but did not read far enough to discuss the tick specific advice on the next page.	√	√	√
Q5	What insect repellents are safe to use in children?	√	√	√	√	√
Q6	Your doctor prescribes Atovaquone/Proguanil or Malarone® to prevent malaria. How long should you take this medicine to prevent malaria?	√	√	√	√	√
Q7	Your doctor prescribes Doxycycline to prevent malaria. Why should you not take the medicine at bedtime?	√	√ Found the necessary information but "some travellers may not link oesophagitis with not taking Doxycycline at bedtime"	√	√ Found the necessary information to answer question, but said that some travellers may not recognise the connection between oesophagitis and going to bed	√
Q8	You are on holiday and develop diarrhoea. When should you not use Loperamide to treat diarrhoea?	√	√	√	√	√
Q9	What should you use to prevent dehydration in a child with diarrhoea?	√	√	√	√	√
Q10	How can you check whether the medicines you are taking with you on holiday are not restricted or prohibited in the country you are visiting?	√	√ Found necessary information to answer question but said they were unsure what a consular website was.	√	√	√
Q11	What medicines should you include in your first aid kit to treat allergies when you are overseas?	√	√	√	√	√
Q12	Are the instructions good enough to follow?	Yes	Yes	In Q11, "a traveller may not know what is a 'suitable antihistamine' although they can ask their pharmacist or doctor"	Good, clear instructions	Yes
Q13	Overall, what do you think of the instructions?	Clear. Important points are bold and so easy to find.Not crowded so easy to find information.	User friendly, a lot of people could make use of this. Concise, most of the important points are there. Well set out and easy to find information.	Very concise and simplistic. Written in layman's terms.	Easy to understand	Good, I'd like to read the rest of it (it all).
Q14	What are the bad points about this booklet? How can we improve it?	Page numbers in the booklet		Contents and trying to find the leaflets - page numbers would be better. Information about children could be separated from main text.	Thumb indents for each section may help the traveller find information or add page numbers to the booklet.	Better contents page and page numbers.
Q15	Are there any good points?	Use of colour for headings makes it easier to find information. Lots of spacing. Clear. Well-written - easy to understand.	Booklet itself is useful and needed. Very thorough but concise at the same time.	The bold coloured headings make it easy to find information within the leaflet - you don't have to read the whole document. Having the main points in bold make it easy to navigate through the leaflets.	Great leaflets	Very informative and easy to read.
Q16	Is there anything about the booklet that we haven't discussed yet that you would like to raise?	No	A section about travelling with medical conditions (such as pregnancy, diabetes) may be useful.	No	Not really, good idea, often fill prescriptions for people who are going away and who could do with more information.	No

	6	7	8	9	10	Implications for Change
Q1	√	√	√	√	√	No change needed
Q2	√	√	√	√	√	No change needed
Q3	√	√	√	√	√	No change needed
Q4	√	√	√	√	√	No change needed
Q5	√	√	√	√	√	No change needed
Q6	√	√	√	√	√	No change needed
Q7	√	√	√	√	√	Slightly alter and refine wording to further highlight and emphasise the explanation attached to the instruction why doxycycline should not be taken at night.
Q8	√	√	√	√	√	No change needed
Q9	√	√	√	√	√	No change needed
Q10	√	√	√	√	√	No change needed
Q11	√	√	√	√	√	No change needed
Q12	Yes, some topics are more detailed depending on the topic of course	Yes	Really good, good idea.	Yes, very clear. In language that everyone can understand. Titles and headings make it easier to find information.	Yes	Comments noted
Q13	Some sections are easier than others. But I would read the whole booklet first before I travelled and so it would be easier to find information than in this test.	I like them, I wish I had something like this when I was travelling.	Really clear, easy to follow because of all of the headings.	Could also be a useful basic guide for pharmacists as well.	Good, once you find the section all of the relevent information is there. The important information is in bold format. The point format is useful with examples and more detailed instructions.	Comments noted
Q14	No bad points.	Would be easier to use with page numbers rather than article numbers	Good	Page numbers in the contents list. Perhaps having heading with different colours may help recognition of different sections.	No page numbers in the contents. No pictures, diagrams may help.	Revised page numbering system and changed index accordingly
Q15	Some sections are very detailed. Very informative	Easy to use. Good, clear information. Big headings for the questions you'd ask yourself	Will be really useful - get asked for information all of the time. No one place to go for information. Hard to know where to go for information.	Very succinct. I like the classifications - very clear for both the pharmacist and patient. Clearly states what to do or what not to do in different situations.	I like the CMI format, people will know what to expect. Having a standard format (description, causes, symptoms, prevention treatment etc) to the leaflets and that it is broken into sections helps you find information. That you can scroll through the sections is a good point.	Comments noted
Q16	No	No	Don't think so.	No.	Perhaps consider having the disclaimer on a separate page and making it more condensed. Perhaps consider a different logo - it is colourful and two-tone but the sun is perhaps more specific to North Queensland - perhaps something more specific to travel medicine would better such as a globe with a plane etc.	Comments noted

- Level A staff training – was completed by all pharmacists who performed the pre and post-travel assessments and
- Level B staff training – for all other staff working in the pharmacy

6.4.3.2.1 Level A staff training

All pharmacists who were actively involved in the provision of the THAS completed level A staff training. A total of 5 pharmacists completed the training during the study period. The training program was organised over 1-2 days and was an introduction and orientation to the APharmTHAS™ pre and post-travel service models and their associated traveller assessment tools and evaluation surveys, and was also an intensive introduction and orientation for pharmacists to the speciality of travel health. The topics covered in the training program are summarised in table 6.6, and many of the learning resources developed for the TBL sessions in the BPharm travel health elective (chapter 5) were adapted and utilised in the program.

6.4.3.2.2 Level B staff training

All other pharmacy staff attended an evening workshop prior to the implementation of the pilot project. The workshop was designed to be a general staff orientation and introduction to the topic of travel health, the incidence of common travel-related health conditions and factors that can influence overall travel health risk and the THAS model.

Table 6-6 Brief overview of Level A staff training program

Session	Session Overview and Topics covered
Introduction	Overview of the training program Introduction to the study Signing of confidentiality agreements
APharmTHAS™ service model	Introduction to the APharmTHAS™ pre and post-travel Service Model: Overview of pre-travel THAS Overview of post-travel THAS Initial traveller enquiry form Pre-travel interview schedule MASTA Health Briefs and resources APharmTHAS™ portfolio and evaluation surveys Appropriate sources of travel health information
Session 1	Introduction to the specialty of travel health Epidemiology of travel-related health problems and risks Preparing the traveller – Pre-travel and post-travel risk assessments
Session 2	General travel advice (Sun safety, DVT/VTE, Jet lag and Motion sickness).
Session 3	Traveller's diarrhoea (review, causes, symptoms, prevention and treatment) and introduction to other diseases transmitted by food and water.
Session 4	Malaria (review, clinical features, prevention measures, treatment, insect bite avoidance) and other non-malarial diseases transmitted by insects.
Session 5	Environmental infections, STIs, travel vaccines and vaccine-preventable diseases.
Session 6	Travelling with chronic medical conditions, whilst pregnant, with medications or buying medications overseas. Medical kits for travellers.

6.4.3.3 Implementation of APharmTHAS™

After the staff training was complete, the service began operation and the pilot project ran from 5th July 2010 until 20th December 2010 (a total of 24 weeks). The level 2 APharmTHAS™ advisory service interviews were all performed in the private counselling room of the pharmacy.

6.4.3.4 Marketing and promotion of the APharmTHAS™ pilot

Prior to starting the pilot, several marketing and promotional activities were performed. All travel-related health products were moved to an identified travel health area in the pharmacy. In-store posters and flyers (Appendix 6.13) were produced and placed around the pharmacy and placed into the paper bags used to pack customers' purchases or prescriptions. The THAS was also promoted to local travel agents and presented at a local Travel Expo. Finally, advertisements were also placed by the pharmacy in local publications (The Townsville Bulletin®, Duo magazine® and Yellow Pages®).

6.4.4 Evaluation of the THAS model (Stage 3)

The APharmTHAS™ pre-travel service was evaluated in 3 main ways:

- Evaluation 1: Analysis of the actual activities and outcomes of the THAS during the 24 week study period.
- Evaluation 2: Analysis of the clients perceptions of the THAS
- Evaluation 3: Analysis of the perceptions of the pharmacists involved in the provision of the THAS and a financial evaluation of the service.

Figure 6.5 summarises the individual assessments and surveys used in the evaluation process.

6.4.4.1 Evaluation 1: Analysis of the actual activities and outcomes of the THAS

The data recorded in the Service Outcome Records (APharmTHAS™ leaflet evaluation) (Level 1 pre-travel service) (Appendix 6.2) and the Pre-travel Interview Schedules (Level 2 pre-travel service) (Appendix 6.4) were collated and examined for trends. The medical, vaccination and medication histories of the level 2 clients were also collated and again examined for trends. An attempt was also made to estimate the overall travel health risk of the clients. Finally, the service outcomes for both level 1 and 2 clients were collated and examined for trends in counselling topics, time taken, reason for referral and value of purchases.

6.4.4.2 Evaluation 2: Analysis of the perceptions of the clients using the THAS

Three survey instruments were used to analyse the perceptions of the clients regarding the THAS, the information resources given to the clients and their views about the role of pharmacists in the area of travel health.

6.4.4.2.1 APharmTHAS™ leaflet evaluation survey (Level 1 pre-travel service)

This survey was intended to evaluate whether clients of the level 1 pre-travel service valued a community pharmacy THAS. Once the counselling session was completed and the client had been issued with any written information resources, the client was then given a participant information

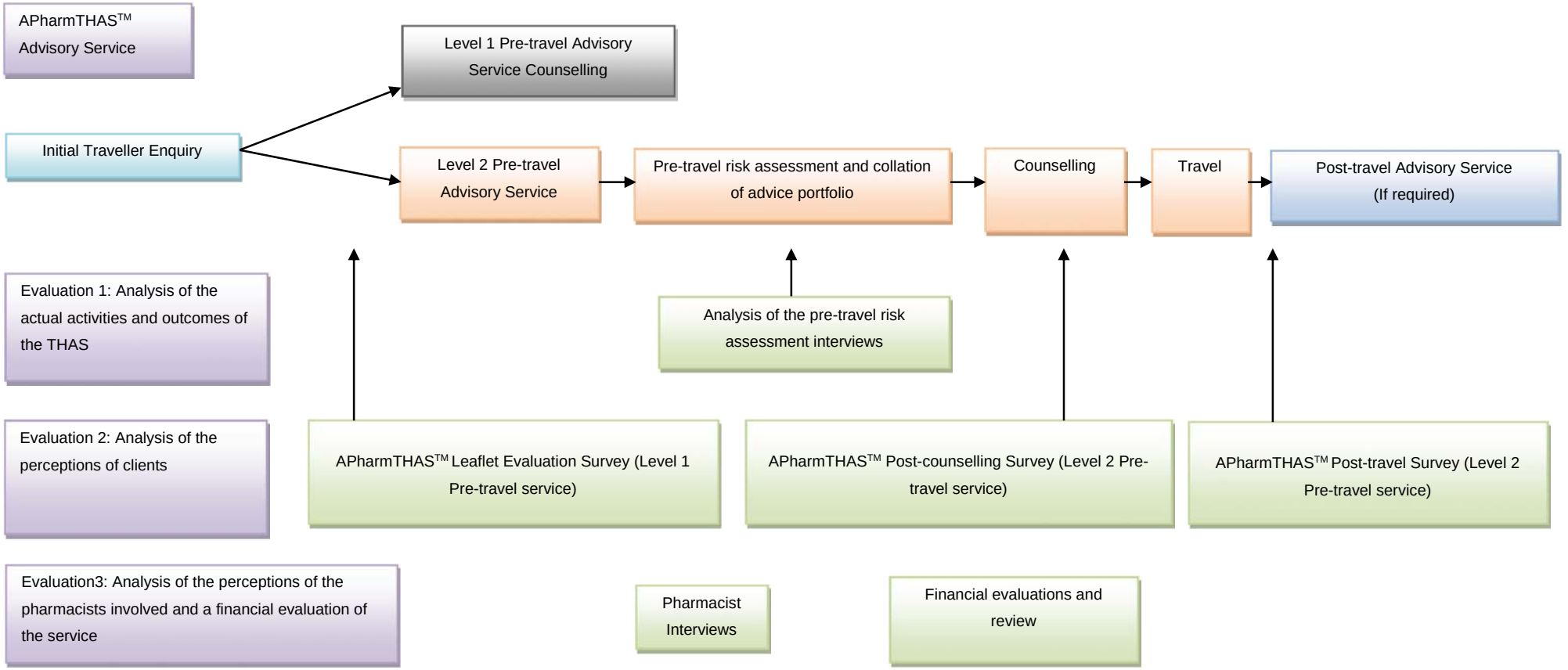


Figure 6-5 Summary of assessments used to evaluate the APharmTHAS™ advisory service

leaflet, a leaflet evaluation questionnaire (Appendix 6.14) and a stamped addressed envelope (SAE) to return the completed questionnaire. The survey consisted of three sections and 24 main questions. Using a combination of MCQs and open answer questions, sections A and B collected demographic data about the client and why they had chosen to use the community pharmacy THAS. The third and largest section (section C) of the questionnaire contained a combination of MCQs, open answer questions and rating scale questions and examined the clients' perceptions of the THAS itself, how useful they found the service to be, and whether they thought that it could be improved. Later questions focussed on how the THAS compared with other services, whether they would use the THAS again and finally, whether they would be willing to pay for the service.

6.4.4.2.2 APharmTHAS™ Post-counselling survey (Level 2 pre-travel service)

The post-counselling questionnaire (Appendix 6.15), which contained identical questions to the leaflet evaluation questionnaire, was intended to evaluate whether clients of the level 2 pre-travel service also valued the community pharmacy THAS. It was placed in the APharmTHAS™ portfolio with a SAE to return the completed questionnaire.

6.4.4.2.3 APharmTHAS™ Post-travel survey (Level 2 Pre-travel service)

The post-travel questionnaire (Appendix 6.16) was also placed in the APharmTHAS™ portfolio with a participant information leaflet and another SAE. It was intended that this questionnaire would be completed after the client had returned from their journey. The main aim of the questionnaire was to ascertain whether the client had any health problems while they were travelling, and whether the pre-travel advice they were given was useful. The questionnaire consisted of 5 sections and 30 questions. Section A consisted of a combination of MCQ and open answer questions to collect demographic data about the client, their destination and activities whilst overseas. Sections B and C used a combination of MCQs, open answer questions and rating scale questions for the client to record whether they had experienced any health problems whilst overseas and if so, to rate their severity, how they were managed and the client's experiences of overseas health services. Section D contained a combination of MCQs, open answer questions and rating scale questions to evaluate the client's perceptions of the usefulness of pre-travel health advice they had received and whether it had altered their behaviour. Finally, section E contained a series of MCQs, open answer questions and a checklist to evaluate the medications that the clients either took with them on their journey, or bought whilst overseas.

In an attempt to improve response rates, all of the three surveys contained an entry form for the client to be placed into a draw to win an Apple iPod. Also, in case further information was required, clients were asked if they would be willing to take part in telephone interviews and if so, they were asked to give signed consent to be contacted and interviewed.

6.4.4.3 Evaluation 3: Analysis of the perceptions of the pharmacists involved in the THAS and the financial evaluation of the service

6.4.4.3.1 Analysis of the views and perceptions of the pharmacists involved in the THAS

After the completion of the trial period, two pharmacists involved in the level 2 pre-travel service were interviewed. The pharmacists were presented with a participant information leaflet, gave signed consent and were then given a semi-structured interview using a standard interview schedule (Appendix 6.17). The interviews were recorded on audiotape, transcribed and a thematic analysis performed on the transcriptions.

6.4.4.3.2 Financial evaluation of the APharmTHAS™ service

In the pilot study clients were not asked to pay for the service or the resources used or supplied, but it was recognised that the service model must be commercially viable. Therefore, a financial evaluation of the service was carried out, using a break-even analysis. Finally, travellers were asked in the post-counselling questionnaire whether they would be willing to pay to use the THAS and if so, what they would be willing to pay for the service.

6.4.4.4 Human Ethics Approvals

The study was conducted under ethical approval H3515 granted by the JCU HREC (Appendix 1). An initial application was made and approved on 26th November 2009. An application for amendments was then made and approved on 11th February 2010. The approved amendments included a number of minor changes to the methodology to allow better evaluation of the THAS. These amendments included:

- the addition of semi-structured interviews to obtain the perceptions of the pharmacists operating the THAS
- the addition of optional semi-structured, telephone interviews of a sample of clients to obtain further information regarding their perceptions of the THAS
- the use of the testing procedure suggested by Sless and Shrensky in the evaluation of the Travel Tips Brochure and leaflets.

6.5 Results and Discussion

6.5.1 Evaluation 1: Analysis of the actual activities and outcomes of the THAS

During the study period, a total of 46 clients (19 level 1 and 27 level 2 clients) used the pre-travel THAS, however no clients used the post-travel THAS. The analysis of the actual activities and outcomes of the THAS focus on 3 main areas: the demographics of the clients using the THAS, an overview of the risk assessments of the clients and finally, a review of the services provided to the clients.

6.5.1.1 Demographic data

The demographic data of the THAS pre-travel service was collated and summarised in table 6.7. The gender distribution of both client groups was similar, with approximately two-thirds of the clients being female. However, the age distribution differed, with the number of level 1 clients increasing steadily with age with the peak number of level 1 clients being in the 61-70 years age group (36.8%). Whereas, the level 2 clients had a more bimodal age distribution with nearly half (48.2%) being in the youngest age group (18-30 years) and just over a quarter (25.9%) being in the 61-70 years age range.

A bimodal age distribution was also reported by Hind et al[80] with larger numbers of clients presenting to their clinic for full travel risk assessments in the 21-30 years (33.6%) and 46-60 years (27.4%) age groups compared to other age groups[80]. However, regarding gender distribution, Hind et al[80] reported an equal number of male and female patients in the Grampian study. Whereas, a retrospective review of the patient database of a pharmacist-run travel health clinic in Claremont, Southern California by Hess et al[87], reported a greater number of female patients (59%) used the service and, although a full age distribution was not reported, the mean age of the clients was said to be 47.2 years[87].

It was found that the majority of the level 2 clients lived in close proximity to the pharmacy, with 44.4% (12/27) residing in the same post code district as the pilot pharmacy, and a further 44.4% (12/27) residing in adjacent Townsville post code districts. Only 3 clients (11.1%) resided further afield. Hess et al[87] also reported that the majority of patients came from within a 15 mile radius of their pharmacy and with only a small number of patients coming from 15-100 miles from the pharmacy[87]. As with the airport study described in chapter 2, the occupation of each level 2 client was categorised into their Australian Standard Classification of Occupation (ASCO) category[114] and the top 4 occupation categories among the level 2 clients were (in order) professionals/associated professionals (6/27, 22.2%), retirees (18.5%, 5/27), managers (11.1%, 3/11) and students (7.4%, 2/27). The level 2 clients were not asked to state their income during the travel risk assessment, but 45.4% of respondents to the post-counselling survey stated that they earned greater than $60.000 a year and therefore a significant portion of the clients had above average income. Comparative pharmacy studies do not report on the range of occupations of their clients, although Hess et al[87] mentions that the clientele of their pharmacy was mainly composed of college students and retirees and that many of the respondents of their prospective survey resembled the profile of the average US traveller, which is an average age of 46 years, educated (39% with a college degree) and with above average income[87].

Finally, table 6.7 also shows that the vast majority of the THAS clients (78.9% and 81.5% for level 1 and 2 users respectively) were travelling for leisure reasons with very few business travellers. Hind et al[80] reported a greater number of business travellers (18.2%) used the Grampian service with a corresponding lower number of leisure travellers (66.4%), whereas UNWTO figures[6] suggest that 52% of travellers travel for leisure reasons and 14% for business. In this study, the relatively higher number of leisure travellers may be a result of the THAS being promoted through local travel agents, media and at local events designed specifically for tourist travellers, and not actively promoted to the local business community.

Table 6-7 Summary of the demographics of the THAS clients

		Level 1 pre-travel service (n=19)	Level 2 pre-travel service (n=27)	Total (n=46)
Gender	Male	6 (31.6%)	9 (33.3%)	15 (32.6%)
	Female	13 (68.4%)	18 (66.7%)	31 (67.4%)
Age	18-30yrs	2 (10.5%)	13 (48.2%)	15 (32.6%)
	31-40yrs	2 (10.5%)	2 (7.4%)	4 (8.7%)
	41-50yrs	4 (21.1%)	3 (11.1%)	7(15.2%)
	51-60yrs	4 (21.1%)	2 (7.4%)	6 (13.0%)
	61-70yrs	7 (36.8%)	7 (25.9%)	14 (30.5%)
Reason for travel	Leisure	15 (78.9%)	22 (81.5%)	37 (80.5%)
	Business	1 (5.3%)	0 (0%)	1 (2.2%)
	VFR	0 (0%)	3 (11.1%)	3 (6.5%)
	Leisure & business	2 (10.5%)	0 (0%)	2 (4.3%)
	Leisure & VFR	1 (5.3%)	1 (3.7%)	2 (4.3%)
	Leisure & religion	0 (0%)	1 (3.7%)	1 (2.2%
Destination (region)	SE Asia	5 (26.3%)	11 (40.7%)	16 (34.8%)
	N Asia	4 (21.1%)	0 (0%)	4 (8.7%)
	W Europe	3 (15.8%)	6 (22.2%)	9 (19.5%)
	Oceania	2 (10.5%)	3 (11.1%)	5 (10.9%)
	N America	2 (10.5%)	3 (11.1%)	5 (10.9%)
	S Africa	1 (5.3%)	2 (7.4%)	3 (6.5%)
	Others	2 (10.5%)	2 (7.4%)	4 (8.7%)
Destination (type) (Client could visit >1 area)	Major metro area	15 (79%)	24 (88.9%)	39 (84.8%)
	Tourist resort	3 (15.8%)	10 (37%)	13 (28.3%)
	Rural/remote area	1 (5.3%)	11 (40.7%)	12 (26.1%)
	Close proximity to locals	0 (0%)	4 (14.8%)	4 (8.7%)

6.5.1.2 Risk assessments of travellers using the APharmTHAS^{TM} service

The information collected from each level 2 client as part of their travel risk assessment was collated into three main areas: destination-related information and risks, travel-related information and risks and traveller-related issues and risks. Then, using a binary scoring method, the overall travel health risk of each client and the client group was estimated.

6.5.1.2.1 Destination-related information and risks

The main destinations specified by clients of the level 1 and 2 THAS were grouped into geographical regions and are summarised in table 6.7. Unsurprisingly, the most common region visited by both groups was South East Asia, as the region contains several popular tourist destinations for Australian travellers, with three South East Asian countries (Indonesia, Thailand and Singapore) being regularly listed in the top 10 tourist destinations[109]. 36.8% of level 1 clients and 44.4% of level 2 clients were intending visiting the regions of Western Europe, Oceania and North America. Again, this is not too surprising as New Zealand, USA, UK and Fiji also regularly appear in the top 10 tourist destinations for Australians[109]. The second most popular destination region for level 1 clients was North Asia (mostly Hong Kong), yet no level 2 clients intended on visiting this region. Clients may have considered Hong Kong to be a relatively safe destination and therefore opted not to request a level 2 consultation. Clients of comparative services tended to visit destinations that were popular to travellers from that specific country. For example, Hind et al[80] report that the most popular destinations for their Scottish clients were Sub-Saharan Africa (38%), South East Asia (29.2%) and the Middle East (13.1%). Whereas, Hess et al[87] report that the most popular destinations for their Californian travellers were Tanzania and a series of South American countries, including (in order) Peru, Brazil, Argentina, Ecuador and Chile.

Although many of the destinations mentioned above are tropical, the vast majority of level 1 and 2 clients were visiting low risk areas in those destinations and staying in accommodation of a relatively high standard. Overall, 85% were visiting metropolitan areas and 28.3% staying in tourist resorts, which generally have lower risk of travel-related health issues than some rural or remote areas. Only 26% of all clients were planning to visit rural or remote areas, but interestingly a higher percentage of the level 2 users (40.7%) were planning to visit these areas. Moreover, travellers should ideally obtain pre-travel health advice 2 months before their journey[18]. Therefore, it could be said that the level 2 clients were generally well organised with many obtaining pre-travel health advice well in advance of their journey (average of 6.4 weeks (range 1-20 weeks) before travel). The average duration of their journey was 19.9 days (range 7-56 days) and the majority of the users would be visiting their destination during winter (44.4%). 70.4% of the level 2 users stated that they would be mainly doing standard tourist activities such as sightseeing but 51.9% did mention some adventurous or higher risk activities, such as skiing, walking at altitude or other activities.

6.5.1.2.2 Travel-related information and risks

All level 2 clients were traveling to their planned destination by air. At their destination, they intended using a variety of transport methods, with the most common being buses (74.1%, 20/27) and cars/taxis (70.4%, 19/27), followed by trains (33.3%, 9/27), further air travel (25.9%, 7/27), boats (18.5%, 5/27) and motorcycles and walking (3.7%, 1/27 each). Most level 2 clients (88.9%, 24/27) intended on travelling in a party with others, and only 11.1% (3/27) intended on travelling with children.

6.5.1.2.3 Traveller-related issues and risks

A medical history is taken from the traveller to assist with the identification of risk factors for travel-related health problems. Initially, travellers were asked to self-rate their current overall state of health

from excellent (1) to poor (4), and the majority of level 2 clients (55.6%, 15/27) rated their overall health to be good, 29.6% (8/27) rated their overall health as excellent and 14.8% (4/27) overall health as fair. None rated their health to be poorer than fair. The average rating was 1.85. Clients were then questioned about their previous medical history and any medical problems reported were recorded, collated and are summarised in table 6.8.

Table 6-8 Overall summary of the various medical conditions and issues found amongst the level 2 clients

Disease, disorder groups or issue identified	Number (%) of level 2 clients	Number of clients with each condition within each group
Drinking alcohol	26 (96.3%)	57.7% (15/26) of alcohol drinkers expected to increase intake while overseas
History of allergy	8 (29.6%)	Nuts and food (5), medications (3), allergic rhinitis (2), animals (1).
Cardiovascular disease	8 (29.6%)	Dyslipidaemia (3), hypertension (2), previous CABG (2), DVT and blocked artery (2), previous pericarditis (1).
Respiratory disease	6 (22.2%)	Asthma (varying grades) (6)
Others in the travelling party with health risks	4 (14.8%)	
Any other chronic diseases	3 (11.1%)	Essential tremor (1), foot problems (2)
Psychiatric illness	3 (11.1%)	Anxiety disorders (2), No detail given (1)
Smoking tobacco	3 (11.1%)	The smokers smoke on average 10.7 cigarettes per day. 33% (1/3) of smokers said they will attempt to decrease intake while overseas
Endocrine disorders	2 (7.4%)	Hypothyroidism (1), Polycystic ovary syndrome (1).
Gastrointestinal disease	2 (7.4%)	Coeliac disease (1), Oesophagitis (1)
Haematological disorders	2 (7.4%)	Iron deficiency anaemia (2)
History of cancer or immunodeficiency	2 (7.4%)	BCC (1), prostate cancer (previous prostatectomy) (1)
Neurological illness	2 (7.4%)	Previous TIA (1), synesthesia (1)
Current or repeated infections	1 (3.7%)	Recurrent ear infections (as a child) (1)
Hepatic disease	1 (3.7%)	Previous jaundice (resolved) (1)

The most common risk factors identified were cardiovascular disease, respiratory disease and the risk of allergic reactions in travellers with a history of allergy. Cardiovascular events are one of the most common causes of mortality in overseas travellers[21] and nearly 30% of the level 2 clients had some pre-existing cardiac issue and a similar number had a history of allergy. It can be seen that amongst the group there was a wide range of pre-existing health problems, some of which could be problematic if they were exacerbated whilst overseas.

A vaccination history was also taken from each level 2 client using a standardised questionnaire and the responses are summarised in table 6.9.

Table 6-9 Summary of the level 2 clients' knowledge of their vaccination status

(Vaccines shaded pale orange are recommended in the NIPS, whereas those in the white section are recommended in the NIPS only for certain risk groups and those shaded blue are not recommended on the NIPS)

Vaccine	Number (and percentage) of clients who know they have:			If given the vaccine (column 1), number (and percentage) of clients who definitely knew they have had the full course of the vaccine
	Definitely had the vaccine	Definitely not had the vaccine	Not sure whether they have had the vaccine or not	
	Column 1	Column 2	Column 3	Column 4
DTPa or dTpa	22 (81.5%)	0 (0%)	5 (18.5%)	6 (27.3%)
Hib	13 (48.1%)	5 (18.5%)	9 (33.3%)	4 (30.8%)
Polio	21 (77.8%)	0 (0%)	6 (22.2%)	5 (23.8%)
Hepatitis B	23 (85.2%)	0 (0%)	4 (14.8%)	5 (21.7%)
Pneumococcal conjugate (7vPCV)	8 (29.6%)	7 (25.9%)	12 (44.4%)	4 (50.0%)
MMR	15 (55.6%)	3 (11.1%)	8 (29.6%)	4 (26.7%)
Rotavirus	1 (3.7%)	17 (63.0%)	9 (33.3%)	0 (0%)
Meningococcal C	9 (33.3%)	9 (33.3%)	9 (33.3%)	0 (0%)
Varicella	1 (3.7%)	17 (63.0%)	9 (33.3%)	0 (0%)
HPV (Females, n=18)	8 (44.4%)	4 (22.2%)	5 (27.7%)	5 (62.5%)
Influenza	10 (37.0%)	7 (25.9%)	10 (37.0%)	3 (30.0%)
Pneumococcal polysaccharide (23vPPV)	0 (0%)	14 (51.9%)	13 (48.2%)	0 (0%)
Hepatitis A*	11 (47.8%)	1 (4.3%)	11 (47.8%)	2 (18.2%)
Cholera	5 (18.5%)	13 (48.2%)	9 (33.3%)	3 (60.0%)
Japanese encephalitis	3 (11.1%)	16 (59.3%)	8 (29.6%)	1 (33.3%)
Rabies	0 (0%)	19 (70.4%)	8 (29.6%)	0 (0%)
Typhoid	10 (37.0%)	12 (44.4%)	5 (18.5%)	1 (10.0%)
Tuberculosis	6 (22.2%)	13 (48.2%)	8 (29.6%)	1 (16.7%)
Yellow fever	6 (22.2%)	13 (48.2%)	8 (29.6%)	1 (16.7%)
Tick-borne encephalitis	0 (0%)	19 (70.4%)	8 (29.6%)	0 (0%)
Q fever	0 (0%)	19 (70.4%)	8 (29.6%)	0 (0%)

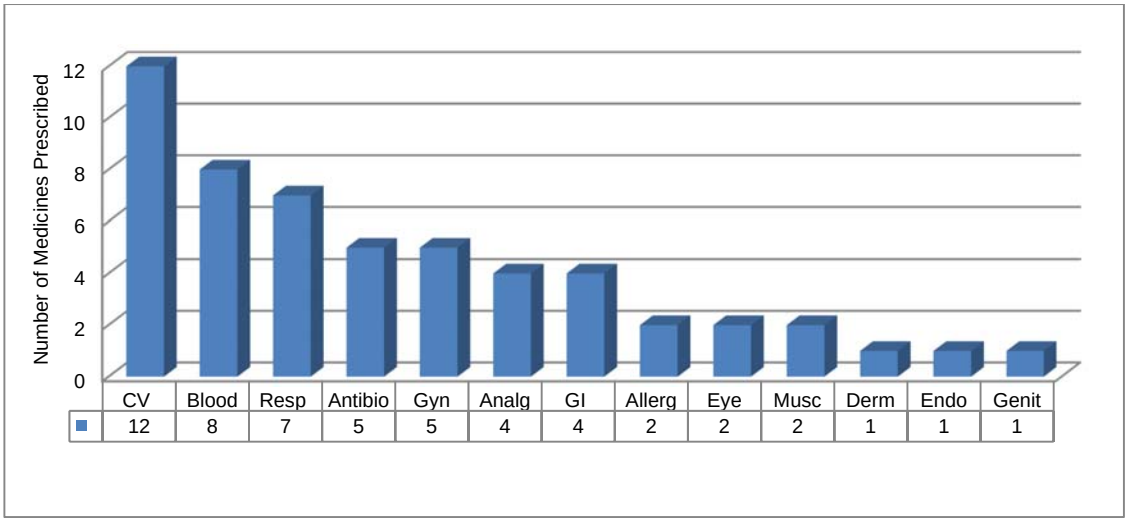
*Hepatitis A vaccine had been inadvertently missed from table 2: vaccination summary in the pre-travel vaccination summary. As a result only 23 clients were questioned about this vaccine.

The responses in column 3 show that overall, the clients had a poor knowledge of their own vaccination histories, with between 14.8% and 48.2% (average 31.08%) of the clients being unsure whether they had previously received a certain vaccine in the past. None of the clients who knew they were given a vaccine in the past could state exactly when the vaccine had been administered apart from responding with broad statements such as "probably as a child", "a while ago", "I can't remember

exactly when". In table 6.9, the vaccines are grouped based on their NIPS recommendations and by examining the responses in column 1 it can be seen that clients seemed more aware that they had received certain vaccines in the past, but not others. For example, 85.2%, 81.5% and 77.8% of users stated that they had definitely received Hepatitis B, DTPa/dTpa (Diphtheria, Tetanus and Pertussis) and Polio vaccine in the past respectively, compared with 3.7%, 3.7%, 29.6% and 33.3% of clients who stated that they had received Rotavirus, Varicella, Pneumococcal conjugate (7cPCV) and Meningococcal C vaccines respectively. Lower percentages of clients were certain that they had definitely received the travel-related vaccines such as Cholera, Yellow fever and Typhoid compared to the percentages of clients who were certain they had received the standard NIPS vaccines. Overall, the average percentage of clients who were unsure that they had received one of the travel-related vaccines in the past (28.7%) was similar to comparative figure for the standard NIPS vaccines (29%), but a lot lower than that of the NIPS vaccines available for specific patient groups (44.3%).

A medication history was also taken from each level 2 client and the data were summarised into three categories; medications prescribed for the control of chronic or pre-existing conditions, OTC medications and finally, complementary and other medications. It was found that the level 2 clients were prescribed a total of 54 medications for chronic or pre-existing conditions (range 0 - 10 medications per client, average 2.0 medications per client) and 7 clients were not prescribed any medications. The medications for chronic or pre-existing conditions were collated and categorised based on their therapeutic use according to the Australian Medicines Handbook 2012. These are summarised in figure 6.6 showing that the cardiovascular drugs were the most common group of medications (22.2%, 12/54 of the medications prescribed) which corresponds to the prevalence of cardiovascular disease amongst the clients (see table 6.8).

Figure 6-6 Types of medications prescribed to level 2 clients for chronic or pre-existing conditions



Remaining questions in the pre-travel interview schedule focussed on the client's previous travel-related health history and whether they had experienced previous travel-related health problems and if so, how these problems were managed. Only 6 (22.2%) clients reported having previous travel-related health issues, and apart from one exception, where a client was hospitalised, all reported relatively minor conditions managed with OTC remedies. The clients were asked what they would do if they

were ill whilst away on this occasion and the results are summarised in table 6.10. Many of the clients (52%) said that they would initially contact their travel insurance provider. The final question of the pre-travel interview schedule asks if the user has travel insurance, and only one client said they did not currently have travel health insurance, although they did intend purchasing it before their journey.

Table 6-10 Where clients would obtain health advice or treatment if they were ill while overseas (n=27 and clients could give more than 1 reply)

Where would clients go for health advice or treatment	Number of clients (%)
Initially contact their travel insurer	14 (52%)
Visit a local doctor or the hotel doctor	7 (26%)
Visit a local pharmacy	3 (11%)
Unsure or haven't considered the issue	3 (11%)
Visit a local hospital	2 (7%)
Actually holidaying with a doctor	1 (4%)
In an organised group, company rep will help arrange a doctor	1 (4%)

6.5.1.2.4 Estimation of overall travel health risk

A clinical estimation of the overall travel health risk of each level 2 client was made using the data collected in the pre-travel interview. Clients were clinically categorised as having a relatively low, medium or high overall travel health risk. Table 6.11 summarises these results and shows that the majority of the clients (59.3%, 16/27) were estimated to have a low overall travel health risk, whereas only 29.6% (8/27) of the clients were estimated to have a high overall travel health risk. Therefore, the majority of the THAS clientele matched the intended demographic of the service. The overall travel health risk of each client was also estimated using a systematic scoring system summarised in figure 6.7. Using the scoring system, the potential risk factors of each client were grouped into nine broad categories, if a client was found to have one or more risk factors in each particular category, they were given a score of 1 for that category. If they had no risk factors in the category, they were given the score of 0 for that particular category. The total score across all 9 categories for each client, was then calculated. An example of this scoring process is shown in figure 6.8. This process was repeated for each client and the results are also summarised in table 6.11.

It can be seen that all clients estimated clinically to have low overall travel health risk also had an overall travel health risk score of between 0 and 2, whereas those classified clinically as medium risk had an overall travel health risk score of 3 and those classified clinically as high risk had an overall travel health risk score of 4 or more. The average overall travel health risk score for the whole group was 2.56, again within the range for low to medium risk travellers, and within the intended demographic for the service. However, further testing, validation and refinement of the systematic scoring system and its relationship to the clinical estimation of overall travel health risk is required.

Figure 6-7 Flowchart of a systematic scoring system to estimate overall travel health risk

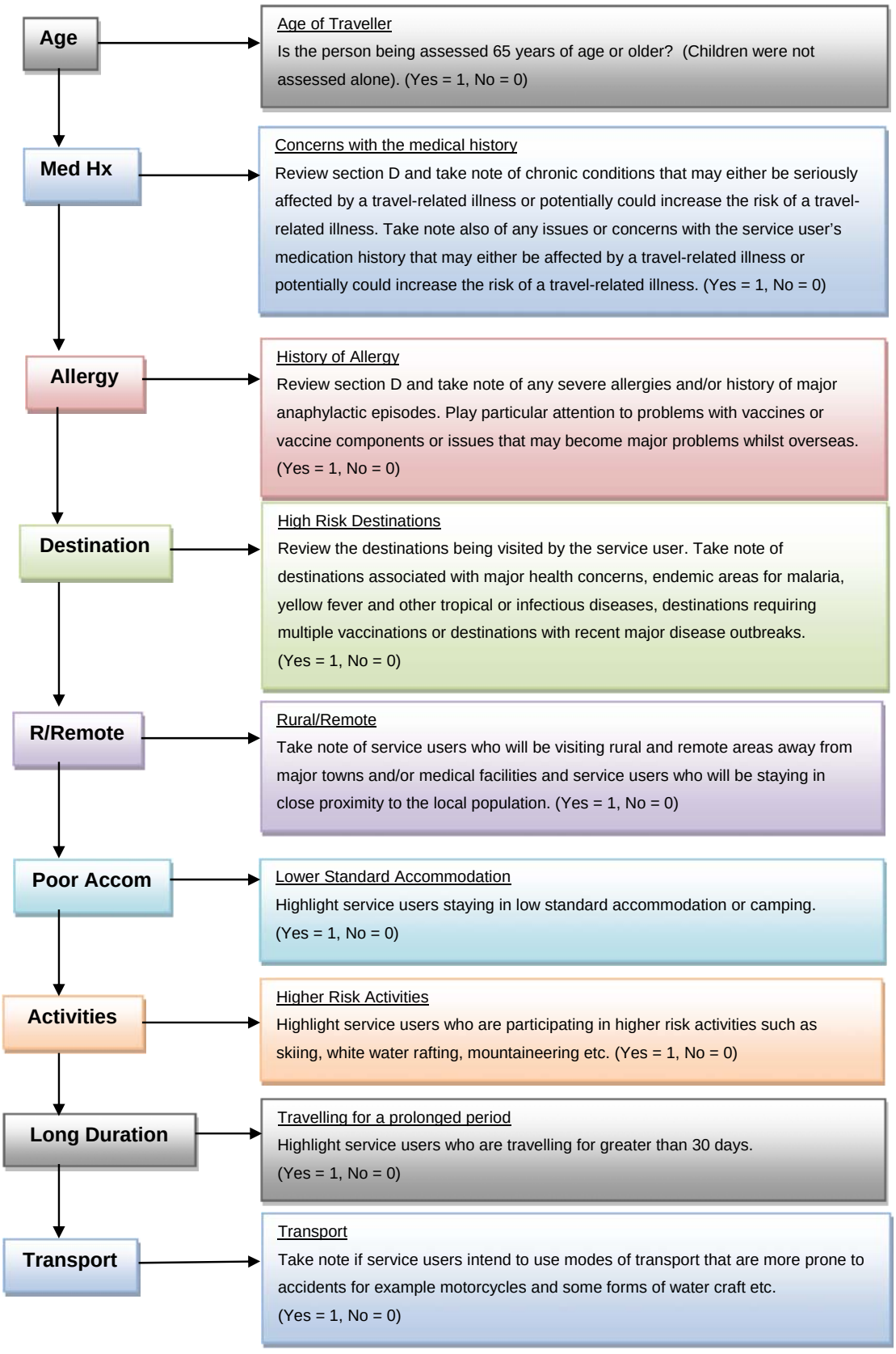


Figure 6-8 Estimation of overall travel health risk for level 2 client A3 using the systematic scoring system

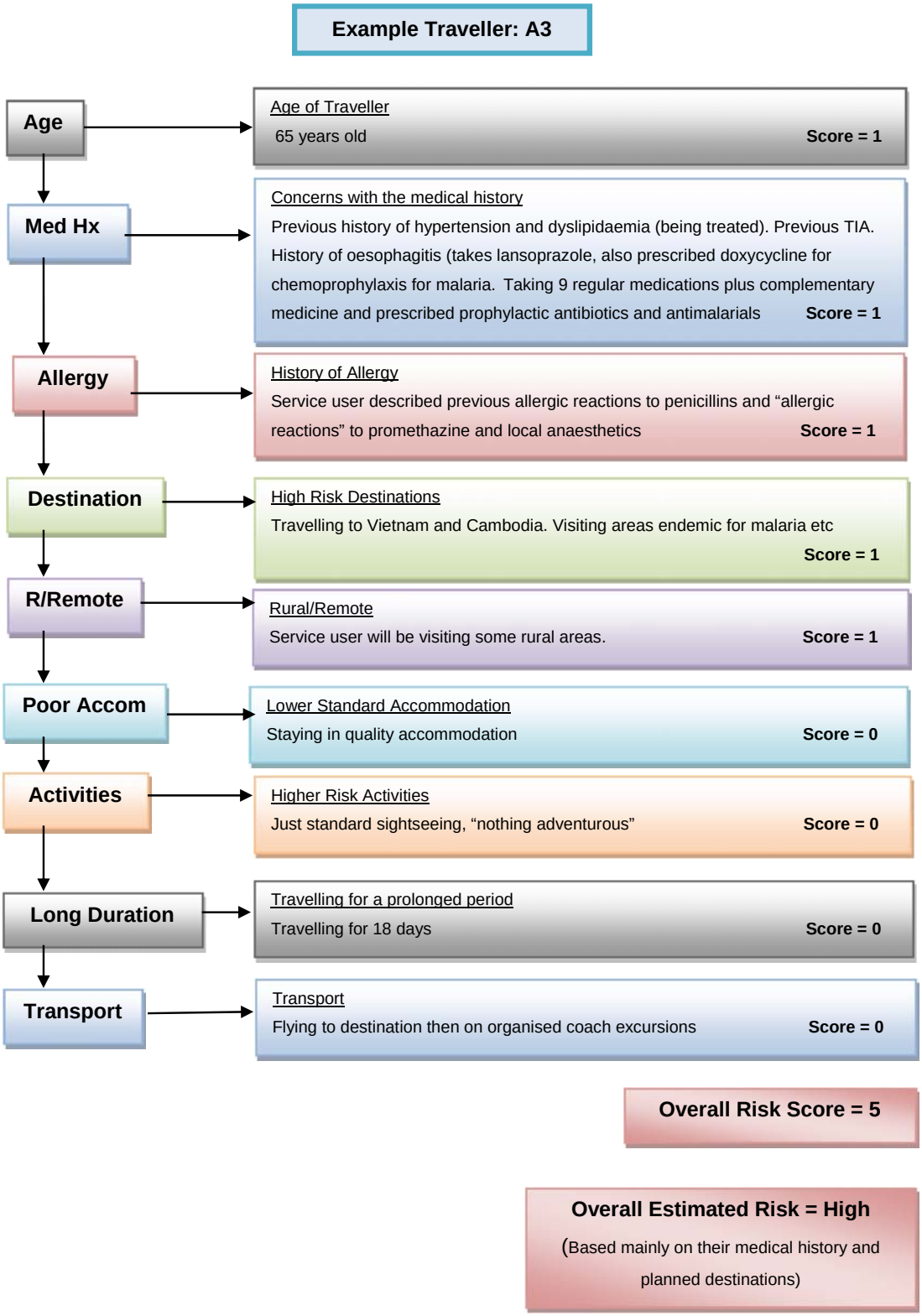


Table 6-11 Overall assessment of travel-related health risk of level 2 APharmTHAS™ pre-travel clients

Traveller	Age	Med Hx	Allergy	Destination	R/Remote	Poor Accom	Long Duration	Activities	Transport	Overall Risk Score	Overall Estimated Risk		
											Low	Medium	High
A1	1	1			1					3		Y	
A2								1		1	Y		
A3	1	1	1	1	1					5			Y
A4	1	1		1	1					4			Y
A5		1	1							2	Y		
A6						1		1		2	Y		
A7				1	1			1		3		Y	
A8				1	1	1		1		4			Y
A9			1	1	1	1		1		5			Y
A10			1	1	1	1		1		5			Y
A11		1					1	1		3		Y	
A12				1						1	Y		
A13	1	1					1	1		4			Y
A14							1	1		2	Y		
A15		1		1	1			1	1	5			Y
A16		1						1		2	Y		
A17				1					1	2	Y		
A18				1				1		2	Y		
A19				1				1		2	Y		

Table 6.11 (Continued)

Traveller	Age	Med Hx	Allergy	Destination	R/Remote	Poor Accom	Long Duration	Activities	Transport	Overall Risk Score	Overall Estimated Risk		
											Low	Medium	High
A20				1				1		2	Y		
A21					1					1	Y		
A22					1					1	Y		
A23	1			1						2	Y		
A24										0	Y		
A25										0	Y		
A26						1				1	Y		
A27		1	1	1	1			1		5			Y
Total	5 (18.5%)	9 (33.3%)	5 (18.5%)	14 (51.8%)	11 (40.7%)	5 (18.5%)	3 (11.1%)	15 (55.6%)	2 (7.4%)	69	16 (59.3%)	3 (11.1%)	8 (29.6%)
									Ave Score	2.56			

6.5.1.3 Services delivered to the users

6.5.1.3.1 Time taken for each consultation

The mean time taken for each level 1 consultation was 8 minutes (range 2-15 minutes) whereas, the mean time for each level 2 consultation was 31.5 minutes (range 15-55 minutes). Similar times are reported for other pharmacy-run travel health services. Jackson[76] reported that most Kaiser Permanente CPITC telephone consultations took 20-30 minutes. Connelly[79] also mentions that users of the Grampian service are given 30 minute appointments. Thirty minutes is a significant amount of time to spend on one consultation, especially if there is only one pharmacist working in the pharmacy. Therefore systems need to be in place to either relieve the pharmacist of other duties, whilst counselling travellers or the pharmacy would need more than one pharmacist on duty at a time.

6.5.1.3.2 Counselling and Education given

The percentage of clients counselled on each of the topics listed in the counselling checklists in sections E and C of the pre-travel interview schedule and service outcome record (APharmTHAS™ Leaflet Evaluation) respectively were calculated and the 18 most commonly counselled topics for each THAS level are listed in table 6.12. It is evident that, although the ranking of the counselling topics differs between the two client groups, that the “top 10” topics delivered to both level 1 and level 2 clients were similar. The only exceptions being that whereas, the topic “disease outbreaks at destination” appeared in the top 10 topics for level 2 clients, “medications for chronic diseases” appears in the top 10 topics for level 1 clients.

The level 2 clients received a much more structured counselling session, whereas the level 1 clients mostly only received the information required to answer their original question(s). As a result, it was noted that the level 2 clients were counselled on a much wider range of topics (26 topics in total) whereas the level 1 clients were counselled on 17 topics in total.

Although references don’t give the exact details of the counselling provided in other pharmacy-run travel health models, it appears that many topics are common to most services[76 79 80]. These include: malaria risk, insect protection, precautions to ensure safe water and food consumption, sun exposure/heat protection, prevention and management of gastro-intestinal problems, motion sickness, jet lag, immunisations and disease prevention. Most pharmacy-run services also provide their clients with written information or an information booklet, but few details are given as to the exact contents of their counselling sessions or leaflets[76 86].

6.5.1.3.3 Referral patterns

The referral patterns for the two service levels were evaluated. 26.3% (5/19) of level 1 clients were referred to other health professionals after their THAS consultation. Two of these clients were referred to their GP (1 client required vaccinations and 1 client required further assessment for potential DVT/VTE risk) and 3 clients were “referred” for a full level 2 pre-travel assessment.

40.7% (11/27) of the level 2 clients were referred to their GP. All of the referred level 2 clients required vaccinations (9 clients required typhoid vaccinations, 4 clients required cholera and hepatitis A,

Table 6-12 Summary of Counselling Topics delivered to THAS clients

	Level 1 Service		Level 2 Service		Combination of both services	
Rank	Counselling topic	% of clients	Counselling topic	% of clients	Counselling topic	% of clients
1	Traveller's diarrhoea	63.2	Food and water precautions	88.9	Traveller's diarrhoea	73.9
2	Food and water precautions	47.4	Disease risks at destination	85.2	Food and water precautions	71.7
3	Medications (general)	47.4	Traveller's diarrhoea	81.5	Insect precautions (general)	63.0
4	Insect precautions (general)	42.1	Insect precautions (general)	77.8	Disease risks at destination	60.9
5	Bite prevention	36.8	Bite prevention	66.7	Bite prevention	54.3
6	DVT/VTE prevention	36.8	Malaria	48.2	Malaria	41.3
7	Malaria	31.6	First aid kits	44.4	First aid kits	39.1
8	First aid kits	31.6	Disease outbreaks at destination	44.4	DVT/VTE prevention	39.1
9	Medications for chronic diseases	31.6	DVT/VTE prevention	40.7	Medications (general)	39.1
10	Disease risks at destination	26.3	Medications (general)	33.3	Disease outbreaks at destination	32.6
11	Motion sickness	26.3	Environmental risks (general)	33.3	Motion sickness	26.1
12	Travel-specific medications	21.1	Water-borne diseases	33.3	Travel-specific medications	23.9
13	Jet lag	21.1	Obtaining medications overseas	29.6	Environmental risks (general)	21.7
14	Disease outbreaks at destination	15.8	Vector-borne diseases	29.6	Water-borne diseases	21.7
15	Environmental risks (general)	5.3	Motion sickness	25.9	Jet lag	21.7
16	Water-borne diseases	5.3	Travel-specific medications	25.9	Medications for chronic diseases	21.7
17	Obtaining medications overseas	5.3	Jet lag	22.2	Obtaining medications overseas	19.6
18	Vector-borne diseases	0.0	Self-treatment and prophylaxis	22.2	Vector-borne diseases	17.4

2 clients required rabies and meningococcal ACWY and 1 client required hepatitis B and polio) . As well as vaccinations, 3 clients required prescriptions for antimalarial medications, 2 clients required prescriptions for antimicrobials and 2 clients required other prescription medications for their journey. Finally, one client was referred for the further evaluation of a chronic ailment.

Many of the pharmacy-run travel health services operating in countries such as the UK and USA, are able to administer vaccines and supply travel-related medications with patient group directives or under physician supervised protocols, and therefore, it is assumed that lower numbers of travellers are referred. Hind at al[80] for example, mentioned that 72% of survey respondents in the Grampian study received vaccinations, 50% received antimalarial medications and only 18.6% of respondents were referred to their doctor or medical travel health clinic.

6.5.1.3.4 Purchasing patterns of level 1 and level 2 APharmTHAS™ clients

A record was made of each client's purchases at the time of their consultation, and these are summarised in table 6.13. Interestingly, relatively more level 1 clients (52.6%, 10/19) purchased items than level 2 clients (14.8%, 4/47). A possible explanation for this trend was that level 1 clients may have visited the pharmacy with the intention of having a relatively quick consultation to answer a specific travel-related query, and were therefore more amenable to buying the 1-2 products recommended in response to that particular query. Whereas, level 2 clients were counselled on a wider range of topics, and in many cases were then presented with a lot of information and a long list of recommended vaccinations and suitable items to purchase before their journey. Many level 2 clients, especially those who were also referred for vaccinations, said that they would return to the pharmacy at a later date to purchase items. It would have been difficult to record the number of level 2 clients who did actually return, and what they purchased, and so this was not attempted. The level 1 clients who did purchase items had a higher minimum sale value than the level 2 clients, but the level 2 clients had a higher maximum sale value and a higher average sale value. However, when average sales are calculated for total clients, the amount for the level 2 clients, in particular, is very low ($5.68), but there is potential for improvement. The pilot study was focussed on providing an information service to travellers and increased sales were not considered to be a major aim or outcome for the study. Therefore, aggressive companion selling was not promoted. Also, 22.2% of the level 2 clients were interviewed by the investigator who, being a former hospital clinical pharmacist by training, was unused to the aggressive companion sale of OTC products. There are potential groups of clients that could be targeted with a system of appropriate and professional companion selling to increase sales. If the average sale per level 2 client was increased to that of the current average sale per level 1 client ($17.54), it would represent at 209% increase in sales and could have a major effect on the financial viability of the service. Purchasing patterns do not appear to be reported in the published reviews of other pharmacy-run travel health services.

Table 6-13 Purchases made by level 1 and level 2 clients

	Level 1 Clients	Level 2 Clients	Total
Total number of clients	19	27	46
Number of clients who purchased items (% of total users)	10 (52.6%)	4 (14.8%)	14 (30.4%)
Minimum sale value for clients who purchased items	$8.15	$3.95	$3.95
Maximum sale value for clients who purchased items	$62.90	$111.80	$111.80
Total sale value for clients who purchased items	$333.34	$153.25	$486.59
Average sale value for clients who purchased items	$33.33	$38.31	$34.76
Average sale value for all clients	$17.54	$5.68	$10.58
Items purchased	Antidiarrhoeal (7) Insect repellent (2) Motion sickness (1) Complementary medications (2) Antihistamine (1) Analgesic (1) Cough & cold remedy (1) Prescription items (1) First aid kit (1) Travel stockings (1) Water purifying tabs (1) Toilet seat covers (1)	Antidiarrhoeal (2) Insect repellent (2) Toiletries (2) Motion sickness (1) Antihistamine (1) Analgesic (1) Acid reflux (1) Antifungal cream (1) Salbutamol Inhaler (1) First Aid Kit (1) Water purifying tabs (1)	

6.5.2 Evaluation 2: Analysis of the perceptions of the clients using the THAS

Three client surveys were used to analyse the clients' perceptions of the THAS. All level 1 clients were given a leaflet evaluation questionnaire to complete and return by post. The APharmTHAS™ portfolio was given to all level 2 pre-travel clients, which contained two postal surveys, the post-counselling questionnaire, which contained the same questions as the leaflet evaluation questionnaire, and the post-travel questionnaire. Only 3 responses (response rate 15.8%) were received from the level 1 clients to the leaflet evaluation survey. 11 responses (response rate 40.7%) were received for the post-counselling survey, but only 7 responses (response rate 25.9%) were received for the post-travel survey. Response rates to corresponding surveys in other studies also varied, Hess et al[87] noted that the response rate to their prospective survey was 29%. Whereas, Hind et al[73 80] noted that the response rate to their evaluation survey was relatively high (71.2%), but with their needs assessment survey it was only 40%.

6.5.2.1 Demographic information

The demographic data collected from the respondents to the three client surveys is summarised in table 6.14. The gender distribution of the respondents to the leaflet evaluation survey was similar to that of the parent group however, the number of respondents is small. Whereas, there were proportionally more female respondents among the respondents to the post-counselling and post-travel surveys compared to the parent group.

Table 6-14 Summary of demographic data of respondents to the client surveys

		Total clients		Survey respondents		
		Level 1 pre-travel service	Level 2 pre-travel service	Leaflet evaluation survey (Level 1)	Post-counselling survey (Level 2)	Post-travel survey (Level 2)
Number of clients/respondents		19	27	3	11	7
Gender	Male (%)	31.6	33.3	33.3	9.1	14.3
	Female (%)	68.4	66.7	66.7	90.9	85.7
Age	18-30yrs (%)	10.5	48.2	0.0	27.3	42.9
	31-40yrs (%)	10.5	7.4	0.0	0.0	0.0
	41-50yrs (%)	21.1	11.1	66.7	9.1	0.0
	51-60yrs (%)	21.1	7.4	0.0	27.3	14.3
	61-70yrs (%)	36.8	25.9	33.3	36.4	42.9

Table 6.14 also shows that the age distribution of the respondents to the leaflet evaluation survey (level 1) is very different to that of the parent group. Whereas, although the age distribution of the respondents to the post-counselling and post-travel surveys does not match exactly the age distribution of the parent group, a bimodal pattern is also seen.

6.5.2.2 Clients' reasons for choosing to use the THAS

Just over half of the level 2 post-counselling survey respondents (54.5%, 6/11) stated that they had decided to use the THAS because it had been recommended to them, either by their travel agent (3 clients) or by the pharmacy staff (3 clients). Other reasons given included convenience (36.4%, 4/11) and advertising (27.3%, 3/11). The THAS had also been recommended to 66.7% (2/3) of the level 1 leaflet evaluation survey respondents, with 33.3% (1/3) also choosing it for its convenience and 33.3% (1/3) because it had been advertised.

In other studies, both Hess et al[87] and Hind et al[80] reported that convenience also rated highly as a reason why patients chose to use pharmacy-run travel health services[80 87]. In the Grampian pilot study, 23% of respondents said that the venue was convenient, 16% said the time of the appointment was convenient and 15% went to the pharmacy-run service because they could get an early

appointment[80]. Another 14% chose to use the pharmacy-run service because their own GPs did not offer travel health services[80].

Just over half of the level 2 post-counselling survey respondents (54.5%, 6/11) had sought advice from other information sources before using the THAS. Other sources included their GP (50%, 3/6), travel agent (33.3%, 2/6), the internet (33.3%, 2/6), family and friends (33.3%, 2/6), books (16.7%, 1/6) and a travel clinic (16.7%, 1/6). All level 1 leaflet evaluation survey respondents had used other sources of information before using the THAS. All had visited their GP, two thirds had visited their travel agent and a third had used the internet.

After using the THAS, 36.4% (4/11) of the level 2 post-counselling survey respondents said that they would seek further advice from another information source: 75% (3/4) GP, 75% (3/4) internet, 25% (1/4) travel clinic, 25% (1/4) travel agent and 25% (1/4) another pharmacist.

A higher proportion (66.7%, 2/3) of the level 1 leaflet evaluation survey respondents said that they would go to a further source of information after using the THAS, both respondents said they would visit their GP and one respondent said they would visit another pharmacist or travel agent.

6.5.2.3 Clients perceptions of the usefulness of the THAS

Firstly, respondents were asked to give an overall rating for the THAS using a 10-point Likert scale (1-very poor to 10-excellent). 73% (8/11) of the level 2 post-counselling survey respondents rated the service as 9/10 or greater, and none rated the service below 7/10 (average rating was 9.0). Likewise, the average rating given by the level 1 leaflet evaluation survey respondents was 8.7 and none rated the service less than 7. This is comparable with other studies, as Hind et al[80] found clients of the Grampian service gave a median score of 10/10 (interquartile range 9-10) in response in response to a similar rating scale question using a 10-point Likert scale with 10 meaning excellent service.

Respondents to the 2 surveys were also asked to rate the quality and usefulness of the THAS using 5-point Likert scales, this time rating from 1-very high quality to 5-very poor quality and 1-very useful to 5-totally useless respectively. Again, clients rated the service very highly, with 81.8% (9/11) of level 2 post-counselling survey respondents rating the quality of the service as 1 (very high quality) and none rated the service below 2 (good quality) (average quality rating was 1.2). For usefulness, 81.8% (9/11) rated the service as 1 (very useful) and none rated the service below 3 (slightly useful) (average usefulness rating was 1.3). Similar results were noted with the level 1 leaflet evaluation survey respondents, with an average rating of 1.3 for both quality and usefulness.

Questions 14-16 of both the leaflet evaluation and post-counselling surveys asked respondents to rate their level of agreement/disagreement to a total of 25 statements about the THAS and the general role of pharmacists in the area of travel health. Table 6.15 lists the average rating for each of statement. (Due to the low numbers of respondents, the significance of any difference in the distribution of ratings between the 2 surveys was not tested).

The responses to the statements in Question 14 show that overall, both client groups were happy with their respective interviews. The interview was not too long, nor did the pharmacist ask too many questions and wasn't too intrusive. The pharmacist had a good interview technique and a pleasant

manner. Importantly, whereas the medical practitioners surveyed in chapter 4 expressed concerns about the level of privacy available in pharmacies, in contrast the THAS clients appeared happy with both the level of privacy in the pharmacy and the fact that any information given to the pharmacist would be kept in confidence. There appeared to be no major difference between the responses of the two groups towards the statements in question 14.

The responses to the statements in Question 15 show that both groups of clients were happy with the information and counselling that they received, they also appear to be confident that the information given to them was of high quality, was correct and up to date, and that they were not given too much information or in a manner, that they did not understand. They did not feel that the pharmacist took too long when counselling them or gave them too much written information and felt that the written information given to them was clear, concise, easy to understand and would be useful when they travel. In the Grampian study, Hind et al[80] mentions the use of a combination of open answer questions to elicit the views of their clients. They report similar findings in that overall, their respondents were happy with the level of professionalism, courtesy and confidentiality shown by the pharmacist, that 98% of respondents were happy to use the service again and that 81.4% thought the service offered value for money. Gatewood et al[86] also reports that the Ukrop pharmacy travel health service was well received by clients and medical staff and that 100% of clients were satisfied/very satisfied with the knowledge and abilities of the pharmacist.

The final group of statements (Question 16) focussed on the clients attitudes towards the general role of the pharmacist in the area of travel health. It would appear that the clients who responded to the surveys feel that pharmacists do have a role in the area of travel health and that they are happy to visit the pharmacist to discuss travel-related problems. Respondents appeared less positive towards statement 16e however, because the majority of level 2 post-counselling survey respondents (63.6%, 7/11) and 33.3% (1/3) of level 1 leaflet evaluation survey respondents disagreed/strongly disagreed with the statement. Only 1 respondent (a level 2 post-counselling survey respondent) actually agreed with the statement 16e (the remaining respondents were unsure). It can therefore be said that most felt that pharmacists were adequately trained to provide travel health advice.

A difference of opinion to statement 6f was evident between the 2 client groups. 63.6% (7/11) of level 2 post-counselling survey respondents agreed/strongly agreed to statement 16f, whereas 66.6% (2/3) of level 1 leaflet evaluation survey respondents disagreed/strongly disagreed with the statement. This suggests that level 2 clients agreed that pharmacists should be able to administer vaccines and supply antimalarials without prescription, whereas level 1 clients did not. However, the number of level 1 respondents was low, but it would have been worthwhile to investigate this trend further.

In their initial needs assessment study, Hind et al[73] found that 58.9% of potential travellers agreed/strongly agreed that they would use a community pharmacy to provide travel immunisations and 74.8% agreed/strongly agreed that community pharmacies would be convenient locations for travel health services[73]. 70% of respondents also agreed/strongly agreed that they could provide a one-stop shop and 43% of respondents said they would be willing to pay for travel health services from pharmacies[73].

Table 6-15 Summary of average ratings to questions 14-16 in the leaflet evaluation and post-counselling surveys

		Average score – level 1 clients (n=3) (Scale 1-5*)	Average score – level 2 clients (n=11) (Scale 1-5*)
Q14 Statements about the APharmTHAS™ service and interview			
a	The interview with the pharmacist took too long. I would have liked a shorter interview	4.3	4.2
b	The pharmacist asked too many questions.	4.3	4.1
c	The pharmacist was very professional when he/she interviewed me.	1.3	1.3
d	The pharmacist had a good interview technique and a pleasant manner.	1.7	1.3
e	It was difficult to remember all of the information I needed to answer the pharmacist's questions.	4.0	3.7
f	I felt comfortable answering all of the pharmacist's questions. None of the questions were too personal or intrusive.	1.3	1.5
g	I was happy with the level of privacy in the pharmacy	1.7	1.4
h	I was happy that all of the information I gave the pharmacist would be confidential	1.7	1.4
Q15 Statements about the APharmTHAS™ service and information given to the clients			
a	I was confident that all of the information that the pharmacist gave me was correct and up to date.	1.3	1.5
b	I could understand everything that the pharmacist told me	1.3	1.5
c	The pharmacist told me too much, I was swamped with too much information	4.3	4.2
d	The pharmacist took too long in explaining what I needed to know.	4.3	4.3
e	I do not need to know about many of the things the pharmacist explained.	4.7	4.2
f	I was given too much written information.	4.7	4.2
g	The written information given was clear, concise and easy to understand.	1.3	1.5
h	The written information will be useful when I go away, as I may have forgotten some of the information that the pharmacist told me before I go.	2.0	1.6
i	The information I received from the travel health advisory service is of a high quality	1.3	1.5
Q16 Statements about the APharmTHAS™ service and whether pharmacists should offer travel health services			
a	Pharmacies should not provide travel health services. It is not an appropriate role for pharmacists.	4.3	4.6
b	I am just as happy and confident to see a pharmacist for travel health advice as see my doctor.	1.7	2.1
c	Some travellers do not see a doctor before they travel because they think they are not at risk of health problems. The pharmacist can help these travellers decide whether they need to visit the doctor for a vaccination before they travel.	2.0	1.5
d	Pharmacists can advise travellers on what medications to take with them on their journey.	2.0	1.6
e	Pharmacists need more training to give travel health advice. They do not know enough about travel health risks.	3.7	3.6
f	Pharmacies would be able to offer better travel health services if the traveller could also get vaccinations and malaria tablets at the pharmacy without having to see a doctor.	4.0	2.5
g	More pharmacies should offer travel health advisory services.	1.3	1.6
h	This service was more convenient than making an appointment to see my doctor.	2.7	1.7

(*Scale: 1-Strongly agree, 2-Agree, 3-Neither agree nor disagree, 4-Disagree, 5-Strongly disagree)

6.5.2.4 Comparison of the THAS with other travel health services

Respondents were asked if they had obtained travel health advice for previous journeys, and if so, where had they obtained that advice and how did the THAS service compare with the other service provider. 54.5% (6/11) of the level 2 post-counselling survey respondents had obtained travel health advice for previous journeys, of these, all (100%, 6/6) had used their GP and 16.7% (1/6) had each obtained travel health advice from the internet, a travel agent or from a pharmacist. Only one level 1 leaflet evaluation survey respondent (33.3%, 1/3) had previously obtained travel health advice, and they had obtained the advice from three sources (their GP, the internet and a pharmacist). For those clients who had never previously obtained pre-travel health advice, 57% (4/7) had not obtained advice because this was their first overseas trip (or first overseas trip as an adult), 28.6% (2/7) did not realise they needed pre-travel health advice and 14.4% (1/7) did not give a reason.

Those travellers who had been given pre-travel health advice for previous journeys were asked to compare the advice given in terms of quality and usefulness. 66.7% (4/6) of level 2 respondents stated that the quality of the advice given by the other sources were similar to, or poorer than that of the THAS, and 33.3% (2/6) reported that the advice given by the other service was superior in quality than the advice given by the THAS. When comparing the usefulness of the advice given, 50% (3/6) claimed similar usefulness and 50% (3/6) claimed that the other service was less useful than that given by the THAS.

All (100%, 14/14) level 1 and 2 survey respondents stated that they would use the THAS again and would recommend it to other travellers.

6.5.2.5 Payment for service

During the pilot project, the THAS was offered as a free service. However, to be commercially viable and to encourage pharmacists to develop such services, it should at least break even and preferably make a profit. Therefore, in both the leaflet evaluation and post-counselling surveys, clients were asked if they would be willing to pay for the service and if so, how much they would be willing to pay. 81.8% (9/11) of level 2 respondents and 33.3% (1/3) of level 1 respondents said that they would be willing to pay to use the service again, and were willing to pay an average of $32 (range $10 to $50) per assessment. This amount is relatively low compared to the time taken to assess and inform the patient (average 31 minutes), the average pay scale of an employee pharmacist ($35 per hour), and the comparable appointment fees of other health professionals. This may be due to the fact that many Australians are unused to paying for services from pharmacies. Reasons given for an unwillingness to pay were that they felt that the service should be covered by Medicare and one client mentioned that they could visit their doctor at work for free. The published literature discusses how travel health services are funded in other countries and that they are generally not paid for by government-funded health care systems and some private health insurance schemes and that in most countries, some level of co-payment is made by the traveller[73 80 86 87]. Hind et al[73] reported that only 43% of respondents would be willing to pay for a full travel-risk assessment and that the median amount they

were willing to pay was £10 ($15-20 AUD). These are lower than the findings of this study, suggesting that UK NHS patients are even less willing to pay for these services than Queenslanders.

6.5.2.6 Final comments

The leaflet evaluation and post-counselling survey contained a final, open answer question to allow respondents to make any comments they wished at the end of the survey. 63.6% (7/11) of the level 2 post-counselling survey respondents made comments and these are listed in table 6.16. No comments were received from the level 1 respondents.

Table 6-16 Final responses for the level 2 clients on the post-counselling questionnaire

Client Number	Client's comments
B1	"Travel health recommendations from different sources can often be vague and sometimes conflicting, especially in regard to non-compulsory vaccinations and preventative medicines. It was good to speak with (name of the pharmacist) who provided up to date information and a print out on general travel health, as well as health matters specific to the individual countries in South America we are to visit. This has enabled me to make decisions about malaria prevention (the maps of the high risk malaria areas in each country were very clear and helpful) and the problem of altitude sickness, which we may encounter".
B6	"This service is a good idea particularly if you are travelling to high risk destinations (both health and personal risks). It helps to determine if you need certain vaccinations or medication and then seek a doctor's appointment if required".
B7	"This was so good for me. Pharmacy staff very professional. Made me feel confident to travel by myself. Being 63 I now feel confident for overseas travel"
B8	"Fantastic idea and was very informative and helpful. Would be great if it was a one stop shop where advice, medication and vaccinations were available as well as post travel consultation to see if any health concerns have arisen".
B9	"Comment to question 19: I had to go to great effort to find advice. Comment to Q 24: Thank you for a service that up to now was almost impossible to find".
B10	"Thank you - would be good to see this service spread".
B11	"It was pleasant and friendly to talk to someone who is aware of the whole family's health risks and needs all in one session. Without tying up a doctor who is hard to get an appointment for".

The number of responses was small and so a full thematic analysis was not performed however, some common trends were still noted. All respondents appeared positive towards the service and at least five felt that the service was a good idea and/or expressed that it should be expanded to other pharmacies. Other comments insinuate that travellers sometimes receive vague and/or conflicting advice about some travel-related health issues and in the past they have had difficulty obtaining pre-travel health advice in the Townsville region. Positive comments received from respondents included that they thought the staff operating the APharmTHAS^{TM} service were friendly, professional and provided up to date, country-specific information.

6.5.2.7 Post-travel survey

A total of 7 post-travel questionnaires were received from level 2 clients (response rate 25.9%) and the gender distribution was not too dissimilar to that of the post-counselling questionnaire (14.3%

male, 85.7% female compared with 9.1% male, 90.9% female with the post-counselling questionnaire). A bimodal age distribution was also evident in the post-travel survey respondents with 42.9% (3/7) of respondents aged 18-30 years, 14.3% (1/7) aged 51-60 years and 42.9% (3/7) aged 61-70 years.

Section B of the questionnaire focussed on the health problems experienced by the clients, while they were overseas. 71.4% (5/7) of the respondents reported a total of 6 episodes of illness while overseas, and as is often reported in the literature the majority of respondents reported that their illness was mild and had little or no effect on their journey[18 21 23 224]. Using a 5-point Likert scale (range 1-very minor illness to 5-very severe illness), the majority of illness episodes (66.6%, 4/6) were rated grade 2/5, with one episode (16.7%) being rated grade 1/5 and only one episode rated grade 4/5. Most respondents (60%, 3/5) said that their illness only caused a minor disruption to their journey and they were still able to do most of their planned activities. The six illness episodes included 4 cases of diarrhoea and gastric disturbance and 1 case each of the common cold and a minor wound, and most respondents used a combination of non-pharmacological measures, OTC remedies and first aid items to manage the illness.

Section C of the questionnaire focussed on the health care services that the travellers had used whilst overseas. One respondent reported having an antibiotic injection administered by a doctor and two respondents reported visiting a local pharmacy. The average cost incurred was $AUD78.77 (range $AUD0.00 to $AUD216.32) and the three travellers paid the full costs themselves, although one noted that they were hoping to be reimbursed by their travel insurer. Respondents who did rate the healthcare services they visited while overseas, rated the overall quality of the service to be an average of 4.5/10 (1-very poor to 10-excellent) (n=2, range 4-5) and 2.7/5 in comparison with Australian services (1-much poorer to 5-far superior) (n=3, range 2-3).

Section D of the questionnaire focussed on whether the clients thought that the pre-travel advice received from the THAS was useful while they were travelling. 85.7% (6/7) of the respondents said that they had used some of the pre-travel advice on their journey. The most useful pieces of information were reported to be malaria prevention (3/7 respondents) and one respondent each mentioned food and water precautions, general travel advice and what to ask their doctor. Respondents were also asked which of the information leaflets in the APharmTHAS™ portfolio were most useful on their journey. 85.7% (6/7) of respondents found the MASTA health brief and the traveller's diarrhoea and travelling with medications sections of the APharmTHAS™ Travel Tips brochure useful, whereas 71.4% (5/7) of respondents found the insect bite prevention, malaria, travel sickness and first aid kits for travellers sections of the APharmTHAS™ Travel Tips brochure useful. Only 57.1% of the respondents found the VTE section of the APharmTHAS™ Travel Tips brochure to be useful. In a rating scale question, using a 5-point Likert scale, respondents were also asked to rate their level of agreement/disagreement with 7 statements about the pre-travel written information they were given and the results are summarised in table 6.17.

Table 6-17 Summary of the average ratings of the statements in question 22 of the post-travel survey

Statement	Average rating (Scale 1-5*)	Range of rating (Scale 1-5*)
The written material provided was relevant and useful for my journey	1.4	1-2
The written material provided increased my knowledge about travel-related health risks	1.6	1-2
After reading the written material, I understood what precautions to take to prevent health problems on my journey	1.6	1-3
The written material helped me feel more confident about dealing with health problems while on my journey	1.6	1-3
After reading the written material I was better prepared for my journey	1.4	1-2
The information was presented in a logical manner	1.4	1-2
I followed the precautions suggested in the written material	1.9	1-3

(*Scale: 1-Strongly agree, 2-Agree, 3-Neither agree nor disagree, 4-Disagree, 5-Strongly disagree)

57.1% (4/7) of respondents felt that the information given had altered their behaviour and/or the precautions they had taken while overseas. The final section (section E) of the post-travel questionnaire focussed on the medication that the respondent took with them on their journey, summarised in table 6.18. Only one of the respondents bought medications while overseas, purchasing a cough remedy, antiseptic and some dressings. Respondents were asked if they had any concerns about taking medications with them on their journey, or about buying medication at their destination. One respondent (14.3%) expressed concerns about carrying unlabelled medications on their journey however, no problems were experienced. Three respondents (42.9%) expressed concerns about potential language barriers when purchasing medications whilst overseas.

Table 6-18 Summary of the medication taken by post-travel survey respondents on their journey

Medication	Number of respondents	Medication	Number of respondents
Antidiarrhoeal medications	7 (100%)	First Aid Kit	4 (57.1%)
Analgesics or pain killer	6 (85.7%)	Complementary medications	4 (57.1%)
Antihistamines	6 (85.7%)	Antimalarial medications	3 (42.9%)
Sunscreens	6 (85.7%)	Laxatives	2 (28.6%)
Creams and ointments - general	6 (85.7%)	Inhalers	2 (28.6%)
Antibiotics	5 (71.4%)	Condoms	2 (28.6%)
Insect repellent	5 (71.4%)	Antacids or indigestion remedies	1 (14.3%)
Antiseptics	5 (71.4%)	Sleeping tablets	1 (14.3%)
Dressings	5 (71.4%)	Oral contraceptives	1 (14.3%)
Regular chronic medications	4 (57.1%)	Thermometer	1 (14.3%)
Cough or cold remedies	4 (57.1%)		

6.5.3 Evaluation 3: Analysis of the perceptions of the pharmacists involved in the THAS and a financial evaluation of the service

6.5.3.1 Perceptions of the pharmacists involved in the provision of the THAS

Two pharmacists were interviewed by the investigator using a standard interview schedule consisting of 12 main questions, responses were recorded in writing and the interview audiotaped. An interpretive thematic analysis was performed to identify and report on patterns within the data using the methods and techniques described by the authors Braun and Clarke[106], Liamputtong and Serry[107] and Liamputtong[108]. The 12 questions may be grouped into 5 main areas; general comments about the pharmacist's role in travel health, the THAS service model itself, whether the pharmacists thought that clients valued the service, their views of introducing telephone counselling into the service and finally, any other comments that the pharmacists wished to add.

6.5.3.1.1 General comments about the role of pharmacists in travel health

Both pharmacists agreed that pharmacists do have a role in the area of travel health, mainly because of their accessibility. They felt pharmacies should provide services of the type offered in this study:

> *"What we were doing* (in the pilot study)*…general* (travel) *advice, up to date vaccination* (advice)*….other things they* (the travellers) *should take with them".* (P1)

Both pharmacists agreed that travel health services could be commercially viable however, they felt that the APharmTHAS™ model would need to be modified, as it was time consuming:

> *"Probably not as is, it is time consuming"* (P1)

> *"We need to condense the time to see the travellers"* (P2)

They also reported that clients appeared to think it was yet another free pharmacy service, and were therefore reluctant to purchase items:

> *"They didn't buy a lot. They were happy with the advice but didn't want to pay. They are used to free advice and saw this as a continuation of free advice"* (P1)

> *"There is no way around this issue, patients have trouble paying. I think some got the advice here, but then bought stuff from other places."* (P2)

However, the pharmacists felt the viability of the THAS model could be improved and that the ability to supply antimalarials and administer vaccines without prescription would also improve viability:

> *"….having product packs ready to go would help"* (P1)

> *"supplying antibiotics, antimalarials and vaccines would help"* (P2)

6.5.3.1.2 Comments about the THAS model and potential improvements

Both pharmacists appeared to be happy with the overall quality of the service model and they felt that they were adequately trained and were comfortable and confident in providing travel health services:

> *"Overall (the service) was quite good, the questionnaire was good and it covered all bases"* (P2)

"Yes, I felt comfortable" (P1)

They appeared to be fully aware of the risks involved in the counselling patients in open shop areas however, they felt that the use of the private counselling area reduced any risk:

"It (privacy) *is always an issue. It tended to bother travellers but they became more comfortable in the* (private) *counselling room"* (P1)

"No one appeared uncomfortable but it could be a potential issue" (P2)

When asked which service level was the potentially the most viable, both inferred that the level 1 service may have greater potential because the amount of time needed to complete a full level 2 pre-travel risk assessment:

"Hard to answer that. The quick, simple one (level 1 service) *may be more viable. Being able to supply antimalarials would make it more viable"* (P1)

"The simple request is more viable – it is a time issue and full assessments need two pharmacists (to be on duty). *Payments are required for the full service."* (P2)

The pharmacists were then asked a series of questions about specific aspects of the THAS model and the client assessment questionnaires and educational resources. Both pharmacists felt that the initial enquiry form was useful and did not recommend any changes to its format.

"…allowed some preparation and the printing of the MASTA printout" (P2)

They felt that the pre-travel interview schedule was well-structured and highlighted all of the client's relevant risk factors. Although there was a difference of opinion about its length:

"Alright, it allowed for elaboration later" (P1)

"A bit long – people wanted to talk, not to be questioned" (P2)

Both pharmacists said that interview schedule was simple to use. However, when asked if they saw benefits in computerising the schedule, one pharmacist was much more positive than the other. However, this difference of opinion may be age-related, as one pharmacist was much older than the other:

"Simple and easy to use, (computerisation) *would be useful"* (P1)

"(the interview schedule was) *a way of doing it methodically"……"I don't find* (computerisation) *easy, I prefer to write down answers, otherwise you end up talking to a computer not them* (the patient)*".* (P2)

When asked about the information resources given to the client (MASTA health brief and APharmTHAS™ Travel Tips Brochure and Leaflets). Both pharmacists mentioned that the MASTA resources were concise, comprehensive and up to date and one thought that they were easier to use than other resources.

"Yes, the website is easy to use" (P1)

"Yes, the health briefs are quite good, people like them and they are up to the minute" (P2)

"The CDC and Yellow book – MASTA is more concise…" (P2)

They also thought that the APharmTHAS™ leaflets were concise and easy to read with a good layout. They had few suggestions of other topics for leaflets, although they thought that country-specific leaflets may be useful. Common themes, comments and recommendations in the discussion included:

"(they are) *very good for the patient, concise, easy to read, layout good"* (P2)

They also found the referral letter useful:

"Yes, useful when referring travellers for vaccines" (P1)

Finally, the pharmacists were asked about the client counselling sessions and checklist. Both pharmacists felt that the counselling checklist was useful as it acted as a reminder so that they did not miss key topics when counselling, although one pharmacist said that it contained too many items:

"It made sure we didn't miss anything when counselling the patient" (P1)

"(The checklist) contained too many items" (P2)

6.5.3.1.3 Did the pharmacists feel that the clients valued the service

Overall, both pharmacists felt that clients did value the THAS and provided them with a service they wanted:

"Yes, the feedback received suggested that travellers were told what they needed to know" (P1)

However, they did not appear confident that clients would be willing to pay, or at least pay more than a minimal fee for the service. Both pharmacists said that a fee of at least $10-20 was appropriate for a 15-25 minute consultation:

"Patients are so averse to paying for service, including other professional services as well. A one-stop shop would be more viable, where we are supplying more than just advice. Then they may be more willing to pay" (P1)

"If it were offered at more pharmacies and patients were more used to paying for service, and if the fee was small, they would be more likely to pay" (P2)

6.5.3.1.4 The views of the pharmacists about telephone counselling and other technologies

Both pharmacists felt that clients could be adequately assessed or counselled over the telephone or by using telepharmacy, but they did recognise that there were some disadvantages that would need to be considered:

"I talked (initially) *to one couple over the phone and it went just as well and didn't make much difference"* (P1)

"There are some problems (with the telephone*), you get more information face to face as you can see the customer and their body language"* (P2)

"The internet wouldn't be as good as the telephone" (P2)

6.5.3.1.5 Final open comments by the pharmacists

Finally, both pharmacists were asked if they had any other suggestions or comments about the THAS. The need for adequate staffing and time to manage the service was highlighted in response:

> *"It is easier* (to operate) *when staff overlap. Time and staff are the biggest issue, you need two pharmacists and taking 30 minutes* (per consultation) *is difficult."* (P1)

> "Many pharmacies won't employ two pharmacists." (P2)

6.5.3.2 Break-even analysis

Break-even analysis (BEA) is used by pharmacy managers to predict the effect of changes in cost, price, or revenue, on business profitability and to assess whether new services are financially feasible or viable [246]. BEA can also be used to model proposed changes to services and costing structures in an attempt to obtain or maintain profitability. The main aim of BEA is to find the break-even point (BEP) of a service. This is the point at which the total revenues or sales of a service equal the total costs i.e. the point at which the service is neither achieving profit nor suffering loss. Carroll[246] describes how BEP can be calculated by either a graphical method or the contribution margin method. Both methods involve the calculation of the fixed, variable, semi-variable and total costs of a service. Examples of fixed costs in the case of the THAS included labour costs, internet access, texts and other standard information resources for the service and some marketing costs. Some fixed costs may only be fixed costs over a specific range. For example, in the case of this evaluation, the labour costs of the THAS were fixed at 4 hours per week because funding was available to employ staff for that time, but if more than 7.5 patients per week were seen by the service then more labour time would be needed. Examples of variable costs in the case of the THAS were mainly the cost of the APharmTHAS™ portfolio.

The contribution margin (CM) approach to BEA, as described by Carroll was utilised in this study[246]. The contribution margin is the marginal profit per unit sale and is the amount of revenue available to cover the fixed costs and net income. CM can be calculated as revenue minus variable costs[246] using the following equation:

$$\text{BEP} = \text{FC}/\text{CM per visit}$$

Where BEP = Break-even point, FC = fixed costs and CM = the contribution margin.

(CM = revenue raised per visit – cost of supplies per visit)

6.5.3.2.1 Calculation of fixed and variable costs of the APharmTHAS™ service

The first stage of the calculation of the BEP is to calculate the fixed and variable costs of the service. The fixed costs of the APharmTHAS service included the costs of standard information resources, internet access, advertising, marketing, labour costs and the cost of space in the pharmacy. Labour costs were calculated on the basis that the pilot was funded for 4 hours of pharmacist time per week at a standard rate of $35 per hour. The cost of space in the pharmacy includes items of expenditure such as rent, lighting and power. These costs were unaffected by the THAS, and therefore not included in

the calculations of BEP. The variable costs of the service included the printing and material costs of the portfolio and MASTA health brief. These costs are summarised in table 6.19.

Table 6-19 Fixed and variable costs of the APharmTHAS service

Fixed costs	Value p.a. ($)	Variable costs	Value ($) per portfolio
Texts and other standard references	$150.00	Cost of printing and materials for the APharmTHAS™ portfolio	$9.17
Internet access and rental	$480.00	MASTA Health Brief	$6.05
Advertising and marketing	$875.00		
Labour costs (4 hours per week at $36.00 per hour	$7280.00		
Total	$8785.00p.a.	Total	$15.22 per portfolio

6.5.3.2.2 Calculation of break-even point using contribution margin method

During the pilot study, level 2 clients did not pay for the services provided, and any revenue raised per visit came solely from the sale of medications and other travel-related items. Level 2 clients were asked if they would be willing to pay for the service and if so, what they would be willing to pay and the purchasing patterns of the THAS clients were also analysed. Using this data, a series of potential costing options were drawn up for the THAS and the BEP for each costing option was calculated[246]. A decision was then made as to whether each costing option was financially feasible by comparing the calculated BEP for each costing option with the maximum number of visit appointments available per year based on the current level of staffing in the pilot study[246]. In the pilot study, the fixed costs of the THAS were calculated based on the assumption that 4 hours of pharmacist time per week was available for the operation of the THAS. As each level 2 risk assessment and counselling session took an average of 31.5 minutes, a maximum of 7.5 interviews per week or 390 interviews per year could be completed using the available pharmacist time. To be financially feasible the BEP calculated in visits per year for each proposed costing option needed to be at least 390 visits per year[246]. The results of these calculations are summarised in table 6.20.

Table 6.20 represents a series of options for the costing of the APharmTHAS™ service (Costing models A to P) and presents various combinations of acceptable client payments and the levels of sales experienced in the pilot study and are categorised into 5 main groups. Group 1 (Models A to E – shaded orange) represent costing options with the client payment set at $0.00 as in the pilot study. Group 2 (Models F to H – shaded blue) represent costing options with the client payment set at the minimum payment that was acceptable to level 2 clients who said they would be willing to pay for the service ($10.00). Group 3 (Models I to K – shaded purple) represent costing options with the client payment set at the average payment that was acceptable to level 2 clients who said they would be willing to pay for the service ($32.00). Group 4 (Models L to N – shaded green) represent costing options with the client payment set at the maximum payment that was acceptable to level 2 clients

who said they would be willing to pay for the service ($50.00), and finally Group 5 represent costing options with the total revenue per client user set at $65.00 (Model O) and $65.00 with a 10% discount for older clients (Model P) (both shaded pink). $65.00 was chosen as the service charge for this group as anecdotally, this is a price commonly charged locally at some medical centres for a short medical consultation. Within groups 1 to 4, the costing models represented the user payment as described above combined with the average sales per level 2 client ($5.68) and per level 2 purchaser ($38.31) and the average sales per level 1 client ($17.54) as previously described. Group 1 also contained two additional costing models, firstly (Model C), no user payment with the maximum level 2 client sale ($111.80) and Model E, which represented the actual situation in the pilot study with 54 clients per year and a calculated break-even price of $177.91.

Comparing the costing models from A to P it can be seen that as the total revenue per client increases, the calculated BEP in client visits decreases. Costing model I represents the total revenue per client of $37.68, and is financially not feasible, as are all other costing models with a total revenue below this figure. Whereas, costing model B represents the total revenue per client of $38.31 and is financially feasible, as are all other costing models with a total revenue per client greater than this figure. This comparison shows that to be financially feasible the total revenue per client needs to exceed $38 per client, but at this costing level to break-even the THAS would have to work at near maximum capacity (380 service client visits per year or an average of 7.3 client visits per week). Unless the THAS was a major component of the overall workload of a pharmacy, as with a travel health clinic, a more realistic workload for the THAS in an average community pharmacy would be between 2 and 5 full level 2 travel assessments per week i.e. models C and G in table 6.20.

Model C represents a situation where only an average of 1.8 clients are assessed each week (a total of 91 clients per year) but to break-even the total revenue per client of $111.80 is required. Model G represents the situation where an average of 5.1 clients are assessed each week (a total of 266 clients per year) and at this level to break-even the required total revenue per client would have to be at least $48.31. In comparison for the pilot study to break-even (Model E) the total revenue per client would have had to have been $177.91 or higher. The maximum that the level 2 clients said that they would be willing to pay for the service was $50.00. Therefore, for the service to be financial feasible and viable, a balance must be struck between the number of clients seen by the service each week and the total revenue per client. There are several options and combinations for service charges and average sales, but a suitable costing model would be option P, whereby clients are charged $65.00 for the service with a 10% discount given to clients over 60 years of age. In the pilot study, 26% of the level 2 clients were 60 years of age or older. But, if costing model P was implemented, only an average of 3.5 clients would have to be seen each week to break-even, which would be manageable by most medium sized pharmacies and as the sales of the clients are not taken into account (as some clients do not buy products), then any additional travel-related sales would constitute additional revenue for the service and make it more profitable.

Table 6-20 Calculated Break-even points of various costing models of the APharmTHAS^{TM} Service

Group	Costing model	Description	Client payment ($)	Average sales per client ($)	Total revenue per client ($)	Calculated BEP in service client visits		Financially feasible or not feasible (i.e. BEP < 390 users visits per year)
						Total each year	Average per week	
1	A	Pilot situation (No client payment & Average sales per L2 client)	0.00	5.68	5.68	-921		Not feasible
	B	Pilot situation (No client payment & Average sales per L2 purchaser)	0.00	38.31	38.31	381	7.3	Feasible
	C	Pilot situation (No client payment & Maximum sale per L2 purchaser)	0.00	111.80	111.80	91	1.8	Feasible
	D	Pilot situation (No client payment & Average sales per L1 purchaser)	0.00	17.54	17.54	3787		Not feasible
	E	Current situation (54 visits per year) & Total revenue per visit of $177.91			177.91	54	1.03	Feasible
2	F	Minimum preferred client payment ($10) & Average sales per L2 client	10.00	5.68	15.68	19098		Not feasible
	G	Minimum preferred client payment ($10) & Average sales per L2 purchaser	10.00	38.31	48.31	266	5.1	Feasible
	H	Minimum preferred client payment ($10) & Average sales per L1 client	10.00	17.54	27.54	713		Not feasible
3	I	Average preferred client payment ($32) & Average sales per L2 client	32.00	5.68	37.68	391		Not feasible
	J	Average preferred client payment ($32) & Average sales per L2 purchaser	32.00	38.31	70.31	160	3.1	Feasible
	K	Average preferred client payment ($32) & Average sales per L1 client	32.00	17.54	49.54	256	4.9	Feasible
4	L	Maximum preferred client payment ($50) & Average sales per L2 client	50.00	5.68	55.68	217	4.2	Feasible
	M	Maximum preferred client payment ($50)& Average sales per L2 purchaser	50.00	38.31	88.31	120	2.3	Feasible
	N	Maximum preferred client payment ($50) & Average sales per L1 client	50.00	17.54	67.64	168	3.2	Feasible
5	O	Total revenue of $65 per visit			65.00	177	3.4	Feasible
	P	Total revenue of $65 per visit with 10% discount for clients >60 yrs of age (26% of clients >60 years of age in the pilot study)			63.31	183	3.5	Feasible

6.5.3.2.3 Calculation of the break-even price for the APharmTHAS™ service

Break even analysis may also be used to calculate the break-even price (BEPr) of the service for different workloads. If;

$$BEP = FC/CM \text{ per visit}$$

Where BEP = Break-even point, FC = fixed costs and CM = the contribution margin. (CM = revenue raised per visit – cost of supplies per visit i.e. price per visit (BEPr) – variable cost (VC) per visit). Then;

$$BEPr = (FC/\text{Number of visits p.a}) + \text{Variable cost per visit}$$

Therefore the BEPr for different workloads was calculated and these are summarised in table 6.21.

Table 6-21 Break-even Price (BEPr) for differing proposed workloads

Average number of client visits			Break-even Price (BEPr) ($)
Per week	Per year	Comments	
1	52		184.16
1.03	54	Pilot study workload	177.90
2	104		99.69
3	156		71.53
4	208		57.46
5	260		49.01
6	312		43.38
7	364		39.35
7.5	390	Maximum workload	37.74

It can be seen that it is possible for the APharmTHAS™ service model to be financial feasible and viable, and that the level of feasibility and viability improves if more than 4 to 5 clients are seen by the service each week. It also has to be recognised that in its current format the THAS is quite labour intensive and if many of the assessment tools were computerised significant time savings in recording information can be made. For example, if the average counselling time was reduced from 32 minutes to 25 minutes or 20 minutes, then the maximum number of clients that could be seen by the service with existing staffing levels would increase from 390 to 499 and 624 per year with a BEPr of $32.80 and $29.30 respectively. If this was combined with appropriate companion selling then significant profits could be made. However, to attract 12 clients per week may be difficult for many pharmacies.

6.6 Limitations and recommendations

There are a number of limitations to this study. Firstly, the number of clients was low and the response rates to the client surveys was relatively low compared to some comparative studies[73]. This could

have been improved by increasing the number of pilot sites and by sending reminder messages or letters to clients or, in the case of the post-travel survey, by posting questionnaires to the clients after their estimated date of return. The location of the pharmacy may have been a limitation due to the demographic of the local population, as the majority of clients appear to come from the area close to the pharmacy. A pharmacy positioned in the CBD of Townsville, a larger shopping centre or in an area closer to a health centre or backpacker hostel may have produced different results. Finally, female clients appeared more likely than males to complete the surveys, which may have influenced the results. These limitations may affect the validity and reliability of the surveys and results and may increase the risk of bias. This needs to be taken into consideration when extrapolating the results across the general travelling population. A systematic scoring system was also used to estimate overall travel-related risk. This system requires further research, testing and validation.

From the results and limitations of this study recommendations for further work include the use of focus groups and follow-up surveys to examine why female travellers appear more likely to obtain pre-travel health advice than males, and whether this is related to the patronage of pharmacies. Also, expanding the pilot project to include a number of other pharmacies to examine the effects of positioning and locality on the demographics of clients and the profitability of the service. Finally, there is a need to examine why some travellers use multiple information sources to obtain pre-travel health advice and others do not.

6.7 Summary

This study was designed to develop, implement and evaluate a THAS operating from a community pharmacy in North Queensland. A particular niche area was identified for the service, to supply travel health advice to travellers visiting relatively low-risk destinations, or travellers who may not normally obtain pre-travel health advice from other sources. It was found that the majority of clients met this profile. The other remit of the service was to operate within current legal and professional restrictions and again this requirement was met with 40.7% of the THAS clients being referred back to their GP after their THAS risk assessment, mainly for vaccinations or for the prescribing of medications not available in Australia without an appropriate prescription. The THAS was accepted and valued by both clients and the pharmacists operating the service. The clients rated the THAS highly for both quality and usefulness and considered the THAS to be comparable to other travel health services. They were very supportive of the role of the pharmacist in the area of travel health. Neither the clients nor the pharmacists involved in the pilot project appeared concerned about any lack of privacy or confidentiality. Due to their accessibility, the pharmacists felt that travel health was an appropriate role for pharmacy and overall, they were happy with the THAS model and resources. They also felt that they were adequately trained and were confident to perform the roles required. They recognised that the model used in the pilot project was not currently financially viable however, efficiencies and changes could be made to make it more viable.

The next, and concluding chapter of this thesis, summarises the key findings of the research performed and in answering the individual research questions of each chapter, addresses the original hypothesis.

Chapter 7 Conclusions

Since the 1960s, the expansion of mass tourism and cheap air travel, the increasing mobility of the global workforce and the globalisation of national economies, have all contributed towards an exponential growth in the number of international arrivals and departures to and from many countries[1 2 6-11 247 248]. Travellers are also increasingly visiting higher risk destinations, often with limited or no prior planning and although they are often aware of travel-related health risks associated with their destination[3], up to 65% of travellers do not obtain travel-related health advice before their journey[54-59]. Therefore, globally, a significant number of people are placing themselves at greater risk of travel-related health problems, which is seen as a major public health concern. In response to these and other factors, the discipline of travel medicine or emporiatrics has grown and developed into what is now a medical specialty in its own right[3]. However, although the number of specialist travel medicine clinics is increasing, in Australia, the availability of full-time, specialist clinics outside major state capitals is limited, and GPs still play a major role in the provision of travel health services in many areas[2 53 61]. Moreover, in some countries, notably the UK, USA and Canada, community pharmacies also routinely offer travel health and immunisation services, which is not currently the case in Australia[71 72 74 80].

At the outset of the study, it was hypothesised that Australian pharmacists are currently underutilised and thus could have a greater role in the provision of travel health services. The overall aim of this research was therefore to investigate the current roles of Australian pharmacists in travel health and to then design, develop and evaluate a pharmaceutical care model for an Australian pharmacy-run travel health service.

The question was therefore posed as to whether travellers leaving an Australian international airport understand the health risks associated with travel, and on examination of their medications and medication histories, whether there is a need for a pharmaceutical care model for travel health? With only 41.7% (91/218) of the travellers interviewed obtaining pre-travel health advice, it does appear that there is a need, and in fact a gap, in the market for pharmacist-initiated travel health services. However, although the number seeking pre-travel advice was low, those that did obtain pre-travel advice did so on average almost 2 months prior to travel, predominantly from GPs and the internet. Their choice of information sources, which were based on convenience, ease of access, perceived level of knowledge about the traveller's destination and, in some cases, because it was mandated by their employer, confirms a role for pharmacists in travel health, as convenience and accessibility are often promoted as advantages of extended pharmacy services[72-74 80]. Access to more specialised knowledge is however often promoted as an advantage of using specialist travel clinics[53 69 70]. However, lack of knowledge that pharmacists can provide pre-travel health information and advice and the perceived limited range of services contributed to travellers not using pharmacies. Only a relatively small number of travellers had concerns about the level of training or the ability of pharmacists to provide travel health services and less than 2% had concerns related to a perceived lack of confidentiality or privacy in pharmacies. Interestingly, those travellers who had obtained advice from their GPs or the internet claimed that the advice given was limited to the need for vaccinations and

malarial chemoprophylaxis for their destination. For travellers leaving North Queensland, reasons given for not obtaining travel health advice was attributed to being frequent visitors to that destination, that pre-travel health advice was unnecessary, or that the destination was perceived to be safe. These findings thus present pharmacists with a number of niche groups that are currently underserviced and which, if targeted, may allow pharmacists to make a significant contribution in increasing the number of travellers obtaining pre-travel health advice. Ultimately, this would not only benefit the traveller, but from a public health perspective, also benefit society in general.

Referral of travellers to GPs, for example for vaccinations, could in fact increase their workload, and foster a multidisciplinary approach to providing travel health services in the best interest of the traveller. The fact that a thorough knowledge of the precautions taken by the travellers to prevent malaria when visiting endemic areas and that their knowledge of their own vaccination history was limited, also provide opportunities for pharmacists and GPs to collaborate on patient education initiatives that encourage travellers to be more aware of their own vaccination histories and the benefits of carrying comprehensive vaccination and medication records. This was highlighted by the findings that only about a third of the travellers who were knowingly visiting malaria endemic areas were using chemoprophylaxis, and that only 16% of travellers visiting malarial endemic areas were taking a chemoprophylactic regimen that did not diverge from standard guidelines. Therefore, it can be concluded that a lack of, and the inappropriate use of, chemoprophylaxis and a lack of adherence with other preventative measures means that a significant number of travellers are placing themselves at risk of contracting malaria. Although currently unable to supply antimalarial medications without prescription, pharmacists are ideally placed to educate and advise both travellers and prescribers on the appropriate use of chemoprophylaxis and to educate travellers about other preventative measures for malaria.

The travellers appeared knowledgeable about the potential causes of eight travel-related health conditions (traveller's diarrhoea, jet lag, motion sickness, prevention of DVT, protection from sun exposure, hepatitis A and B and malaria) and how they were transmitted and managed. However, they were less aware of, or more disinclined to follow precautionary advice that could prevent these conditions, which highlighted another potential educational role for pharmacists as a member of the travel health team. Although travellers were carrying a diverse range of medications to manage travel-related health conditions, the number was low, with just under a third travelling with some form of first aid kit. The supply of first aid kits and OTC remedies to manage travel-related health problems has been highlighted as a potential role for pharmacists in travel health[72 74 82 162], with these findings confirming this observation.

Assessment of travellers for a series of PPRs and PCIs, yielded results similar to the general population in terms of the number taking chronic medication, with less than 50% taking one or more medications[165 166]. Not surprisingly, the most prevalent PCI identified was travelling to a malarial endemic area without adequate chemoprophylaxis. In addition, almost 20% of the travellers required some form of patient education about their chronic medication regimen. This concurs with the findings of non-travel health studies, where up to 25% of general patients do not know standard facts about their medications such as dosages, their actual purpose and potential side effects[249 250]. These issues

do however highlight another potential role for pharmacists in advising and educating travellers not only about their chronic medication in general, but also about aspects relating to their storage and required documentation.

Therefore, it can be concluded that the findings of this study answered the first part of the research question, in that many of the travellers leaving an Australian international airport do understand the health risks associated with travel and were knowledgeable about the causes, routes of transmission and management of a selection of common travel-related health conditions. However, they were less knowledgeable about preventative measures for these conditions and/or less likely to take precautions while overseas. This clearly demonstrates the need and importance of placing greater emphasis on medication-related issues in travel health and thus answers the second part of the research question, in that a need for a pharmaceutical care model for travel health is confirmed. The value of pharmacists as members of the healthcare team, if they were more proactive in the pre-travel assessment of travellers, including the provision of information and medications to help prevent and manage acute travel-related health conditions, and to help improve the knowledge of travellers about their medications generally, but also to focus on the medication-related issues associated with travel is also confirmed. The pharmaceutical care model developed and presented here is novel, and represents the first application of a pharmaceutical care model in travel health, although further validation is required.

It was also important to investigate whether Australian pharmacists consider travel health to be an appropriate role, and if so, what do they consider to be the most appropriate level of involvement and what do they perceive to be the barriers to delivering travel health services? Although nearly 70% of responding pharmacists reported offering some level of travel health service, these were mainly reactive and represented only a small part of their daily workload, thereby showing that travel health services in pharmacies are underdeveloped in Australia. This was confirmed by the low number of pharmacists performing comprehensive travel risk assessments. Investigating pharmacists' perceptions regarding the future development of travel health services, their training needs and their perceptions of potential barriers to the service resulted in an overwhelming majority confirming that travel health is an appropriate role for pharmacists. Obviously some barriers were identified, notably a lack of time and staffing issues, however these pharmacists did not see the current inability to vaccinate and to provide, for example antimalarial agents without prescription, as a barrier to future service development. This demonstrates a commitment by pharmacists to offer extended travel health services, with a self-recognition of their own training needs. Also, pharmacists will not be easily deterred by opposition from the medical profession.

It can be concluded from an investigation into the pharmacists' current level of knowledge of causes of morbidity and mortality, traveller's diarrhoea, vaccinations, malaria and first aid kits, that their level of knowledge of the causes of morbidity and mortality in travellers and their ability to advise on items travellers should include in a travel first aid kit was superior to that of their knowledge of vaccination requirements for a number of less frequently visited destinations. Overall, the pharmacists appeared knowledgeable about preventative measures for malaria, although it is of concern that over a quarter appeared to incorrectly believe that thiamine could help prevent mosquito bites.

Australian pharmacists therefore do consider travel health to be an appropriate role for pharmacists and many are already offering some level of service, although in many instances the service provided is rudimentary. The majority of pharmacists however wanted greater involvement in the clinical aspects of travel health. Although pharmacists perceived some potential barriers to the development of travel health services, many of these barriers were not considered to be insurmountable.

In contrast to this positive outlook, less than a quarter of a sample of medical practitioners (MPs) in Queensland supported the greater involvement of pharmacists in travel health, and the vast majority disagreed that travellers should be able to obtain influenza vaccinations, travel vaccinations, antimalarials and travel-related antibiotics from pharmacies without prescription. In turn, this was in contrast to the perceptions of a sample of Queensland travel agents (TAs), who supported the provision of these services from pharmacies, tended to be more positive about pharmacists performing travel risk assessments, advising travellers on a range of travel health issues and about extended pharmacy services in general. This reluctance of the sample of Queensland MPs to support pharmacist-initiated interventions in travel health was further confirmed by their perception that pharmacists are not appropriately trained to deliver these services. However, in terms of training needs, this was similar to the views of the pharmacists themselves. The sample of Queensland MPs raised concerns relating to a perceived lack of privacy and the maintenance of patient confidentiality with pharmacy-run travel health services, however this contradicted the views of both travellers and pharmacists who did see this as a matter for concern.

The proposed service model for a pharmacy-run travel health advisory service (THAS) was well received by both the samples of Queensland MPs and TAs, as its intended niche was travellers who may not normally visit their doctor for pre-travel health advice and also because travellers requiring vaccinations would be referred back to their own doctor. Almost all of the sample of MPs were happy to accept referrals for vaccinations from the THAS, even though they perceived that the THAS would not be to the same standard as those offered by GPs or travel clinics. In conclusion, the sample of Queensland TAs appeared more positive towards extended roles for pharmacists in the area of travel health than the sample of Queensland MPs. That said, a significant number of the sample of Queensland MPs did support the proposed model for a pharmacy-run THAS and saw benefits in the model for both for the traveller and themselves.

As identified, pharmacy staff have training needs that must be met in order to deliver travel health services from community pharmacies. The preferred delivery method of travel health educational materials to a sample of undergraduate students was considered and comparisons were made between team-based learning (TBL) and web-based learning (WBL). Initially, students were interested in the concept of both learning methods, with students being significantly more interested in TBL than WBL. Students expected to get significantly more feedback from the academic staff and their peers with TBL. However, after completion of the taught component of the subject, the students' preferences moved from both TBL and WBL back towards traditional, lecture-based learning (LBL), mainly because students were more familiar with traditional, didactic LBL, however it is recognised that pure LBL is less suitable for the continued professional development of registered pharmacists.

Finally, the question was asked whether a THAS, which is compliant with current Australian legal and professional restrictions and practices, could be developed and operated from a community pharmacy, and whether it could provide an effective service that is valued and accepted by clients. The THAS provided information services mainly to a target market of relatively low risk travellers or travellers who may not normally attend pre-existing travel health services. The service complied with current Australian legislative and pharmacy practice standards in a number of ways. Firstly, the development of the actual care model and APharmTHAS™ resources and tools, and in the choice of commercially available resources, was guided by a consensus achieved from the recommendations of the published literature, professional bodies, authorities or other professionals working in the field of travel health. Secondly, all advice and educational resources supplied to the clients complied with the best practice standards and again, the recommendations of the published literature, professional bodies and other authorities. Finally, the service complied with all of the current Australian legislation regarding the sale or supply of medications and other items from pharmacies, and if items were required that are only available on the authority of another practitioner, then the client was referred to another appropriately qualified professional or travel service who was able to legally supply the required items. The THAS also met its intended objective of providing travel health services to its intended niche market of travellers visiting lower risk destinations with few clients visiting high risk destinations or visiting rural/remote areas.

In terms of data collection tools to perform pre-travel and post-travel risk assessments on individual travellers, the pharmacists found the interview schedule to be well structured, systematic, easy to use and identified all of the client's risk factors for travel-related health problems. Clients found the travel health information resources provided to be clear, concise and easy to understand and of high quality, and this concurred with the views of the pharmacists who also found the information to be comprehensive, concise, current and easy to read, with a good layout. It was obviously important to evaluate whether travellers would access, utilise and value travel health services provided from community pharmacies, and to analyse the types of travellers who would utilise those services. Many clients used the THAS because it had been recommended to them by travel agents or pharmacy staff. Whereas, others decided to use the THAS because of its' convenience or because they had seen it advertised. Overall, the clients valued the THAS and rated the quality and usefulness of the service highly, both in comparison to other travel health services and more importantly that they were willing to use the service again and recommend it to other travellers. Two-thirds of clients who were able to make comparisons with other travel health services, rated the THAS as similar to, or superior to, those other services.

Finally, the overall hypothesis has been proven: Australian pharmacists are currently underutilised and could have a greater role in the provision of travel health services. In the process, the overall aim for the thesis was also achieved, as the current travel health roles performed by Australian pharmacists were investigated and a care model for an Australian THAS was developed and evaluated. Results confirm that a significant number of travellers leaving Australia do not obtain pre-travel health advice, in particular, frequent travellers, repeat travellers and travellers who perceive their destination to be "safe". By targeting these niche groups, Australian pharmacists would have a significant impact on

reducing the number of Australians travelling overseas without taking prior travel health advice, thereby potentially reducing the rates of travel-related illness amongst these travellers. Pharmacists do recognise that they have training needs if they are to have a greater involvement in the provision of travel health services. However, they are keen for further involvement and support the formal accreditation of pharmacy-run travel health services. The most significant outcome is the demonstrated need for the greater inclusion of assessments for medication-related risks associated with travel, using pharmaceutical care models such as the model described, into the pre-travel assessment of travellers. Finally, this body of work offers a clear demonstration that Australian pharmacists and pharmacies can provide an effective travel health service to achieve better outcomes for Australian travellers.

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