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Editorial

"TRAVEL IN THE YOUNG IS PART OF EDUCATION: IN THE ELDER, PART OF EXPERIENCE" *Francis Bacon*

This is the 21st issue of the BGTHA Journal, the publication has come of age, a traditional time for reflection. The first issue was launched four years after the inception of BTHA. I had been editor of Travel Medicine International an innovative journal which was then the lone publication devoted to travellers health, until its demise. The Journal of Travel Medicine of ISTM had just appeared but the new discipline of travel medicine was unrepresented in Britain and it seemed an appropriate opportunity to start our own journal. Some doubted whether the association could support the venture, but the journal has proved resilient, true to its objectives and survived in defiance of critics. I am grateful to the authors and committee members who have written regularly to fill the columns with articles to educate and inform members and travel health professionals across the world.

I noted in my first editorial that the journal offered new authors, first time reviewers and researchers a rare opportunity to see their work in print and we have assiduously nursed new writers to publication. I pleaded with members

to send in case histories, anecdotes and research work and it remains a challenge to maintain quantity and quality of content. Continued publication depends on individual members writing contributions and we encourage each one to send in material. Sadly, the discipline in the UK suffers from a dearth of research projects needed on many aspects of traveller's health and innovative reports rarely present for publication.

Peer-reviewed articles have ranged over the broad spectrum of travel related medicine and authors and researchers from across the globe have ensured the international flavour of content appropriate to an association, which now includes "global" in its title. To continue to further anniversaries, we need, writers, proof readers, reviewers and the case histories, articles and anecdotes which provide the interest and education, we seek to disseminate. I encourage nurses, doctors and pharmacist members to take an active role in the journal by submitting material. The advancement of the journal rests in their hands. With help from individual members I hope the BGTHAJ will appear for many more years.

Iain B McIntosh, Editor in Chief.

Chairman's Editorial

On 10th June the Executive Committee of BGTHA did me the honour of electing me as the new Chairman of BGTHA. I would like to thank the Committee for expressing their confidence in me in this way. I would also like to thank Julie Gallagher for her inspiring leadership over the last 3 years. I look forward to building on her success, and on our past achievements, during my period in office. We have a strong team on the Committee, probably the strongest and most active we have ever had, and I am sure that between us we can take BGTHA on to even greater achievements. At the outset I would like to set out some of the goals that I would like to see us achieving, not necessarily in order of priority.

I would like to see the Committee communicating more with you, our members, keeping you all up to date with important breaking news items and information on the Committee's activities. I would also like to encourage the formation of regional groups with meetings and educational activities. We are already looking at ways in which we might achieve this.

As we have changed our name to include the word "Global" in our title in recognition of the increasing importance of global health issues to the travel health community, I would like to expand our role in this field in promoting global health education and participating in global health projects. We also need to continue and increase our co-operation with the Faculty of Travel Medicine and with other national and international associations, including our continued participation in NECTM and continuing our newly-formed links with Medsin, the lively and enthusiastic student global health body.

Having taken over the Chair, I feel it will be necessary to relinquish my responsibility for the website. Developing the BGTHA website has been an exciting challenge for me, and I consider that we now have a website of which we can be justly proud and which compares very well with those operated by other bodies in this field. I look forward to our appointing a new webmaster with the skill, enthusiasm and

foresight to carry the website on to even greater heights.

Before taking on my new responsibilities I took over the Chairmanship of the Scientific Committee organising the content of the 2013 BGTHA Conference, which this year has the theme of gastrointestinal infection as a global problem as well as a problem for travellers. We have attempted to make our conference more inclusive this year by arranging not only interesting and informative plenary sessions but also parallel sessions at which those attending will have the opportunity to attend either scientific presentations on travel and global health or workshops on the basic elements of travel medicine in order to cater for those at all levels of expertise amongst our members. Once again the Conference will be held at the Mshed in Bristol, the scene of last year's very successful conference, and I would urge as many of you as possible to make the effort to attend this year.

I originally came into travel medicine via wilderness and expedition medicine, so the Special Interest Group for Expedition and Wilderness Medicine is something that I was keen on hosting within BGTHA. Now that the group has been established I would like to see it developing its presence in BGTHA, in our publications and on our website and forming a focus for all those with an interest in this field in the UK.

I look forward to working with the Executive Committee and with all our members during this new chapter in my long association with BGTHA. I am always open to suggestions and new ideas about how we might continue to develop our Association, and I hope that all members will feel free to be able to contact me. Equally, if you experience any problems in connection with your membership of the Association I would like to hear about them so that suitable action can be taken where necessary. To borrow a phrase from the retail trade, "if we get it right, tell everyone else; if we get it wrong, tell us".

Mike Townend

The British Global and Travel Health Association in a changing world

M Townend

The British Travel Health Association came into being in 1998. More recently it has adopted the title of the British Global and Travel Health Association (BGTHA) in recognition of the fact that issues relating to the health of travellers are inextricably associated with those of global health. For example, the response to the question "How can we reduce the risk of malaria for UK citizens travelling to sub-Saharan Africa?" could be answered in a variety of ways. Traditionally we have looked at such factors as avoiding mosquito bites and the use of antimalarial chemoprophylaxis, but taking a more global view should we not be looking at controlling or eliminating the transmission of malaria in Africa? By doing so, we could reduce the enormous burden of malaria for the indigenous population whilst at the same time reducing the risk for travellers.

During the relatively short lifetime of the BGTHA there have been many changes in the world, some of them as part of a gradual evolution, with or without a contribution from human activity, some of them sudden and catastrophic. The aim of this paper is to examine some of these changes and the impact that they have had on the global population and on our own practice.

Natural disasters

The lives and health of indigenous people and travellers in many parts of the world are at risk from natural disaster associated with climate and geological instability. Damage to homes, infrastructure and medical facilities bring with them risks associated with trauma, communicable disease, particularly water-borne infections and exposure to severe weather conditions. Some recent examples show the magnitude of these risks.

In December 2004 an earthquake of strength 9 occurred in the Indian Ocean¹, causing a tsunami with waves of up to 15 metres in height that engulfed coastal regions of south and southeast Asia, and parts of Africa, causing an estimated 230,000 deaths. Around 5 million people lost their homes or access to food and water supplies. In addition there were an estimated 150,000 additional deaths from infectious disease. A huge international effort brought a promise of \$7 billion in aid; the cost of reconstruction was estimated at \$7.5 billion.

In October 2005 an earthquake of strength 7.6 struck northern Pakistan² and adjoining areas of India, causing around 75,000 deaths, many more casualties and widespread damage to property and infrastructure. Livelihoods were destroyed and access to food, shelter and clean water supplies was greatly affected, with large parts of the population, estimated at over 3

million, living in camps and temporary accommodation such as improvised tents. The problems were further compounded by the onset of severe winter conditions. International aid efforts were concentrated on providing food, shelter, emergency trauma care, childhood immunisations, prevention of water-borne disease and restoration of clean water supplies. In spite of these efforts there were still many people living in temporary accommodation many months later.

In July 2010 heavy monsoon rains caused extensive flooding in Pakistan.³ Approximately one-fifth of the country's total land area was underwater, approximately 796,095 square kilometres. The floods directly affected about 20 million people, with destruction of property, livelihood and infrastructure, with around 2,000 deaths and around 10 million people using unsafe drinking water supplies. Property damage was estimated at \$2.5 billion and damage to crops at \$500 million.

Man-made disasters

Not all disasters are the result of the vagaries of nature. For example, global warming may be associated with natural cycles of climate change but there now seems little doubt that the activities of mankind are playing a major part in its production. If climate change continues unabated we may in the future see fertile areas becoming deserts, temperate regions becoming sub-tropical and familiar patterns of weather changing radically. More dramatic changes such as the relocation of the Gulf Stream could see the United Kingdom experiencing winters such as are seen in Moscow or New York. Summers are likely to become much wetter. Some of us who had our homes flooded in the summer of 2012 may already be experiencing such a change. Areas such as southern Europe may see their climate becoming tropical or sub-tropical, and conditions may then be ripe for the emergence or re-emergence of diseases such as malaria and dengue.

Mass migration⁴ of populations may occur as a result of economic inequality as migrants go in search of a better life, which they do not always find. Once a migrant population becomes established it may act as a magnet for further migrants, who are at risk of financial and sexual exploitation. Migrants may also carry with them diseases such as tuberculosis, with the risk of spread to the indigenous population. Climatic conditions such as drought also play a large part in mass migration.

Migration or internal exile may also result from war or civil conflict as large numbers seek to escape death or the destruction of their livelihoods. Often the only refuge they can find is in camps in which they are at risk from communicable diseases and water-borne

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infections and from malnutrition. In Africa alone there are an estimated 16 million migrants and 13 million internally displaced persons.⁵ Ethiopia and Sudan in particular have seen much mass migration in recent years, sometimes voluntary and sometimes enforced as a result of ethnic conflict.

Changes in diseases and their treatment

Diarrhoeal disease

The incidence of travellers' diarrhoea is estimated to be up to 50%, or even as high as 90% in some high risk areas⁶, in those travelling from a high-income country to a low-income country. Indigenous residents in low-income countries, especially children, suffer more serious illness or death from diarrhoeal disease, with, according to the World Health Organization (WHO), around 1.5 million children dying each year.⁷ The commonest infecting organism is still likely to be enterotoxigenic *E Coli* (ETEC)⁸, though *Campylobacter* is becoming increasingly recognised as a causative agent. Developments in the prophylaxis and treatment of travellers' diarrhoea in recent years include the oral cholera vaccine, which offers some measure of protection against travellers' diarrhoea, and the introduction of a virtually non-absorbable antimicrobial agent rifaximin which can be used for both prophylaxis and treatment, though only against non-invasive gut pathogens.

There are around 17 million cases of typhoid per year worldwide⁹ caused by *Salmonella typhi*, and the disease is endemic in the Indian subcontinent, though it represents a relatively low risk for UK travellers, with the possible exception of those of immigrant origin visiting friends and relatives (VFRs). A worrying development is the emergence on the Indian subcontinent of resistance to quinolone antimicrobial agents such as ciprofloxacin¹⁰, drugs commonly used to treat typhoid and other enteric infections. The spread of resistance to other *Salmonella* species and/or other enteric pathogens would be a very worrying development as such drugs are widely used by travellers to treat diarrhoea.

Cholera represents an even lower risk for most travellers. It tends to occur in settings such as refugee camps where people with reduced immunity as a result of illness and malnutrition are crowded together with poor sanitation and contaminated water supplies. It has been seen in recent years following many of the natural and man-made disasters referred to above.¹¹

Malaria

Perhaps the most notable change seen in patterns of malaria during the existence of BGTHA has been the steadily increasing proportion of chloroquine-resistant *Plasmodium falciparum*^{12,13} compared with other forms of malaria, and in addition to this we have seen the increasing recognition of *Plasmodium*

*knowlesi*¹⁴ as a cause of malaria in southeast Asia. Changing patterns of drug resistance are constantly being seen, necessitating monitoring of all available data when choosing drugs for treatment of malaria or its prophylaxis in travellers.

Reference has already been made above to climate change and the possible re-emergence of malaria in Europe, and already there have been several cases of *Plasmodium vivax* malaria reported in Greece in patients who had not travelled abroad. There is as yet no necessity for routine chemoprophylaxis to be advised for travellers to Greece but the possibility of the acquisition of malaria by travellers should be borne in mind and anti-mosquito bite measures are advisable.

Artemisinins

The use of *Artemisia annua* has been known in Chinese medicine for around 2000 years, but it was not until around 1980 that artemisinins became known to western medicine. Artemisinin-based combination therapies (ACT) have become the drugs of choice for treatment of malaria caused by *Plasmodium falciparum*, but the recent emergence of resistance to ACT in Cambodia and Thailand is a cause of great concern. Should this resistance spread, as resistance to chloroquine spread, the successful treatment of malaria will be put at great risk, and much effort is currently being put into attempts to control artemisinin resistance in southeast Asia.

Malaria vaccines

Because of the complex life cycle of the malaria parasite and the different stages that can be targeted by a vaccine, an effective vaccine has so far eluded researchers. The currently most advanced candidate vaccine, the RTS,S vaccine has been shown to reduce episodes of malaria in children aged 5 to 17 months by around 30 %, though another study claimed a reduction of 50% during the year after vaccination.^{15, 16} Vaccines are most likely to be of use in indigenous populations in malarious areas, and it seems unlikely that a vaccine for travellers will be available in the foreseeable future. If or when an effective vaccine becomes available, although it will be of great benefit to indigenous people it will, of course, be of secondary benefit to travellers by reducing the pool of malaria parasites available to infect travellers.

Influenza

Influenza viruses are capable of infecting humans, other mammals and birds, including domestic animals such as pigs, and domestic poultry. They have a remarkable capacity for mutation in their surface antigens, hence the need for changes in seasonal influenza vaccines and new vaccines for novel strains. Some strains are virtually confined to non-human mammals or birds but are capable of acquiring the ability to

infect humans by the transference of the necessary genetic material. This is most likely to occur if there is co-infection by more than one strain in the same animal host. Co-infection in the same human host by a mammalian or avian strain and a human to human transmissible strain may transfer the capacity for human to human transmission to the mammalian or avian strain, resulting in a novel, transmissible and often severe infection transmissible between humans and not susceptible to existing human vaccines. There have been notable examples of such changes in recent years.

H5N1¹⁷ is a highly pathogenic avian influenza virus that has caused serious outbreaks in domestic poultry in Asia and the Middle East. Although it does not usually infect humans, around 600 human cases of H5N1 in humans have been reported from 15 countries since 2003. Most human cases have occurred in people who had recent contact with poultry that were infected with H5N1 viruses, and about 60% died from their illness. H5N1 usually does not spread between people, though occasional cases of apparent human to human transmission have been reported.

H1N1 is a sub-type of the common influenza A virus. It was originally found in pigs and was responsible for the "swine flu" pandemic in 2009.¹⁸ Though no longer pandemic, the virus continues to circulate in humans and protection is afforded by seasonal flu vaccination.

Coronaviruses

Coronaviruses have been known for many years as a cause of common cold-like illnesses¹⁹. In recent years, however, new strains have emerged that are capable of producing more severe respiratory illness.

SARS (severe acute respiratory syndrome)²⁰ is caused by a coronavirus. It was first identified in a traveller from Guangdong province in China. It is an example *par excellence* of how diseases can be rapidly spread by international travel, cases being found in Asia, Australia, Europe, Africa, and North and South America within weeks, all traceable to the original cluster of cases. The virus remains in circulation but the threat of a massive pandemic did not materialise.

Novel coronavirus²¹ is a new coronavirus first identified in September 2012 in a patient who died from a severe respiratory infection in June 2012. To date there have been 13 cases detected globally. It appears to have originated in the Gulf States and one case has been identified as part of a family cluster in a patient who had not travelled abroad, indicating that whatever the origin it is transmissible from human to human. To date its mortality rate has been higher than that seen in the SARS outbreak.

Dengue

Dengue infection was initially localised in southeast Asia, but it has now spread to most parts of the tropical and sub-tropical world.^{22,23,24} It is highly likely that international travel has been responsible for this spread, as infected travellers have carried the infection to other areas where there are *Aedes* mosquitoes capable of transmitting the infection. Migration of *Aedes* mosquitoes, for example in their larval state in exported rubber tyres, has also played a part in its distribution. Continued climate change seems likely to cause further spread of dengue.^{25,26}

HIV and tuberculosis

According to the WHO the risk of developing tuberculosis (TB) is estimated to be between 20-34 times greater in people living with HIV than among those without HIV infection.²⁷ In 2010²⁸, there were 8.8 million new cases of TB, of which 1.1 million were among people living with HIV, and TB caused over a million deaths worldwide.

According to the UK's Health Protection Agency (HPA) around 9000 cases of TB are currently reported each year in the U.K.²⁹ Most cases occur in major cities, particularly in London; 74% were born outside the UK and mainly originated from South Asia and sub-Saharan Africa.³⁰ In the early 1950s the annual incidence began to fall by 10% per year after the introduction of widespread BCG vaccination & chemotherapy. It continued to fall by 5% per year even after waves of immigration in the 1960s & 1970s. In the 1990s incidence began to rise again slowly. Although the total numbers of TB cases have stabilised to some extent since 2005 there was a slight rise between 2010 and 2012. The number of drug resistant cases continues to rise³¹ with 431 cases (8.4%) resistant to any first line drug reported in 2011, an increase of 26% from 2010. The number and proportion of isoniazid resistant and multi drug resistant (MDR) cases increased in 2011 by 7.6% and 1.6% respectively. Twenty four extensively drug resistant (XDR) cases have been reported since 1995, six of whom were reported in 2011. It seems likely that the overall rise in the numbers of cases of TB since the 1990s is associated with a number of factors including immigration from countries with a high prevalence of TB, HIV co-infection and the emergence of MDR and XDR TB.

TB does not represent a major risk to most travellers from the UK, though some groups of travellers likely to be in close and prolonged contact with at-risk populations are at higher risk, such as health care and aid workers and VFRs. Health care professionals in the UK dealing with immigrant communities should be alert to the possibility of TB in their communities. Ensuring completion of treatment programmes is of great importance in reducing the numbers of new cases of drug-resistant TB. The introduction of directly observed therapy (DOT), in which health care pro-

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professionals or health care assistants administer medication under supervision, may help to ensure that this occurs, but as yet there is little evidence that it does so.³²

Conclusion

This paper has outlined a few of the many changes that have been seen during the lifetime of BGTHA. There has been a considerable impact of global health issues on travel and of travel on global health, and these impacts seem likely to continue and to proliferate. It is incumbent on all of us who have an interest in global health and the health of travellers to be continually vigilant and to keep abreast of developments as they occur.

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Travel Medicine Education – Past, Present and Future (Personal Reminiscences)

E Walker

Background

The practice of 'Travel Medicine' only emerged as a special discipline during the 1970s with the advent of 'jumbo' wide-bodied aircraft and the resulting huge increase in international travel. At that time the number of travellers leaving the UK for holidays and business and other reasons was around 5 million a year – it is now around 60 million.

This expanding cohort of new travellers was looking for details of required and recommended vaccinations and other advice including malaria prevention for which there were very few authoritative and balanced sources of information available. World Health Organisation and the Foreign Office focused mostly on legal requirements such as the need for yellow fever and cholera vaccination certificates. Some of the advice given at that time now seems rather strange – for example, typhoid vaccine and sometimes immunoglobulin against hepatitis A was advised for Spain and malaria tablets were advised for transit passengers through Saudi Arabia.

Nearly all education for doctors and nurses on recommendations at that time was led by the vaccine and drug companies organising half-day lectures with an inevitable focus on the need to prescribe. Wall charts usually produced or sponsored by the companies were popular and often included in the free GP newspapers.

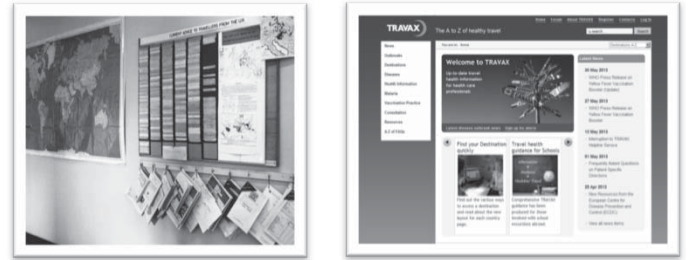
Information Resources

The challenge of providing comprehensive and evidence based advice, was taken on in Scotland by the Communicable Diseases Unit (CDSU) in the early 1980s. This was shortly after the BMJ's first 'ABC of Healthy Travel' was published. Previously most enquiries went to the local Medical Officers of Health (MOH) or to yellow fever vaccination centres registered to issue international certificates. However, MOHs at around that time were abolished and replaced by 'Public Health' Consultants. These new consultants usually had little or no training in vaccine advice for travellers and were understandably reluctant to take on the role.

At CDSU (now Health Protection Scotland), I remember regularly receiving more than 100 phone 'travel enquiries' a day from doctors, nurses and sometimes the general public. Many of these calls were very basic: 'What malaria pills do you need for Turkey?' or 'Is a yellow fever certificate needed for India?' Wall charts were usually their only other reference source and the country destination was usually the only factor taken into "risk assessment".

Something had to be done to improve what was clearly an unsatisfactory situation and so 'TRAVAX'

was borne. The first step was to compile detailed information on easily accessible cards for each country and used by those answering phone calls.



The first 'TRAVAX' on 'wall cards' and a page from the current on-line version

The next stage was to team up with the Scottish Poisons Bureau that supplied information via 'Ceefax' to A/E departments – however few health centres providing travel health services had the necessary Ceefax terminals. I remember clearly the day when we went to the Poisons Bureaux in Edinburgh for a demonstration of something called 'the Internet' – it involved using a new invention called a personal computer (a 'PC' - not to be confused with 'Police Constable!') and some sort of magical link up to others through the telephone – this was all very new and confusing and did not seem to work reliably. We were very sceptical!

Slowly but surely, however, use of the Internet became more widely accepted and the information on TRAVAX was eventually installed by myself and Fiona Genasi (later to become the first Travel health Nurse Consultant in the UK and President of the International Society of Travel Medicine) onto a purpose built website. TRAVAX and its public version 'Fit for Travel' has become a primary source of information throughout the UK and elsewhere but doctors and nurses initially needed a lot of encouragement to use it! We would regularly (politely!) have to say to telephone enquirers 'Please, in future, could you look at TRAVAX first before telephoning us' – or 'Do you think you could persuade your practice to get a computer?'. If a practice had a computer it was often kept in the doctor's consulting room while nurses were seeing the travel patients elsewhere! To our surprise we had representatives from CDC Atlanta visiting us to see what we were doing and eventually they set up a similar resource for the US.

The Need for Training and Education

On-line information however was not enough and we recognised that those using TRAVAX needed training on how to interpret the information and in particular

Travel Medicine Education – Past, Present and Future *continued*

how to make detailed 'risk assessments'. Two-day 'Practice Nurse' courses were set up in Glasgow and doctors were also welcome to attend. These courses were very popular and were ably led by Lorna Boyne. In 2000 Sheila Hall was invited to take over this role, developing them further and making them available throughout the UK and Ireland as the very popular 'TREC' (Travel Health related Education and Care) courses.

The Diploma

The next stage was when it became clear that there was a demand for a higher level of training for those especially interested in or wanted to teach travel medicine to their colleagues so in 1995 the Glasgow Travel Medicine Diploma Course was started in collaboration with the University, later to be moved to the Royal College of Physician and Surgeons, Glasgow. Many of those who successfully completed this course are now leaders in the field of travel medicine both in the UK and in many other countries such as Australia, New Zealand, Canada and South Africa. It was during one of these Diploma Courses that over an evening dinner table (or perhaps in the pub afterwards if I remember correctly!) that the idea of a British Travel Health Association (BTHA) was borne. This association has had a leading role in offering conferences, a regular newsletter, a journal and other travel medicine resources to travel health practitioners throughout the UK since 1998.



Some of the students on one of the first Glasgow Diploma courses

The Faculty

In 2007 the Faculty of Travel Medicine was established within the Royal College in Glasgow. This was already a multidisciplinary College and including Travel Medicine within its remit is now allowing, in collaboration with the Royal College of Nursing, the development of Standards of Travel Medicine Practice while also providing educational and networking

services for its members. As the first Dean, I envisaged the Faculty and the BTHA (now BGTHA) working together in the education field with complementary roles and I am encouraged to see this liaison now being actively taken forward.

Combining Global and Travel Health Education

The most recent educational development is a move towards working together with the equally new speciality of Global Health. The two disciplines are closely interlinked. Indeed it is impossible to provide sound advice for travellers without a detailed knowledge of the health risk within countries travellers visit and this information should ideally come from within these countries themselves and not mainly from studies carried out after travellers return to the UK as has often been the case in the past. The interest in 'Global Health' is a response to the 'global village' concept after rapid international travel has become the norm. Pandemics such as Influenza now take only months rather than years to spread worldwide and, due to travel, diseases such as AIDS, previously confined to isolated parts of the world (in the case of HIV infection central Africa) have quickly become global. 'Tropical' and other unfamiliar infections present in most unexpected places.

Also many of us in Travel Medicine have all along felt very uncomfortable about being involved a speciality which is often seen as providing services mainly to well-off international travellers with only a passing interest in the huge health disparities often so clearly evident between the traveller's home country and their destinations.

Encouragingly, the General Medical Council has recently advised all Medical Schools in the UK to include an introduction to Global Health in their undergraduate curricula and more advanced GH Intercolated BSc and MSc courses are also being set up in many universities. In Glasgow, Global and Travel Health courses are integrated and this is a develop-



Students at the a recent highly successful Medsin 'Migration' conference in Glasgow

ment that I believe should be encouraged elsewhere. These changes have been strongly influenced by lobbying from the influential student organisation 'Medsin' (Medical Students International) which believes that looking at 'health' from a global perspective is a priority in medical education.

It is exciting to have seen the 'BTHA' taking a lead in this by recently becoming the 'BGTHA' opening up opportunities for networking and participation in

new educational ventures, looking at health issues from a global perspective and moving away from an 'us and you' way of thinking about health risks when we advise our travellers.

Eric Walker: MBE, DSc (Madras) FRCP and FFM Glasgow – currently Hon Assoc. Professor in Dept. of General Practice and Primary Care, Glasgow University

Salient factors influencing medical tourism destination choice

Medical tourists with lower levels of familiarity regarding medical procedures and medical tourism destination tend to engage in greater external search behaviour, by consulting brochures and advertising campaigns developed by medical tourism promoters. They also seek information from insurance companies and personal doctors.

To evaluate alternative medical tourism destinations, prospective medical tourists set certain 'decision rules'. In this regard, quality of care is assessed on a 'non-compensatory' rule, which means that medical tourists avoid visiting destinations whose quality of care is lower than their threshold level. However, the provision of a higher quality of care than this threshold level does not significantly enhance the appeal of a destination. In contrast, saving potential is assessed by a 'compensatory' decision rule, which means that medical tourists are willing to trade-off certain other destination attributes for greater saving potential. Despite their indirect relationship to medical tourism, personal images and attitudes regarding hygiene and safety/security are also found to influence the desirability of a medical tourism destination.

Jotikasthira, Lismore NSW, Southern Cross University.

Medical Tourism – Opportunity, Challenge, Dilemma

I B McIntosh

General practitioners and nurses are often questioned by patients investigating medical facilities overseas. They are intent on utilising privately-run commercial health services which are mushrooming in a number of countries within and out-with Europe. A global industry is developing to service demand from non-domiciled visitors for health care, as a complement to a vacation visit, or access to on-demand establishments catering for health or treatment needs.

Medical tourism is a recently coined term used to categorise people who travel from their homeland for health treatment and surgical procedures. This is an ancient custom however, dating back thousands of years to when Greek pilgrims travelled extensively to Epidauria, the sanctuary of the healing god Asklepios. Spa towns and sanatoria were early medical tourism destinations for the Romans. In Victorian England, patients travelled to British and European spas to partake of mineral waters to treat diseases such as gout and liver disorders. In the nineteenth century tuberculous patients travelled to Switzerland to expose themselves to health-giving mountain air.

Medical tourism today is defined as, travel abroad with the prime intent of medical investigation, treatment, or operative intervention. Citizens of highly developed countries by-pass care available locally and travel to usually less developed world areas to receive a wide variety of medical services. The occurrence is driven by marketplace forces and occurs out-with the control of conventional organised healthcare systems. This is a trend which differs from the custom of wealthy residents of undeveloped countries travelling to Western lands seeking high quality medical care. These affluent citizens arguably, are doing a service to their country of domicile, by removing themselves from imposing personal clinical demands on the home health care system, which may be rudimentary or impoverished.

The medical tourist however can add to the burden of health care in the host country and possibly deprive the country's residents if clinical resources are limited. Medical tourism may seriously undermine the care of local residents by adversely impacting on scarce health worker distribution and diverting limited resources. A potential benefit however is that revenue generated by countries providing medical services to foreigners, may create opportunity to improve quality of care available to local citizens, if there is political will and Government direction.

Global travel and medical tourism are expanding markets with potential benefit for local economies. Their further development should consider quality of services, care provision and the impact on host country. Verifiable statistics regarding the magnitude of

medical tourism are scarce. Estimates suggest that the global medical tourism industry currently generates annual revenues between £30-£45 billion, with 15-20% annual growth. Thailand has over a million medical tourists per annum. 450,000 foreigners seek medical treatment in India annually. 75,000 UK patients went for treatment abroad in 2011.¹ Common medical tourism destinations are Bulgaria, Croatia, Ukraine, India, Thailand, Singapore, Malaysia, South Africa. Major hubs for north-south medical tourists are Thailand, India and Singapore. Minor ones are Costa Rica, Hungary and South Africa. India is cheapest in costs, with surgical procedure prices a fifth of those in USA, Thailand has the best elective procedures for routine check-ups and cosmetic surgery, Singapore has skilled practitioners and state-of-art technology.

Major medical tourism destinations area:

Asia/Middle East

China, India, Israel, Jordan, Malaysia, Singapore, Philippines, Turkey, United Arab Emirates.

The Americas

Argentina, Brazil, Canada, Colombia, Costa Rica, Ecuador.

Europe

Belgium, Czech Republic, Germany, Hungary, Italy, Latvia, Poland, Romania, Spain.¹

Africa

South Africa, Tunisia.

Other

Australia, Barbados, Cuba, Jamaica.

Reasons for medical tourism

- Low costs for patients
- Circumvention of delays associated with long local waiting lists.
- Access to procedures not widely available in country of domicile.
- Belief that privacy and confidentiality will be protected in a distant setting.
- The opportunity to have medical care and travel to exotic locations.

The global increase in medical tourism is driven by the expansion in world travel by citizens of developed countries and affluent populations conditioned to foreign vacations. Ageing and wealthy populations in near Europe, seeking medical support promptly and time-determined by them, are turning to health tourism. The extension of the European community has brought the facilities of countries from mid and eastern Europe into public cognition. The NHS sends patients to nearby EC countries for operations, and more distant medical tourism destinations may be

used in the future.

A Directive on Cross-border Healthcare was adopted by the EU in 2011.² It was intended to facilitate access to safe and high-quality cross-border healthcare and promote cooperation on healthcare between member states. It provided added stimulus to the growing number of medical tourists who seek hospital treatment in the European Union and removed obstacles for UK patients wishing to travel for treatment in other EU countries. In some circumstances, they can reclaim the cost of treatment from the NHS. Patients pay travel and accommodation costs, plus any top-up fees if charges in foreign hospitals are higher than the NHS. UK National Institute for Health Research has commissioned research on the implications for the NHS of inward and outward medical tourism.

Member States are expected to:

- facilitate development and functioning of a network connecting national authorities responsible for health technology assessment
- support provision of objective, reliable, timely, transparent and transferable information on the short- and long-term effectiveness of health technologies
- enable an effective exchange of this information between national authorities
- help to promote access to high quality and cost-effective healthcare for all patients with a medical condition requiring a particular concentration of resources or expertise
- provide quality and safety benchmarks and to help develop and spread best practice within and outside the network
- help patients to protect their rights and seek appropriate redress in the event of medical mishap
- provide and disseminate information to patients on their rights related to cross-border healthcare and guarantees of quality and safety, protection of personal data, procedures for complaints and means of redress harm caused by healthcare in another Member State.²

Overall quality care should be improved by this directive in EU states and some concerns about health tourism may be ameliorated.

Concerns and problems relating to health tourism

There are concerns, ethical dilemmas and problems relating to this growing commercial health industry.

- Potential patients can find difficulty identifying well-trained physicians and modern hospitals providing high-quality care.
- Risk of complications resulting from travel and vacation activities in postoperative period.
- Management of postoperative complications after

return from distant medical facility may create problems in home location with family doctor and local hospital having to take up care .

- Case notes and professional communications from operating doctors may prove inadequate or absent.
- Overseas units may have an inadequate complaints policy to deal with complaints made by dissatisfied patients.
- Costs of after care and rehabilitation may not have been considered in the initial contract and may prove difficult to organise if needed urgently on return. The NHS may be reluctant to provide a follow-on service and further local private health care can prove expensive and with service limitations.
- Medical malpractice law of some countries where treatment is sought, ensures that medical tourists face a diminished likelihood and extent of financial compensation, should medical injury result.
- Health tourism destinations such as India, South Africa, or Thailand have very different infectious disease-related epidemiology to Europe eg. Patients can be exposed to mosquito-carried infection and GI illness.
- Long flights and inevitable decreased mobility in intercontinental travel risk DVT and pulmonary embolism.³

The UK population is cossetted by the NHS with a relatively seamless continuity through diagnosis to treatment, convalescence, rehabilitation and after care. People are often unaware of this protective umbrella of management and a similar comprehensive package will not be met in a medical tourist contract. Some are even unaware that travel health insurance packages will not cover travel solely for the purpose of treatment.

The UK Foreign & Commonwealth Office warns, "although medical and dental treatment abroad may be cheaper, standards of care may not be the same as those in UK, and emergency facilities such as intensive care may not be readily available."

Medical tourism is currently driven by commercial interests lying outside of organised and state-run health policy-making and delivery.⁴ The inconvenience and uncertainties of offshore healthcare for many patients are offset by lower financial demands of healthcare in low-cost medical tourism venues. Low administrative and medico-legal expenses for overseas practitioners contribute to the affordability of offshore medical care. Some countries attracting medical tourists however are often unable to meet even the most basic medical needs of their own populations – an ethical dilemma. Ageing, well-travelled and affluent citizens unhappy with health provisions in the home country e.g. UK and USA are forcing

Medical Tourism *continued*

the expansion of the uncontrolled industry. Internationally recognised and global safeguards are needed to protect the medical tourist traveller.

Three components (economic, treatment-related, travel-related) have been identified as motivation to travel for treatment. Insurance protection, income and age influence consumers' economic motivation to use medical tourism³ Over 50 countries have identified medical tourism as a national industry.⁵

Most popular destination for those in the UK travelling overseas for treatment

	% Patients
Belgium	16
Hungary	16
Poland	10
Czech Republic	9
Turkey	9
Others	4

In a survey of the health care experiences of patients seeking treatment overseas, it was reported that:

%	Patients ⁵
90	would definitely, or probably, go abroad for treatment again
88	would recommend going abroad for treatment to a friend
84	would go back to the same doctor, dentist or clinic
51	travelled to a country they had never been to before for treatment
85	were either 'very' or 'quite' satisfied with their experience
67.2	did not require further treatment or follow up on return home.
70	were contacted by the overseas clinician or clinic upon return home

Average in-patient stay among respondents was three days with average trip of 16 days. The longest stay was for orthopaedics and shortest for obesity patients. Fewer than one in ten had bought special travel insurance designed for people going abroad for medical treatment and were relying on standard travel insurance that would not have covered them in the result of loss or accident. One in three had no travel insurance at all.⁵

Patients were willing to trade-off certain destination attributes for greater saving potential.⁴ Hygiene and safety/security influence the desirability of a medical tourism destination.⁶

Summary

The medical tourism industry is thriving and expanding. There is a lack of systematic data concerning involved health services with scant robust evidence that medical tourism enhances economies of destination countries, or improves services for local populace. Research and evaluation has not kept pace with development and there is a need for governments and international body (e.g. EU, OECD, WHO) surveillance. Family doctors, physicians and nurses approached for information should be aware that, there is insufficient evidence to assess good, bad or indifferent medical care, or who benefits and who loses out in the global medical tourist industry.

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MIGRATION – CHANGING MEDICINE

A highly successful national Global Health Conference was run by the student organisation 'Medsin' in March 2013 with the theme 'Migration - Changing Medicine'. It was held in Glasgow and there were about 250 attending over the 2 days with plenaries, numerous small group workshops (several BGTHA members contributed) as well as a global health 'fair'. An essay competition was held and the 'prize' was that essays would be published in the BGTHA Journal.

Four essays were selected and awards were presented at the closing ceremony by Eric Walker on behalf of the BGTHA. They demonstrate special insights and understandings of issues involved in migration are understood by the future generation of health care professionals. BGTHA welcomes the opportunity to support Medsin in this way.

Please visit their website to find out more:
<http://www.medsin.org/>



Migration, does one size fit all?

H Fiddler

Populations today are increasingly mobile and medical practice needs to be individualised with reference to a person's place of origin, their reason for leaving, their destination and how they arrived.¹ A migrant is defined by the Home Office as 'all those born outside the UK', and in 2001 an estimated 8.3% of the UK population were born overseas. Currently, UK migrant populations consist of those from Ireland originally; commonwealth countries; EU member states; asylum seekers and refugees; managed migrants through work permits and visas; and undocumented or 'irregular' migrants.² This demonstrates the great variety in needs.

An awareness of diseases common amongst some migrant populations is required. This includes infectious and genetic diseases;

- different presentations of common UK diseases;
- different risk factors such as tobacco chewing in Asian populations² and obesity symbolising wealth in West African populations;
- increased incidences of certain diseases especially myocardial infarction and diabetes mellitus in South Asian populations;
- different methods of management, such as hypertension treatment in those of African or Caribbean origin.^{2,3}

Whilst each culture is very different, the use of traditional healers in many countries will contrast starkly with visiting a General Practitioner (GP) in the UK. Due to high levels of infant mortality and

limited health care provision in some countries, an element of fatalism may result in later presentation to the doctors.³ These cultural influences on access to healthcare ought to be explored in consultations. Whilst up to two thirds of asylum seekers may have experienced anxiety and depression, counselling may be unheard of in many cultures and coping strategies may be to forget and not to discuss it with strangers.⁴ When providing mental health services to migrants, these all need to be considered.

New migrants commonly have limited understanding of NHS services or how to access them, and are without a guide.⁵ The NHS is free of charge to all those who are considered 'ordinarily resident', which includes asylum seekers applying for asylum. Despite this many asylum seekers may only have temporary registration with a GP preventing access to health checks, screening and immunisation. This, coupled with an inadequate understanding of naming systems and barriers to communication results in low uptakes of cancer screening programmes by migrant women.² Additionally, female migrants are often less fluent in English than their male counterparts and may be illiterate in English and their mother tongue. Taking time to explain screening through an interpreter rather than a relative or friend, to enable both the discussion of sensitive issues and more accurate translation as well as following up on non-attendance could improve uptake.^{2,5}

Key priorities for change in medicine are:

- education on differences between migrant

Migration – Changing Medicine *continued*

- populations and individuals;
- taking the time to explore patients' beliefs, expectations and concerns;
- directed explanations and reassurances;
- training in interpreter use;
- providing targeted health promotion;
- tailoring services to individual needs;
- increasing accessibility to the NHS. A combination of these would enable medicine to move towards meeting the needs of migrant populations.

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Migration and Infectious Disease – a UK perspective

H R Lewis

International migrants comprise 3% of the worldwide population.¹ Meanwhile 12% of the population of England and Wales were born outside the UK,² and the number of tourist travellers has increased by a factor of 13 over the last 50 years.³ This huge shift in population has resulted in the rapid worldwide spread of communicable diseases such as influenza, severe acute respiratory syndrome and drug resistant forms of tuberculosis.⁴ This has led to increased burden on communicable disease centres and the requirement for migrant health programs, it also poses the threat of rapid, global pandemic spread of disease.

Within the UK, health services have to be prepared to deal with the health related consequences of migration. The main goal of migrant medicine according to the World Health Organisation (WHO) is “to avoid disparities in health status and access to health services between migrants and the host population”.⁵ Providing health care access for migrants with non-communicable diseases and psychosocial disorders is essential, however, increased spread of infectious disease is potentially the most worrying health problem associated with a migrating population.

While most migrants to the UK are healthy,⁶ the total population of migrants is still a major source of infectious disease cases.⁶ In 2010, 73% of Tuberculosis cases, almost 60% of HIV cases and 80% of hepatitis B infected blood donors were born outside of the UK.² There is a similar pattern with malaria, 77% of cases between 2005 and 2010 were diagnosed in foreign born populations. Migrants coming from countries where the living conditions are poorer and the risk of disease is higher, in comparison to the UK, should trigger a higher index of suspicion when considering an infectious disease diagnosis.² This requirement for extra vigilance amongst migrants from disease

endemic regions should continue for several years, as 77% of the Tuberculosis cases discovered in the migrant population were diagnosed in migrants who had been settled in the UK for more than 2 years.² Some migrants are also at greater risk of acquiring new infections within the UK, 50% of new HIV infected migrants likely acquired their infection within the UK.² This increased susceptibility to disease in the migrant population is due primarily to socioeconomic status.⁶

Improving access to medical services for migrants and ensuring that follow-up appointments are made after the initial contact is vital in improving migrant health.⁶ Communities of migrants with different cultures and languages should be met with adequate knowledge of both, to ensure they are not left behind in terms of health outcomes.²

The majority of diagnoses of infectious disease come through primary care,² it is therefore important that primary care practitioners consider the specific health concerns of migrants. Asking patients their country of birth along with increased knowledge of rarer infectious diseases can vastly improve accurate diagnoses, for example in cases of Chagas disease in migrants from South America.² Ensuring that infectious diseases are diagnosed promptly amongst migrants is important in improving outcomes,² along with prophylaxis by ensuring that migrants and travellers have all the correct immunisations.²

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The Unfulfilled Potential of Travel Medicine

M Tonkins

The effects of migration upon medicine are apparent in numerous medical specialities, and none more so than in the discipline of travel medicine which emerged as a discipline in its own right in the latter half of the 20th century.¹ Broadly speaking, travel medicine is concerned with those threats to the health of travellers and host nations which are the result of international travel.

Travel medicine today is on the cusp of outgrowing its origins in tropical and infectious diseases, public health and primary care.² It encompasses a range of subject matter, including disorders specific to travellers such as jet lag³ and fear of flying;⁴ infectious disease surveillance,⁵ the ethical aspects of healthcare for travellers⁶ and the challenges that travel and migration present to medical education.⁷ However, travel medicine is limited in the sense that it is almost exclusively concerned with those who are travelling. In order to develop into a more influential and mature discipline, it should also take into account both those who will travel, and those who have travelled.

With regard to the former of these groups, broadening the discipline's focus would allow travel medicine to encompass the ways in which travel and migration are changing the medical landscape on a larger scale. Many of the medico-social issues facing healthcare in the 21st century are related to migration: resource security, urbanisation and climate change could all find their home here. With regard to the second group, travel medicine could also take under its wing the study of the health of migrant populations themselves: the particular burdens of disease which they bear – such as infectious disease and mental illness – and their access to healthcare.

This integration provides an attractive alternative to the current fragmentary situation, in which a clear understanding of the ways in which travel and migration are changing medicine is obstructed by disciplinary boundaries. To expand on the example of migrant mental health, at the moment it is necessary

to consult a swathe of psychological literature in order to appreciate the high burden of mental illness among immigrants.⁸ In addition, one must refer to primary care journals in order to discern how this is managed in the community.⁹ Yet these are not two issues, but two aspects of the same issue. Together with analyses of the factors which are causing people to migrate in the first place, they could be productively integrated in one forum.

Travel medicine is well-placed to act as that forum, since it already includes medical practitioners from numerous specialities. Were it to expand its current role in this way, travel medicine could grow into an interdisciplinary hub: integrating and disseminating knowledge on the whole range of effects that travel and migration have on medicine.

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Migration – Changing Medicine *continued*

Global Migration and Health

I Maan

Human travel and migration has resulted in the collision of people and cultures throughout history and has acted as a vector for spreading diseases. The process of migration allows humans to carry their infections as well as their genes, cultural preferences, behaviour and customs with them.¹ These beliefs can affect health especially when considering attitudes towards tobacco, diet and cultural norms for exercise and body mass.² The scale of movement seen today, fleeing across borders from conflict or moving around the globe on business, poses risks to both travelling and native populations.¹ This essay will briefly look at some health effects on migrants and host populations and conclude by highlighting the need for a policy response.

The modern era of migration, particularly the last 50 years, has seen large waves of new arrivals to European and North American countries influenced by rapid decolonisation, conflicts and the breakup of the former USSR.² Many migrants have fled from unsafe countries but a large and growing proportion are for economic reasons.³ There are stark inequalities of wealth, life expectancy and disease burdens between the developed and developing worlds and the variation in disease epidemiology is what poses such a risk to health. Infectious diseases, often vector or environment based, can be brought with people to their host country but the disease is usually self-limiting, as the conditions do not exist for onward transmission. However some infections can continue to transmit in a new environment as HIV did, devastating developed nations as a new infectious disease in the 1980s. The link between the spread of HIV and population movement has attracted attention, particularly between North America and Haiti.⁴

Migrants reflect the health characteristic of their area of origin and bring with them their cultural and health beliefs.² Many cultures view an increased body size as attractive and are not able to maintain their traditional diet after migrating. These and genetic factors have created a concerning burden of non-communicable diseases, such as diabetes, amongst this population. Migrants are shown to have low utilization of

health care, especially after recently arriving, even with the right to access services.⁵ This is worrying given the number of undocumented migrants living in developed countries today who may not have access to medical services, putting their health in danger.

Historically, screening programs for new migrants were used to prevent disease introduction into a country, as was famously done on New York's Ellis Island targeting Eastern Europeans.⁶ However, this type of programme only addressed infectious diseases. Regional wealth and health disparities continue to exist meaning migration will continue to pose a threat of carrying disease with it. There is an argument to be made for developed nations to reduce these health disparities in order to protect themselves. There is also a need for a migrant health framework that balances international trade, economic and security concerns with the need to protect health.² However international frameworks will have to be used alongside pragmatic national programmes to account for undocumented and illegal migration and the trafficking of people across borders.

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Anti-tuberculosis drug resistance - a major public health problem

I Mackay

Although caused by vastly different pathogens, the world's three most serious infectious diseases, tuberculosis, malaria, and HIV-1 infection, share the common problem of drug resistance. The pace of new drug development has been very slow for tuberculosis.

Tuberculosis, is a contagious disease that thrives in overcrowded places. It is caused usually by *Mycobacterium tuberculosis* which typically attacks the lungs, but also affects other parts of the body. It is spread by air transmission when affected people cough, sneeze and pass respiratory aspirate through the air. Most infections remain latent, but about one in ten of these cases eventually progresses to active disease. Once the infection becomes active, if left untreated, the mortality rate is high with the disease killing half of those infected. About one third of the world's population has probably been infected with *M. tuberculosis*,¹ with an estimate of 9 million new cases and 1.5 million associated deaths annually, mostly occurring in developing countries.² Up to 80% of the population in many Asian and African countries test positive in tuberculin tests. The absolute number of tuberculosis cases has been decreasing since 2006. More people in the developing world contract tuberculosis because of compromised immunity, largely due to high rates of HIV infection and the corresponding development of AIDS.³

The global burden of TB remains enormous. In 2011, about an 1.4 million people died from TB, including almost one million deaths among HIV-negative individuals and 430 000 among people who were HIV-positive. TB is one of the top killers of women, with 300 000 deaths among HIV-negative women and 200 000 deaths among HIV-positive women in 2011.²

Classic symptoms are chronic cough, blood-tinged sputum, fever, night sweats, and weight loss. Diagnosis of active TB depends on chest X-rays, microscopic examination and examination of body fluids, with latent TB identified by tuberculin skin test. Prevention relies on screening programs and vaccination with the bacillus Calmette-Guérin vaccine. Treatment requires administration of multiple antibiotics over a long period of time.

Development of resistance to antibiotics is common in many bacterial infections. Resistance is often due to transmission of infrequently-arising resistant clones, generated through mutation. Cure of an uncomplicated Tb infection may require at least six months, on up to four different drugs, allowing the bacteria ample opportunity to develop resistance. Anti-tuberculosis drug resistance is a major public health problem which threatens progress made in TB

care and control worldwide. It arises from improper use of antibiotics in chemotherapy of drug-susceptible TB patients, the result of improper treatment regimens and failure to ensure that patients complete the whole course of treatment. Drug resistance arises in areas with weak TB control programmes. A patient who develops active disease with a drug-resistant TB strain can transmit this form of TB to others.

Increasing antibiotic resistance has brought multiple drug-resistant tuberculosis (MDR-TB) infections. Poor diagnosis, misuse and mismanagement of powerful drugs have created strains progressively harder to combat. When a TB patient is given an ineffective prescription or, starts but does not complete the full course of drugs, the bacterium can grow stronger and resistant to medication.⁴ Nearly 4% of new TB patients have MDR strains of TB. Among patients who had been treated for TB before, about 20% have MDR TB. According to the World Health Organization, worldwide rates of MDR and extensively drug-resistant (XDR) tuberculosis are probably higher than reported.⁵ Complete drug resistance in TB has not been clearly defined but the evolution of resistant variants has made some Tb infections virtually untreatable. XDR is reported by WHO in 84 countries.⁵ East and Southeast Asia, Eastern Europe, South Africa, Russia and India have alarmingly high rates of drug resistance but only India, Italy and Iran have reported cases of TB that do not respond to any drugs.

Multidrug resistant TB strains (MDR-TB) cause 3.6% of all TB cases and require at least two years of treatment with as many as six potentially toxic drugs.⁶ Extensively drug resistant strains (XDR-TB), which may be nearly impossible to cure, have been isolated in all countries that have adequate diagnostic capability to recognize them.⁷ Within a year of the first reports of extensively resistant TB (XDR-TB) in 2006, isolated cases were reported in Italy that had resistance to all first-line anti-TB drugs (FLD) and second-line anti-TB drugs (SLD) that were tested. In 2009, a cohort of 15 patients in Iran was reported which were resistant to all anti-TB drugs tested. The terms 'extremely drug resistant' ('XXDR-TB') and 'totally drug-resistant TB' ('TDR-TB') were given by authors reporting this group of patients. Recently, a further 4 patients from India with 'totally drug resistant tuberculosis' ('TDR-TB') were described, with subsequent media reports of a further 8 cases.⁷

Reports of tuberculosis patients with these severe patterns of drug resistance are increasing. The term 'totally drug resistant' has not been clearly defined for tuberculosis. A new definition of resistance beyond extensively drug-resistant TB (XDR-TB) is not recommended by WHO. While the concept is easily under-

Anti-tuberculosis drug resistance... *continued*

stood, in practice, in vitro drug susceptibility testing (DST) is technically challenging, with problems in drug susceptibility testing of many anti-TB medicines, insufficient evidence to link such DST results to treatment outcomes of patients, and lack of standardised DST methods for several anti-TB drugs (including new ones). XDR-TB severely reduces the options for treatment. Patients who have resistance to additional second-line anti-TB drugs have even more limited therapeutic options.⁷

Mass migrations, urban overcrowding, increasing global air travel, national conflict and civil wars ensure that the disease is spread rapidly. If TDR strains take hold in global populations, the resulting contagion could be catastrophic and in some areas it is already difficult for health authorities to contain. Zimbabwe for instance is grappling with multi-drug resistant tuberculosis (MDR-TB) as patients fail to respond to traditional first-line TB drugs. According to the Ministry of Health and Child Welfare, cases of MDR-TB nearly doubled last year from 156 in 2011 to 244 cases. This was despite the fact that notifications for ordinary TB drastically declined from 47,000 in 2010 to 38,367 in 2012.⁸

Since 2006, India's government has provided free TB medication nationwide. In Hinduja (where the first Indian cases of totally drug-resistant TB were reported) victims get free medications but patients need to go to a clinic, hospital or government drug provider three times a week to acquire them. For day labourers, this is impracticable and they do not take up the offer, take the drugs intermittently, or discontinue treatment prematurely. In the slums, as many as a third of TB patients stop taking their drugs before the standard six-month treatment is complete. New patients are given a combination of four medications, with two months of intensive treatment followed by four months of continuing care. Following the regimen is crucial. If patients do not respond to that treatment, or if they test positive for drug resistance, they are given other, more powerful second-line drugs, which can be highly toxic and are part of a gruelling two year program very demanding on the ability of poor patients to follow. If a patient stops treatment the bacterium becomes even more resistant to a concoction of ever more toxic drugs.

While the overall incidence of tuberculosis worldwide has gone down in recent decades, the rise of TB in North Korea has been swift. According to a 2012 report by the World Health Organization, between 1994 and 2011, reported cases went from fewer than 50 per 100,000 people to 380 cases. Today, the incidence of TB in North Korea is second only to that in sub-Saharan Africa. Several factors have allowed TB to take a hold, firstly a four-year famine that left malnourished survivors highly susceptible to TB infection, secondly, a shortage of TB drugs at the time and a tendency of locals not to comply with therapy

recommended by doctors.⁹ Today, the country's health ministry estimates that up to 15% of patients with TB fail to respond to commonly used first-line TB drugs, which suggests they are carrying drug-resistant strains. Neighbours, like China, are worried as MDR is difficult to treat even with top-tier health programs and North Korea's health responses are politically compromised.

The anti-TB arsenal of drugs is decades old and is being quickly depleted due to resistance. The US Food and Drug Administration has recently approved the first new drug for a long time and several other drugs are also in the pipeline that could help fight resistant strains. Faster and more accurate diagnostic tools are also on the way, including GeneXpert, a machine already in use in India which tests for drug-resistant TB in hours, rather than days.¹⁰

Another approach is to repurpose existing drugs approved for other infections such as the MRSA drug linezolid and the antibiotic metronidazole. New research on genes essential for MTB survival in the host has prompted the search for inhibitors of the products of these attractive targets. These developments are puny considering the enormous challenge of drug resistant TB and the concurrence of HIV-1 plus TB epidemics. As with HIV-1, it is increasingly clear that no single drug can act against TB. It is essential to develop new drug combinations for TB, using new and existing compounds to provide shorter, effective therapy.¹¹ WHO is promoting initiatives for early collaboration among pharmaceutical companies producing investigational new TB drugs, to use these drugs in novel combination regimens and to facilitate their introduction into clinical settings.

Increasing antibiotic resistance resulting in multiple drug-resistant tuberculosis (MDR-TB) infection is a major global health challenge and so far there has been an ineffectual response by world health organisation to combat it. If TDR strains take hold in global populations, the resulting contagion and spread of the disease could be catastrophic. The hope is that new drugs and new combination therapies will stem the resurgence of this potentially fatal disease.

Conclusions

Anti-tuberculosis drug resistance is a major public health problem

The pace of new drug development for tuberculosis treatment has been very slow.

There is a pressing need for properly conducted studies evaluating head-to-head comparisons of available DST methods, in different epidemiological settings, and linked to patient management and clinical outcomes.

WHO is promoting initiatives to encourage pharmaceutical companies producing new TB drugs, to use these drugs in novel combination regimens and to facilitate their introduction into clinical settings.

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Emaciated tuberculosis patients undergoing treatment in Africa and India

Meningococcal B vaccine – the Last Piece of the Puzzle?

G Kassianos,¹ K Veitch,² P Watson²

Meningococcal infection is a major cause of morbidity and mortality worldwide, and is most common in infants, young children, and adolescents. The large majority of invasive meningococcal disease (IMD) cases are caused by five main *Neisseria meningitidis* serogroups, A, B, C, W135 and Y. Following an increase in cases of meningococcal serogroup C disease in the 1990's there was a rapid development and deployment of monovalent polysaccharide-conjugate serogroup C meningococcal conjugate vaccines (Men C).¹ The successful incorporation of these vaccines into routine childhood vaccination schedules since 1999, is estimated to have prevented over 9,000 cases and 1,000 deaths over the subsequent years (**Figure 1**).^{2,3} This has been followed by the development of effective quadrivalent glycoconjugate vaccines against the four serogroups, A, C, W135 and Y, but the development of a broadly effective vaccine against serogroup B has been difficult.

Serogroup B has always been the predominant meningococcal serogroup in the UK in the modern era, accounting for approximately 60% of IMD cases before the introduction of the Men C vaccines, increasing to approximately 90% of cases as serogroup C incidence has declined to virtually zero (**Figure 1**). With the similar successes of glycoconjugate vaccines against *Haemophilus influenza* type b (Hib) and *Streptococcus pneumoniae* this leaves serogroup B as the most common cause of bacterial meningitis and septicaemia in the UK, associated with high mortality and morbidity, particularly affecting young infants and pre-school children (**Figure 2**). So protecting infants against serogroup B meningococcal disease remains a major public health need.

The successful monovalent vaccines against serogroups C, and the multivalent vaccines against serogroups A, C, W135 and Y are polysaccharide-protein glycoconjugates, exploiting the antigenicity of the characteristic capsular polysaccharides that define these serogroups, chemically conjugated to carrier proteins (typically forms of diphtheria or tetanus toxoids) to enhance the immune response.⁴ The serogroup B polysaccharide, however, is poorly antigenic as it closely resembles some human neural polysaccharides, so another approach to develop a serogroup B vaccine was necessary.^{4,5}

For some strain specific regional outbreaks, notably in New Zealand, Norway and Cuba, preparations of outer membrane vesicles (OMV) in which the main antigen is the PorA protein were used as the basis for MenB vaccines. However, while successful against the specific strains responsible for each outbreak, and with the variability of the PorA proteins,

such vaccines provide neither long-lasting nor broad responses against other strains.⁵ In response, by applying the techniques of reverse vaccinology, Novartis Vaccines and Diagnostics took the novel approach of sequencing and analysing the meningococcal genome to identify and select surface-exposed proteins that would be present on a majority of serogroup B strains, and thus provide recombinant protein candidates for inclusion in a broadly effective vaccine.

This resulted in the multicomponent vaccine (4CMenB), which has recently received European approval as Bexsero®. This innovative vaccine contains three recombinant proteins: *Neisseria* heparin binding antigen (NHBA) and factor H binding antigen (fHbp) both which are presented as fusion proteins with other recombinant proteins – and *Neisseria* adhesin A (NadA), in addition to the OMV from the New Zealand outbreak strain, NZ98/254, which has the PorA P1.4 variant. In the development of this vaccine to licensure, it has been evaluated in large scale clinical trials involving over 6400 infants, children, adolescents and adults.

Immunogenicity

The relative rarity of meningococcal disease means vaccines cannot be assessed on the basis of their efficacy, but a surrogate of efficacy is applied, namely the ability of sera from vaccinees to kill *N. meningitidis* bacteria *in vitro* – the serum bactericidal activity (SBA).⁶ An exogenous complement source must be included in this assay, and some meningococcal vaccines have been licensed on the basis of their ability to elicit SBA with baby rabbit complement (rSBA), but the gold standard is to use human complement (hSBA). The correlate applied to license MenC vaccines was a serum dilution of 1:4 in an hSBA assay (i.e., an hSBA titre of 4), which was considered to be protective, as indicated by data from recuperating IMD patients.⁶ Subsequent experience with the large-scale use of MenC vaccines in the UK has supported this concept² and the same correlate has been accepted for the quadrivalent ACWY vaccines which followed, and the new MenB vaccine. Due to the multicomponent nature of Bexsero® immunogenicity of the vaccine was tested as hSBA against several *N. meningitidis* target strains, each selected to be relatively specific for one of the four vaccine antigens, as not all MenB strains either have the genes or express each of the individual antigens. As with the glycoconjugates, an hSBA titre ≥ 4 was used as indicator of protection, although in some infant studies a titre ≥ 5 was applied as cut-off as this is considered to be protective with

95% confidence.

In these clinical studies Bexsero® has been shown to be immunogenic and generally well tolerated in all age groups from 2 month-old infants to adolescents and adults. In infants, three doses of Bexsero® at 2,4,6 or 2,3,4 months elicit high levels of protective titres, and a 4th dose at 12 months boosts all responses (Figure 3).^{7,8} The vaccine has no clinically significant effect on responses to concomitantly administered routine vaccines (Infanrix™-Hexa and Prevenar™).^{7,8} There were also high responses to two doses of Bexsero® in toddlers at 12-15 months, with the first dose given either concomitantly with or separately from measles, mumps, rubella and varicella (MMRV) vaccine.⁹ Other studies have confirmed similar high immunogenicity to two doses in adolescents given 1, 2 or 6 months apart¹⁰ and adults,¹¹ achieving the protective response in virtually 100% of subjects against at least two antigens.

Reactogenicity and safety

In the licensure studies, Bexsero® has been assessed in 4843 infants and children, and 1584 adolescents and adults and raised no safety concerns. When given alone, reactions to Bexsero® are similar to routine vaccines, but there is a small incremental increase in reactions when routine vaccines and Bexsero® are given concomitantly (Figure 4).^{7,8} The increase in reports of fever when Bexsero® is given concomitantly with routine vaccines is principally associated with more fever on the day of vaccination and can be mitigated by prophylactic paracetamol, without compromising the responses to the vaccine components.¹²

The coverage and hence effectiveness of Bexsero® against circulating strains of serogroup B meningococci will depend upon the presence and expression of the vaccine antigens in those strains. As it is technically not feasible to test sera from Bexsero® vaccinees against all potential strains, especially when one considers the small volumes of sera obtained from infants, an automated technique has been developed to predict coverage. The Meningococcal Antigen Testing System (MATS) uses antigen-specific ELISAs to determine the cross-reactivity and quantity of the antigens expressed by individual meningococcal strains, and is predictive of the susceptibility of any particular strain to killing in the SBA by Bexsero® – induced antibodies.¹³ MATS has been developed and validated in several national reference laboratories, where testing so far has revealed conservative estimates (as synergies and additional OMV antigens are not taken into account) of strain coverage from 69% to 87% in different European countries, with a coverage of 73% (95% CI: 57-87%) in England and Wales.

Conclusions

Meningococcal serogroup B disease is a public health problem, particularly affecting infants and young chil-

dren, and is now the major cause of meningitis and sepsis in UK children. Strategies to successfully develop glycoconjugate vaccines against other bacterial causes of meningitis and meningococcal serogroups cannot be applied to serogroup B, making the licensure of Bexsero® a milestone in paediatric vaccine development. In extensive clinical testing this innovative vaccine has been shown to be well tolerated and highly immunogenic in the primary target age groups of infants and young children, and immunogenicity has also been demonstrated in older children and adolescents who are likely to be included in any catch-up campaign when Bexsero® vaccination is implemented. Bexsero® can be administered concomitantly with current routine infant and toddler vaccines to facilitate inclusion in the immunisation schedule. The predicted strain coverage includes the majority of serogroup B strain isolates from the UK, so inclusion of Bexsero® with established vaccines will offer the first realistic opportunity of providing children with protection against all causes of bacterial meningitis.

Declaration

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Figure 1

Meningococcal disease rates over the decade following introduction of routine meningococcal serogroup C vaccination in England and Wales. From reference 2.

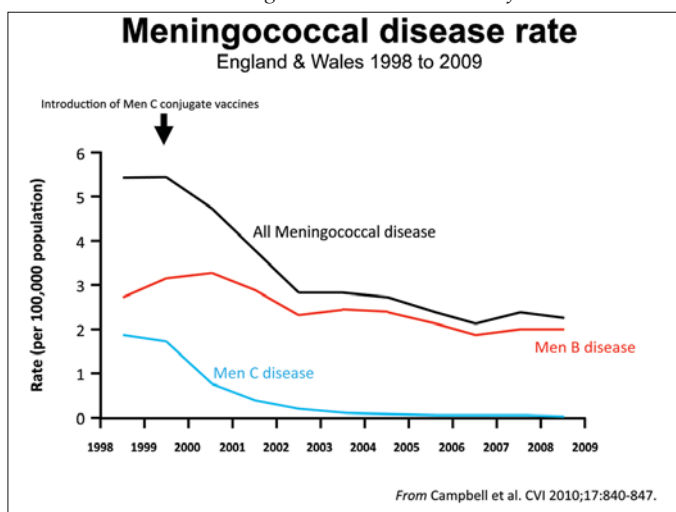


Figure 2

Laboratory-confirmed cases of meningococcal serogroup B infection in England and Wales per year and age group. Data from reference 3.

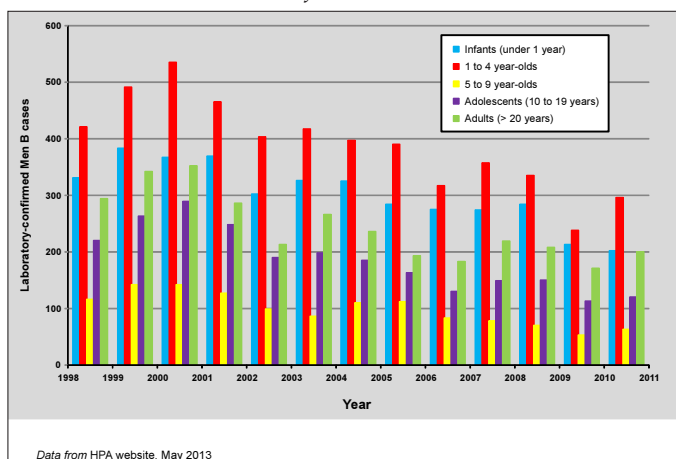


Figure 3

"Seroprotection rates" (hSBA titres ≥ 5) against the four indicator strains in infants and toddlers following four doses of 4CMenB at 2, 4, 6 and 12/13 months of age. Data from reference 8.

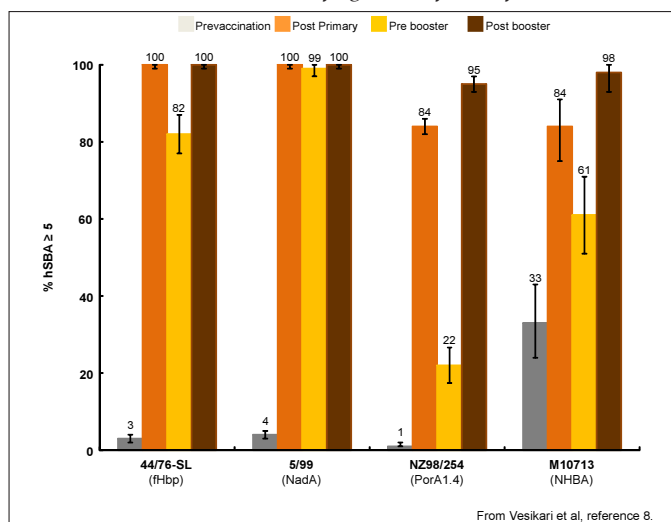
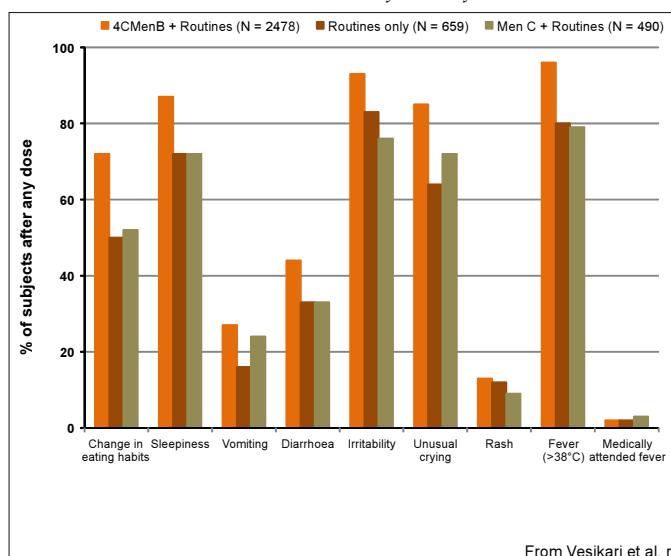


Figure 4

Systemic reaction incidence rates after any of the three doses in the infant schedule (2, 4, 6 months), when 4CMenB was administered concomitantly with routine (DTaP-HBV-IPV/Hib and PCV7) vaccines, compared with routine vaccines alone, or routine vaccines with MenC vaccine. Data from Reference 8.



Mercy Ships – a local and global endeavour

K Griffin

Abstract

This article looks at the development of Mercy Ships International into a globally recognised charity committed to helping improve the healthcare of developing nations. Mercy Ships International is a charity organisation sending hospital ships to the world's poorest ports to offer free health care and perform life-changing surgical procedures including cleft palate repair, maxillofacial, orthopaedic and cataract surgery. For over 30 years, Mercy Ships have stayed true to their original mission in bringing hope and healing to the world's poorest. Their work has continued to support the aims of the World Health Organisation and they have made a strong contribution to surgical care in developing countries, aiding the Millennium Development Goals of 2015. This article considers the future of the Mercy Ship mission and discusses the importance of embracing sustainability when planning further services and also looks at the benefit of collaborating with other voluntary organisations to reach a wider population.

The Mercy Ship Vision

The Mercy Ship vision has not faltered from the first moment it was formed in the mind of Don Stephens. The concept of "offering hope and healing to the world's poorest" was always going to be an enormous challenge and in its practicality almost seemed impossible. But it is the determined passion and resolute belief behind this concept that has brought the Mercy Ship vision into a reality and allowed it to remain the driving force in the Mercy Ship campaign.

"Your son will help you on your journey to becoming the eyes, ears, mouth and hands for the poor." It was these words spoken in a chance meeting with Mother Teresa that finally gave Don the motivation to pursue his dream of building a fleet of hospital ships to serve the world's poorest countries, often forgotten by aid organizations. His son, a severely handicapped child, tested his strength and courage on a daily basis. Mother Teresa saw the unconditional love in Don's heart and reminded him of what he already knew. That love should be put into action, "doing the gospel" as she so famously expressed it. And with that, there were no more excuses or reasons to delay. The Mercy Ship project was launched.

Mercy Ships is an international charity that sends hospital ships to the world's poorest ports to offer free health care and perform life-changing surgical procedures. Don Stephens recognised that 90 out of 100 of the world's largest cities were port cities and it was the port cities that had the highest infant mortality, lowest life expectancy, and the lowest income.¹ Therefore, a self-sufficient ship equipped with modern hospital equipment and medical supplies would be able to reach a large amount of people and deliver

a better standard of health care efficiently to those in desperate need. The poor in developing countries often have no access to basic health care and it is common to see easily treatable conditions become life threatening as they are left in the hope that they will resolve themselves. The majority of surgical procedures performed aboard the Mercy Ships are simple procedures with a life-changing effect. For example, a cleft lip and palate repair can give a child a normal smile again and avoid years of bullying and social out-casting experienced by children with this deformity. Cataract surgery can give someone their sight back and is one of the most cost-effective treatments that can be offered in developing countries.² More than 50% of blindness cases in Sub-Saharan Africa could be prevented with a low cost, twenty-minute procedure. Pregnancy-related fistulas causing permanent incontinence can easily be repaired preventing a lifetime of embarrassment for affected women. Their husbands often abandon them, leaving them with no financial support a fistula repair operation can help begin to restore their life. These surgical interventions can have a major impact on the economic health of countries in the developing world.

Surgery has historically been overlooked in the prioritisation of global health strategies, often side-lined as a "luxury" in comparison to the treatment of infectious disease. However, recent evidence has suggested that surgical care is much more cost-effective, even rivaling childhood immunisations in its contribution to the economic health of a country.³ Consequently, surgery is becoming more accepted as a priority in the global health community.

Surgical Procedures On Board

A cleft lip or palate is the most common facial birth defect worldwide.⁴ The worldwide incidence of oral clefts is 1 in 700 live births. The aetiology is not well understood but there is a recognised role in genetic and external factors such as alcohol and other teratogens.⁵ A cleft lip and palate can present a number of problems for the affected child. Importantly, it limits the success of breastfeeding and slows the child's ability to thrive. The deformity also has a negative impact on speech and language development. In the developed world, cleft repair surgery is completed within the first year of life, ideally performed within 2-3 months of the child being born. The outcome from this relatively simple procedure is very successful with only the more severe cases requiring secondary procedures. By treating this defect early, it avoids the associated psychosocial effects. Unfortunately, cleft repair surgeries are often a low priority in developing countries' healthcare systems and as a consequence, affected children develop psychosocial problems including low self-esteem, anxiety and depression.⁶

Mercy Ships – a local and global endeavour *continued*

These effects are notably more pronounced in the 6-12 age group, often preventing them from attending school.⁷ In some cultures, cleft lips are seen as a curse. The children are shunned by society and even by their own families, as they are believed to be “touched by the devil”. The babies have difficulty feeding and become malnourished. This problem greatly increases morbidity and mortality rates in developing populations and highlights the need for surgical intervention to lessen the economic burden. Prior to a port-visit, Mercy Ships partner with healthcare workers in the visiting country, to identify surgical candidates. Staff see thousands of patients at dedicated screening days and assess who can benefit from the life-changing reconstructive operations offered on board the hospital ships. They advertise on television and radio and put up posters months before their arrival to raise awareness of the type of treatments available. Still, there is apprehension from local people and many do not believe that the offer of “free surgery” to cure their ailment is really possible. “What do we have to do?” is the common worry that deters people from even attending the screening days. It is this upsetting and also frustrating concept that highlights the need for permanent primary health care facilities. Referrals from primary healthcare workers in the villages would prompt affected individuals to seek surgical care when it is available. Their uncertainty and fear could be lessened by some reassurance from a familiar member of staff. The Alma-Ata declaration in 1978 affirmed that access to basic health care was a fundamental human right and it established a primary health care approach that developing countries would adopt over the next 20 years.⁸

Unfortunately, more than 30 years later, these goals were not reached. This was largely accountable to the refusal of developed countries to accept the principle that communities should implement their own healthcare services.⁹ Mercy Ships are offering a life-changing service, but the ships are only docked for a few months at a time, uncertain if they will return to offer a second opportunity to attend. They need to maximise output in this short space of time in order to benefit the largest amount of people, but they can only achieve this if the people are willing to come. Mercy Ships have always maintained that their focus is on the individual but an additional focus on reaching every individual, possible could enhance their campaign.

Cataracts are the leading cause of preventable blindness worldwide.¹⁰ It is estimated that 90% of the world’s population living with cataracts are in developing countries and for these people; visual impairment has a severely damaging effect on their quality of life, affecting their ability to work and provide for their family. Cataract surgery is recognised as one of the most cost-effective surgeries to perform in developing nations, yet it’s delivery to the populations in

need is still facing challenges.¹¹ The cost, a shortage of trained staff and lack of population awareness are some of the barriers facing this major global health issue.¹² In 1999, the World Health Organisation (WHO) and International Agency for the Prevention of Blindness (IAPB) launched an initiative called “Vision 2020: The Right To Sight” with the aim of eradicating preventable blindness by the year 2020 [13]. It is estimated that 39 million people worldwide are affected by blindness and this is set to increase to 76 million by 2020 if the issue is not addressed. Vision 2020 has set out clear objectives in order to facilitate the planning; development and implementation of sustainable national eye care programmes.¹³ The importance of primary health care systems is highlighted here once again. There needs to be an increase in primary health care workers in remote locations to ensure that people receive referrals for procedures such as cataract surgery. This first-line approach tackles the problems of awareness and distance, two major obstacles on the road to reducing the prevalence of preventable blindness. However, it is not suggested that eye surgery should be performed in these remote locations, as there is an associated increase in the risk of complications. Instead it is accepted that a network of permanent static facilities where high-volume surgery is available is the preferable option.¹⁴ The cost of a cataract operation is mostly related to the fixed costs such as staff training and salaries. Fixed costs do not rise with increased workload; therefore if capacity is maximised then the unit cost of cataract surgery is reduced to a minimum. High-volume surgery is the most effective strategy in eliminating cataract blindness and dedicated ophthalmic teams should be focused on this achievable goal.

Mercy Ships have invested their resources in their specific areas of expertise, which is exactly the philosophy that should be followed in order to utilise staff to their optimal degree. The charity focuses on maxillofacial surgery, eye surgery, plastic surgery, orthopaedic surgery and their most recent specialty, vesico-vaginal fistula (VVF) repair. This approach reflects the high-demand strategy already employed by the Vision 2020 project in tackling the problem of preventable blindness. An individual should focus on their strength to achieve the most success. For Mercy Ships, their strength is surgery and so it stands to reason that they must load their resources into this area in order to reap the largest benefit.

Sustainable Change

Health services in poorly developed countries of Africa do not meet the needs of all the residents. Healthcare varies markedly from country to country but it is particularly poor in rural and coastal areas away from cities. The major challenges impeding the provision of healthcare to the populations in need are a lack of resources, problems with transport to hospi-

tal facilities and a lack of infrastructure within the country.¹⁵ It has already been realised that the United Nations will not reach their Millennium Development Goals as hoped by the year 2015. The aim of these eight goals is to improve the social and economic development of the world's poorest countries but their achievement has suffered a major setback as a consequence of the global financial crisis.¹⁶ Despite this, the UN is still committed to furthering their progress in global health improvement. The UN has highlighted in its objectives the need for adequate primary health care services, especially in rural and remote areas.¹⁷ Realising the values and principles of primary health care is an important step in promoting a sustainable change in the healthcare systems of developing countries. In light of this, is there a role for Mercy Ships with its established and successful healthcare program on board, to extend a hand in helping set-up permanent health-care services on land?

The heart of the Mercy Ship mission is to bring hope and healing to the world's poorest. Their dedicated surgical teams offer free procedures to people with curable conditions. A large proportion of these people had not even imagined that a cure was possible. The outcome is undeniably life changing.

Individuals who were previously convinced that they would live outcast from society or who would possibly never regain their sight are given a new lease of life with new opportunities opened to them. The profile of Mercy Ships has grown over the years as word of mouth spreads about the successful work they are accomplishing. The success of the Mercy Ship venture has led to increased sponsorship and funding fuelling the dream of Don Stephens to help more of the world's neediest. More countries are extending invites to Mercy Ships to dock in their ports and the previous wariness that existed from locals is lessening. It is a logical progression to want to move forward, think bigger, and achieve more. Therefore, in recent years, the Mercy organisation has also embraced the idea of prevention in their mission objectives alongside their main goal of cure. They have started education programmes in local clinics, set-up land-based resources and kick-started community projects in villages and towns. This seems a sensible advancement for a company that has excelled in one area, to go further and offer their expertise in other areas of need. Especially in the time of a global recession, which has slowed the provision of health care facilities, help in this area would only be encouraged. However, there is an undeniable danger involved in setting up new projects in previously unexplored areas and that is the sustainability of these projects. The Mercy Ship focus has always been to offer a cure to the individual. Prevention is important but is an organisation focused on curative procedures well equipped to offer preventative measures as well?

Education projects are a worthwhile endeavor but will they come to fruition after the Mercy ships have left port if there is no further reinforcement? The hospital ship staff may offer training to healthcare workers on land but if there is no follow-up then how can they ensure that the new methods are put into practice? New health-care clinics are desperately needed in rural communities but setting up a new clinic without continued supervision and the correct regulation could be regarded as irresponsible.¹⁸ Mercy Ships have created a respected name for themselves by successfully carrying out short-term initiatives. Education is a valuable long-term endeavour but it is imperative that it does not distract from the core goal of the Mercy Ship mission, reaching the individuals in need.

The Future of Mercy Ships

The complex dilemma of cure versus prevention will be an ongoing challenge for Mercy Ships in the future. The question of sustainability should dictate which areas Mercy Ships will extend a helping hand to. Short-term medical missions (STMMs) have long been a valuable asset in the improvement of health care services for developing nations. There are a vast and varied amount of health care missions that deliver services across the globe. These are often organised privately and sponsored by small groups and consequently there is no standardised approach as to how these projects are run or evaluated. This is one of the major issues affecting the sustainability of short-term medical missions. The impact of their efforts within a country cannot be properly assessed without evaluation standards. This has raised concerns over the need for a global assessment tool to assess the quality of medical missions. Recent reports investigating the development of this tool have exposed factors such as follow up data, poor relations with the local health care system and a lack of sustainability, which are challenging the good intentions of the missions.¹⁹

It is possibly a controversial opinion to say that STMMs often disregard the evaluation of their efforts, preferring instead to focus on the project at hand. However, an evaluation is not meant to add to the workload or deter from the mission. Rather it is designed to benefit the overall outcome of the STMMs, enabling them to optimise the quality of care offered and address areas of deficiency. Organisations would be able to learn from others in a similar field and possibly form partnerships where one mission could complement another. The concept of global health partnerships was first introduced in 1998 by the newly appointed WHO leader, Gro Harlem Brundtland, who was a major figure in the emergence of the terminology of "global health" as opposed to the previous term "international health." The strategy for defining global health was to overhaul the fragmented management of healthcare programmes and

Mercy Ships – a local and global endeavour *continued*

to remove the political influence that dictated the healthcare focus of individual countries.²⁰ Global health was to consider the health needs of the people of the whole planet above the preferences of particular nations, and thus a move away from “international health” sparked the emergence of public-private partnerships. The WHO realised the potential benefit of partnering with private agencies and non-governmental organisations to support healthcare programmes in countries of need. They could take a coordinating and leadership role over these partnerships to better organise their efforts. Following this example, a thriving international organisation such as Mercy Ships is in a great position to partner with smaller companies on land. Charitable organisations already established within the country would have an in-depth knowledge of the needs of that area as well as an understanding of the cultural context of the population.²¹ Their experience could help direct the resources offered from Mercy Ships into the appropriate areas and therefore maximise the health outcomes as well as the economic benefit for the country visited.

Summary

Mercy Ships International began as the dream of one man to offer hope and healing to the world's poorest. Over the past 30 years, this dream has become a reality. Hospital ships offering free healthcare have served over 150 ports in developing nations and provided services valued at more than £500 million. Their unique approach has startled the world and their continued commitment, to providing high-quality health services, has, increased their funding and support over the years. The workforce behind Mercy Ships International is entirely made up of volunteers. Each and every crewmember raises his or her own support to serve on board the ships. They may choose to come aboard for a variety of reasons but they all share a fundamental belief in the Mercy Ship aim and the desire to create a significant change. The pathway of significance beyond success has led Mercy Ships to where it stands today, an International Organisation staying true to its original mission. The future of Mercy Ships will continue to make a significant difference at a local level and hopefully with the consideration of sustainable change, will contribute to an improvement in the global healthcare of the world's developing nations.

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Personal Communications

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Cholera in Rokel, Sierra Leone and West Africa

D Crowther

When I first visited a school in Freetown in 2011 Kadie the headmistress told me she was worried about the possibility of cholera because of the poor state of the water supply. How right she was. She showed me the school well which had been dug some years earlier but there was no pump so they were unable to get water to the school. I felt sad because she clearly seemed to hope that I personally would provide money for a pump for the well. As it happens the water was tested later and was found to be polluted. During the time I was there several other people mentioned to me their anxieties about cholera.

Not far from the school I watched as children and others queued and pushed to collect water from the nearby river. It was quite a steep slope and they mostly only had flip flops or bare feet. I felt humbled that I live in such luxury and this is how they get their water.

I soon learned that this was not the only problem. Even in the capital city many people have no toilets or privies or latrines and no real understanding of hygiene. In Sierra Leone after ten or so years of civil war things are only very slowly getting back to normal. In addition there are no regular rubbish collections so that rubbish piles up by the side of the road or in the side streets.

The Quaker Peace Networks www.qpnwa.co.uk) project with which I am associated is in Rokel which is about 12 to 16 miles from Freetown. It could be on the moon for most people because there is no transport and people are occasionally taken to hospital in a wheel barrow. Hospital treatment is not free, so after arriving in your wheelbarrow you have to pay.

I have visited on two occasions in the dry season. I knew that corrugated iron was often used in Africa but on the one occasion when it did rain, with a ferocity you don't often see or hear in the UK, I found myself wondering whether the corrugated iron buildings gave any shelter at all and what it must sound like inside. How would the women fair if they went into labour when it was raining? No wonder there is such a high maternal and infant mortality.

The 2012 rainy season was much worse and longer than usual. It has brought with it many problems. Occasionally I have been contacted to say that one of our workers has died of malaria but this year it has been much worse. There has been a massive cholera epidemic which has shot through Sierra Leone and Guinea. It has also affected Ghana but I believe that their facilities are possibly somewhat more advanced.

All our workers are so far alive and have not contracted cholera. They have been educated about the importance of clean water. However the rest of the community have been at great risk and people are dying quickly.

As a small charity founded only 3 years ago QPNWA

has so far been able to open three wells in the area and has managed to keep them clean. They are checked daily. For a community of 10,000 plus, spread over quite a large area, this is not much clean water. Because of insufficient finance we have so far been unable to supply latrines or privies. There is very little facility for sewerage collection. People have always used the bush just outside their homes as toilets and may not wish to walk a couple of miles to the nearest latrine. They are instructed to defecate away from the wells. The problem is that the chickens peck around everywhere and may well be infected. Cooking over charcoal stoves makes it difficult to heat things through thoroughly.

We have just finished building a clinic. Because of the cholera epidemic it has not come in time. The manager Fatu has always been clear that it is vitally important to educate people about hygiene. I hope that she is able to get the message across and is not diverted because she is too busy.

She and others who are employed to work in the clinic have been travelling round the community educating people about clean water and hygiene. They have also tried to treat the people who have the disease and have been very upset when people have died. It is an uphill struggle because most people have not thought about hygiene before. Supplies of electrolytes for fluid drinks have dried up all over West Africa. I have been helped by medical friends including SOMW (Society of Medical Writers) list server members, to find websites to advise them how to make their own. It is not always easy to supply sugar and salt for these remedies and there is certainly no orange juice around. People normally live on cassava or sweet potatoes. Malnutrition is common as is malaria and TB. HIV has also a high incidence but it is not as high as in some other parts of Africa. Some diseases which we no longer see in Europe, like polio are also prevalent but as soon as the clinic opens immunisation will be on the agenda.

We pray that in the future our clinic and the expertise of our workers will improve the situation for the local Rokel population. We also hope to make some arrangement for toilets etc. One arborloo has already been dug. These are a fascinating concept. The arborloo is a simple toilet. Contents can be used for compost and when the loo is full a tree can be planted.

I have watched with interest the growing development of our little band of workers and seen them gain in confidence. Some are actually earning money to keep the project going. They hope eventually to be self sufficient and not dependant on donations from the UK, but that has not happened yet. The uplifting thing about it is that this project has been started and run by Sierra Leoneans themselves. They have been desperately short of money all the time but have continued

Cholera in Rokel, Sierra Leone and West Africa *continued*

cheerfully and in faith.

At the time of writing there have been no new cases of cholera in Rokel since Fatu and her team started visiting and giving hygiene advice. The epidemic may be waning as the rainy season is over.

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Collecting water in Sierra Leone

Pre-Travel Advice for Skiers

M Townsend

As we sit at our desks the thoughts of many of us, and those of our patients, turn from the wet greyness outside our windows to dreams of swooping down sparkling white pistes under a clear blue sky with a backdrop of dramatic snow-clad peaks. Like other sports, however, skiing is not to be undertaken without prior preparation. We would not expect to attempt a sub-10 second 100 metres or play in a Cup Final at Wembley without a considerable amount of training, but are our patients properly prepared for their winter sports holiday, and are we properly prepared to advise them? In this article we will look at some of the factors that should be taken into consideration when advising would-be skiers.

Previous experience

Enquiring about previous experience of the activities to be undertaken by any traveller is essential at a pre-travel consultation for two reasons. Firstly, it is necessary before giving advice to carry out an individual risk assessment for each traveller, and the nature of the intended activities and the degree of previous experience are an important part of this risk assessment. Secondly, it may save embarrassment for the travel adviser in avoiding giving elementary advice to someone who clearly knows more about the activity than his or her adviser.

Physical fitness

Skiing is a physically demanding activity. Downhill skiing uses 400 to 600 calories per hour, depending on the degree of exertion involved, and cross country skiing 500 to 900 calories per hour, the equivalent of running about 5 miles each hour. This demands both a reasonable level of general fitness and an appropriate degree of muscular strength.

General fitness

General fitness can best be achieved by whatever form of aerobic activity most appeals. Running outdoors or on a treadmill, cycling, step aerobics and similar activities or even brisk walking should be carried out several times a week for around 30 minutes, with one longer period of activity for an hour or more each week to improve stamina for long days on the slopes.

Muscular strength

Skiing makes use of all muscle groups, but, some are used more than others. Having properly trained muscles will not only make skiing more enjoyable and less painful, it will also help to avoid injury. The principal groups that need to be worked on prior to skiing are:

- **Quadriceps.** The quadriceps are in continuous use during skiing and are of the greatest importance, maintaining and stabilising the flexed posture of the all-important knee joints.

- **Hamstrings and gluteal muscles.** Similarly, the hamstrings and gluteal muscles are important in stabilising the flexed posture of the knee and hip joints.
- **Adductor and abductor muscles.** The muscles responsible for adduction and abduction of the hips are used in maintaining alignment of the skis and in steering.
- **Calves.** Calf muscles, in conjunction with the anterior tibial muscles, stabilise the position of the ankle joint.
- **Abdominal muscles,** together with
- **Back muscles** are important in maintaining core stability.
- **Upper body,** especially the arms, which are in continuous use manipulating ski poles.

An experienced gym instructor will be able to advise on suitable exercise programmes, and examples of appropriate exercises can be found at website such as:

- www.news.bbc.co.uk/sport2/hi/other_sports/winter.../4261932.stm
- www.skinet.com/ski/galleries/get-gym-fitness-skiers?i=59675
- www.igluski.com/ski-tips/fitness

In addition to exercise directed at specific muscle groups, core stability exercises are also very useful, and many sports centres and gyms hold core stability classes.

Pre-existing medical conditions

Patients with severe cardiorespiratory conditions such as ischaemic heart disease, cardiac failure or severe COPD, or with severe musculoskeletal conditions such as osteo- or rheumatoid arthritis would probably not be capable of the exertion or range of movement required to ski. Those with conditions such as hypertension, well controlled asthma, well controlled diabetes mellitus, stable cardiorespiratory problems and milder degrees of musculoskeletal condition may well be capable of undertaking a skiing holiday, given adequate preparation. They may, however, find it difficult to obtain insurance cover for their proposed trip. Insurance cover offered by tour operators is seldom a best buy for any traveller, and those with pre-existing medical conditions are likely to find that such insurers will refuse them. There are specialist travel insurers who will provide cover for most types of medical condition and some who specialise in travellers with special needs. Links to some of these insurers can be found on the Links page of the British Global and Travel Health Association's website, www.bgtha.org.

Insurance

One of the most important pieces of advice that any travel health adviser can give to a traveller, whatever

Pre-Travel Advice for Skiers *continued*

the nature of the journey, is to obtain adequate travel insurance. This is particularly true of winter sports holidays. Mountains are a high risk environment, and any activity carried out on mountains has a relatively high level of risk. Many insurance companies offer winter sports cover, but as outlined above, some individuals may not be able to obtain cover. Even those without any pre-existing medical conditions would be well advised to shop around, as the cover offered with their holiday may not give the best benefits or the most competitive premium. The purchaser should ensure that all likely costs are covered, including rescue, evacuation, by helicopter if necessary, all necessary treatment, whether in hospital or elsewhere, repatriation if required, and repatriation of the body in the event of death. Women in the later stages of pregnancy are unlikely to contemplate a winter sports holiday, though they may accompany a spouse or partner on the trip, and some women whose pregnancies are less advanced may well wish to ski. They should be warned that although they may be able to obtain cover for complications of pregnancy, especially from specialist insurers, there is no cover under such a policy for any infant born prematurely, be it for specialist perinatal or neonatal care or repatriation under specialist supervision.

Skiing injuries

The most common skiing injury is injury to the knee, especially the anterior cruciate ligament. Other common injuries, in descending order of frequency, are^{1,2}

- Shoulder injuries
- Lower limb fractures
- Spinal injuries
- Head injury
- Injury to the wrist, hand or thumb

Modern ski boots and bindings have helped to reduce the incidence of lower limb fractures but have not decreased that of knee injuries.³ In spite of the commonly held belief that wearing safety equipment may encourage risk-taking behaviour, the use of ski helmets has been shown to reduce the risk of head injury.⁴ Shoulder injuries, especially dislocation, are frequently the result of external rotation and abduction of the shoulder by the ski pole during a fall, and thumb injuries, mainly sprains of the first metacarpophalangeal joint, are caused by traction on the thumb by the pole grip and strap.⁵

Injuries caused by environmental conditions

Sunlight

Skiers are exposed to more intense ultraviolet (UV) radiation at high altitude and this is further increased by reflection of UV light from snow. It is essential to use an effective high factor sunblock preparation, applied to all exposed skin surfaces and re-applied at intervals according to the manufacturer's instructions. Snow blindness, or UV induced keratitis, is caused by

UV burns to the cornea. It causes pain, redness and watering of the eyes. Pain is often so severe as to cause spasm of the eyelids and inability to open them, hence its name of snow blindness. It can be avoided by using effective UV absorbing goggles or enclosed wrap-around sunglasses. Conventional sunglasses are not adequate as they allow UV radiation access to the eyes around the edges of the lenses.

Cold

Accidental hypothermia may occur in skiers even in relatively temperate environments.⁶ Heat loss from the body is exacerbated by wind chill or the slipstream effect during downhill skiing, and by extreme physical exertion during cross-country skiing. The use of alcohol and drugs, especially antipsychotic drugs,⁷ increases susceptibility to hypothermia, and the risk is also increased by trauma. Frostbite is the result of cold injury to the extremities. If severe it can cause permanent tissue loss, but the less severe form, frostnip, recovers fully. It results from vasoconstriction, vascular occlusion and ice formation within cells. The most commonly affected areas are fingers, toes, ears and the nose. Badly fitting boots may impair peripheral circulation and predispose to cold injury.

The risk of both hypothermia and cold injury can be reduced by wearing warm and windproof clothing and adequately insulated well-fitting boots and socks when skiing. Warm hats and adequately insulated and waterproof gloves are very important, and care must be taken not to lose gloves and to remove them only for very short period when absolutely necessary. It is vital to ensure that an injured skier is protected from further heat loss by covering the body with as many layers of insulation as possible and placing insulating layers between the casualty and the snow. Potentially frostbitten extremities should be kept warm and must not be rubbed, as this causes further tissue damage.

A useful guide to the symptoms and treatment of hypothermia and cold injury can be found at <http://www.princeton.edu/~oa/safety/hypocold.shtml>

Dealing with injuries abroad

Many ski resorts are situated in the European Union (EU), and skier, like all travellers to the EU, skiers should ensure that they carry an up to date European Health Insurance Card (EHIC) which can be obtained online from www.nhs.uk/e111-ehic. This card should be carried at all times. It entitles the holder not to the same benefits as would be provided by the NHS but to the same health care in state institutions provided for citizens of the member state in which it is used. It does not necessarily cover all the costs of treatment. Up-front payment may be required and reimbursement, in whole or in part applied for later, or there may be payment in part or in whole without reimbursement for some elements of treatment.

Private treatment and repatriation to the UK are not covered by the EHIC, and insurance is still necessary for those elements of treatment not covered by state provision, any elements given in a private clinic, and for repatriation.

Skiers should carry their travel insurance details at all times. Many insurers provide a credit-card sized card bearing the policy number and emergency contact number, and this is the most convenient way to carry the necessary information. In the event of injury they should contact their insurer's emergency helpline at the earliest possible opportunity to discuss how the matter will be handled.

Skiers must be aware of how to summon help in case of accident or injury. If visiting a new or unfamiliar area they should investigate what emergency services are available and how they can be contacted. In popular skiing areas mobile ski patrols operate and are often at the scene of an accident very quickly, and are skilled in emergency treatment and evacuation of injured skiers. Hospitals in popular skiing areas such as France and Switzerland are usually very skilled in dealing with skiing injuries and can be relied upon to provide good standards of care without the necessity for immediate repatriation to the UK for treatment.

In more remote or wilderness environments or in less developed ski resorts help may not be as readily available. If travelling to such areas skiers must plan carefully, discovering what is and is not available and what communication exist. If there is no mobile telephone coverage, satellite phones can be rented or radio communications may need to be established. It is possible to carry small electronic devices that emit a signal enabling rescuers to locate an accident or avalanche victim, but rescuers would need to know that such a device is being carried and would need to possess the appropriate receiver to pick up the signal. This limits the usefulness of such devices. GPS devices are useful to enable rescuers to be given a precise location when communications have been established, and it may also be possible to locate an individual by tracking a mobile phone. Hospitals in remote areas or less developed ski resorts may not have the same degree of experience or expertise as those in the European Alps, and injured skiers may wish in these circumstances to discuss with their insurers the possibility of repatriation to the UK or transport to another closer country possessing the appropriate facilities and experience for their initial treatment.

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Mike Townend

Key points

- Skiing is a physically demanding activity
- A good level of general physical fitness is required
- Exercising specific groups of muscles will help to reduce the incidence of injury
- Skiers should wear warm and windproof clothing, protective helmets and well-fitting hard shell ski boots
- Pre-existing medical conditions do not necessarily preclude skiing but they must be covered by travel insurance
- All skiers must have adequate travel insurance and carry details with them
- Skiers in EU countries should carry the EHIC card
- Travellers to remote skiing areas must be aware of the availability of rescue and treatment facilities and have access to communications equipment

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Motion Sickness

T Blackwood

High-flying modern jets, stabilised passenger ships and broad, gently curving motorways have diminished the incidence of travel sickness. Many people however still dread global relocation, or dare not travel for fear of succumbing to the miseries of motion illness. They suffer in greater or lesser measure from a disabling malady and the consequences of an unstable environment. Anticipatory drug therapy can provide a measure of protection with manageable side effects but, the ideal anti-motion remedy is still awaited.

Motion sickness is a debilitating but relatively short-lived illness which indiscriminately affects air, land and sea travellers.¹ The malady attracted profound investigation, with the advent of cosmic travel and its attendant space sickness. It appears to have affected man through recorded time. It was well known to ancient Greek seafarers who referred to it as *nauxia* – sea-sickness – precursor of the English word *nausea*. Greek mythology records that the fair maiden Helle, flying home from her adventures on a golden ram, was affected by vertigo and fell into the sea – the Hellespont. Julius Caesar suffered grievously from the disease on his crossing of the Channel and the illustrious Lord Nelson had to fight sea-sickness before his battles.

Textbooks refer to travel sickness as a physiological vertigo and the autonomic symptoms are all too familiar to many. The onset follows a variable sequence of drowsiness, yawning, cold sweats, increased salivation and general malaise. Associated with epigastric discomfort, nausea and pallor, digestion is impaired and the sight or smell of food aggravates the condition, which continues to vomiting and varying degrees of apathy, depression and incapacity. Circulatory, respiratory and psychological disturbance are often apparent. Hyperventilation is common leading to hypoxia and changes in blood volume, with pooling in the lower parts of the body with accompanying postural hypotension and syncope.

A Significant problem

It has proved to be a significant problem in manned-space flights. Despite much study there are still no good predictive tests of individual propensity to motion sickness and no perfect counter-measures – or therapies to counter its onset.

Signs and symptoms

Symptoms can be present in variable degree, may wax and wane, but develop over time and steadily worsen with exposure to environmental instability. New cases continue to appear after many hours, as unaccustomed motion continues. Characteristically, vomiting eases the symptoms temporarily, but persistent

vomiting over several days of travel can often result in dehydration and electrolyte imbalance. Psychological components present as varying degrees of withdrawal, apathy, or depression associated with functional incapacity.

There are reports of sickness occurring in passengers mounting the gangway of the ship, even before untoward effects of motion have been experienced.

With professional aviators and seamen a significant consideration is the adverse effect on performance. 60 to 80% of sailors in naval off-shore patrol boats have been shown to suffer sea-sickness in rough weather, and many become unfit to continue conventional duties. Pilots on holding patterns in turbulent air conditions become airsick, with possible hazardous effects on performance. Most airline company regulations preclude use of anti-motion medication.

The exact cause of motion sickness is still not understood but the illness arises from stimulation of the labyrinthine sense organs over a lengthy period in an intense manner to which the body is not accustomed. The condition only occurs in those with intact labyrinths. Visual sensory disturbance sickness suggests it is related to conflicting information in brain input from the visual and labyrinthine sensors which is then read in relation to a pattern of expected associations stored in the brain. The brain's failure to match perceived and received information results in conflict, dissonance and physiological disturbance.

Most observers consider that motion sickness is a normal response to an abnormal environment. One widely accepted hypothesis postulates that the brain stem mechanisms of orientation and motion may perform an additional function other than maintenance of body equilibrium, stability of head and body, and gaze maintenance. This function detects and responds to certain poisons. With motion sickness, conflict in sensory inputs simulates poisoning of neuromechanisms.¹

Some investigators believe that the emetic chemoreceptor trigger zone in the area postrema of the medulla oblongata is incriminated in producing motion illness. It has been postulated that, due to motion a vomiting substance is secreted into the cerebro-spinal fluid in the emetic process and that therapeutic measures should be directed at prevention of its secretion. Overall, evidence suggests that the area postrema is not essential for motion-induced vomiting and it is irrational to seek pharmacological blocking agents that act at the chemoreceptor trigger zone. It may be that an as yet unidentified neural element indispensable for motion-induced vomiting is located close to the area postrema. Identification of this feature and its neurochemical links could be the breakthrough required for an effective therapy for motion sickness.³

Habituation

A striking feature of motion sickness is individual ability to become accustomed to motion. Most people habituate to the adverse stimulus over time but the conditioning is lost when exposure is discontinued and re-exposure is delayed. Habituation is also related to the pattern of motion with travellers in large ships becoming ill on transferring to small ones whilst sailors can become air-sick when transferring to aircraft exposed to sustained turbulence. The change in ability to withstand the disturbing stimuli presumably includes a learning component with the individual adapting postural control and locomotor function to the moving environment.

Simulator machines are often used to test for propensity to motion sickness although there have been occasions when cosmonauts most resistant to rotational stimulation have succumbed markedly to space sickness in flight. Machines have shown that the frequency of up and down movement most likely to induce illness is one cycle in 16 seconds. Frequencies higher than one cycle per second produce little motion sickness. The study of autonomic response in motion sickness stimulation has shown increases in pulse rate, ventilation and vasoconstriction and provided data to support the supposition that motion illness can be categorised as a stress reaction.⁴

Prevention

Only deaf-mutes with non-functioning labyrinths are known to be immune to the malady. The use of stabilisers on large ships diminishes the incidence of the ailment. Assuming the horizontal position is a useful preventive measure as it removes vertical acceleration, a dominant component of the disturbance. Keeping the head fixed relative to the body, maintaining the eyes on the horizon and avoiding fixating on proximal moving stimuli is also useful in prevention. Involvement in physical work on board ship, but avoiding reading, is also helpful. Many of those who are car-sick as passengers will be aware that they can avoid succumbing to the illness by driving themselves. Stuffy atmospheres and smells of cooking and fuel oil are stimuli likely to induce vomiting and should also be avoided. Those who have suffered the trauma of travel sickness will testify to the need for an effective preventive or remedy.

Case History

The toughest and fittest can succumb and I recall an occasion when as medical officer I was accompanying a high climbing expedition of brawny mountaineers en route to the Himalayas. Engine problems had grounded the scheduled jet service to Nepal and we transferred to an ancient piston-driven aeroplane for the flight over the hump to Kathmandu. Turbulent air space over the foothills had the aircraft bouncing and pitching as it clawed its way to higher altitude and

tough 'tigers of the tops' were soon devastated by air-sickness. Some were prostrated and once sun-tanned faces took on an unaccustomed pallor and several became green of visage as nausea and vomiting took their toll.

Drug therapy

Drug therapy can be prophylactic but there is a strong placebo effect with anti-motion therapy. Controlled studies have shown that up to 55 % of a group can benefit from appropriate drug provision but 45 % will benefit from placebo. Anti-motion drugs are not very effective in diminishing the symptoms once the condition is established. They can provide protection during the first few days of exposure to vestibular stimulation, and habituation usually progressively increases to provide protection after this initial period. The two most commonly used drug groups, the phenothiazines and antihistamines, act centrally. The phenothiazines act on the chemoreceptor trigger zone (CTZ) and vomiting center, whereas the antihistamines act on the CTZ and the vestibular apparatus. All have anticholinergic side effects which may prove troublesome. These effects have to be weighed against the potential benefits to the patients if sea crossings or road journeys are short.⁵

Cinnarizine, cyclizine, dimenhydrinate, hyoscine, meclizine and promethazine are all in general use. In a double-blind Norwegian study comparing seven commonly used agents for prophylaxis of seasickness in over 1700 volunteer tourists, there was little material difference shown in the efficacy of the drugs.¹

Hyoscine has had a predominant place in therapy because of its efficacy but it has side effects. It causes a dry mouth and dilation of the pupils with resultant loss of visual acuity and it has often a 'drugging' effect which causes a relaxed state of mind and disinclination to incentive and activity. The latter is a disadvantage where immediate action and response is required. The drug only works for a short period of six to eight hours.

Antihistamines are popular although not as effective as hyoscine. They give longer protection for up to 24 hours but cause sedation as a side effect. This can be welcomed by the traveller confronting a tedious journey but is potentially hazardous for those involved in decision-making and transport control. There is no advantage in combining an anti-histamine and hyoscine. Swallowed tablets require to be ingested an hour before exposure but some like 'kwells' are absorbed quite rapidly when taken sublingually. The transdermal patch is stuck behind the ear and gives three days' protection which is usually sufficient to allow habituation to free the victim from the disease.

Hyoscine dosage is two 0.3mg of the hypo-bromide taken an hour before travel and followed up at intervals of eight hours to a limit of 2mg per 24 hours. This can give up to 90 per cent protection from vomiting

Motion Sickness *continued*

but combats the nausea to a lesser extent.

Promethazine (Phenergan) and cyclizine (marzine) are given in a dosage of 25 to 50mg in 24 hours and with a protection range of 40 to 70 % in those treated. The use of anti-motion drugs in civil and military flying has been resisted on the grounds that any medication or condition requiring medication is likely to diminish operational proficiency to a dangerous level. Preparatory work for space-flight travel suggested, however, that selected dosage and combinations of promethazine, scopolamine and d-amphetamine could be used in cosmonauts without loss of operational proficiency.³ I-Hyoscine (Scopolamine) has been considered for combatting motion sickness (Dahl 1984) especially for brief exposure, but has been of limited value orally and as an injection because of side effects. The anti-nauseant effect of scopolamine does not depend upon its peripheral parasympathetic blocking capacity but is caused by a central effect. Using the transdermal route of administration allows delivery of the drug in an effective concentration in a dosage low enough to avoid severe adverse reactions. The efficacy of transdermally administered scopolamine has been compared with the efficacy of dimenhydrinate and placebo in a double-blind controlled studies. The patch afforded 61-67% protection against motion sickness at sea against 48-88% protection from dimenhydrinate. Dry mouth is the main side-effect reported for the patch occurring in around two-thirds of users. Temporary blurring of vision may also occur with the drug which is otherwise well tolerated in transdermal presentation. The patch also has the advantage that it can be removed if the need for protection becomes no longer paramount.

Treatment

Once the individual has succumbed to the illness, he or she should be encouraged to lie down, if possible, with eyes closed. The prostrated should be kept warm and given sips of water to avoid dehydration. The very ill over a longer period may require enteral or parenteral fluids. Despite the misery of the condition while it lasts, most people, on a longer journey, can expect substantial improvement over a day or two. A remarkable feature is the self limitation of effects and the rapidity of recovery once motion ceases.

Hyoscine is an effective preventive medication for which oral preparations and transdermal patches are established in clinical practice, and emerging evidence suggests that hyoscine nasal spray is effective in preventing motion sickness

Evidence to support the use of other drugs, taking into account the trade off between efficacy and adverse effects, is weaker.⁶

Management of motion sickness with traditional remedies such as ginger and acupressure bands has not been shown to be effective.

Advice for travellers

Sea travel

Apply a scopaderm transdermal patch three to four hours before starting voyage. Keep in the fresh air as much as possible.

Fix the eyes on the horizon.

Keep the head fixed in relation to the body.

Lie down if symptoms seem imminent with the head towards the centre of rotation and close eyes.

Seek a mid-decks, midships cabin.

Car-sickness

A short-acting preventive may suffice but must be taken one hour before travel. Use a head-rest to fix the head position.

Use fresh-air vents to avoid a hot, stuffy atmosphere.

Fix eyes on the distant view, or keep them closed.

Avoid reading when travelling.

Air-sickness

Long flights merit the use of the scopaderm patch applied before arrival at the airport or antihistamine medication.

Avoid ingesting alcohol, and eat little.

Keep the head fixed against the headrest.

The new Boeing Dreamliner has technology in the seats which senses and counteracts turbulence, and Boeing predict an eightfold reduction in the number of passengers experiencing motion sickness.

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Scenarios from the NaTHNaC Telephone Advice Line

A Stillwell

The National Travel Health Network and Centre (NaTHNaC) was created by the Department of Health in 2002; is now commissioned by Public Health England (PHE) and hosted by University College London Hospitals (UCLH) NHS Foundation Trust. NaTHNaC works in partnership with the network founders; Hospital for Tropical Diseases (HTD), Liverpool School of Tropical Medicine (LSTM), London School of Hygiene and Tropical Medicine (LSHTM) and Public Health England, Travel and Migrant Health Section.

The telephone advice line service provides detailed advice for health professionals advising travellers with special health needs or complex itineraries. The line operates Mondays to Fridays between 08.30 – 11.45hrs & 13.00 – 15.15hrs. Queries are answered by one of the specialist nurse team with medical cover provided. For more information about NaTHNaC refer to the website at www.nathnac.org

Scenarios from the queries to the advice line might prove informative to health professionals advising travellers; a selection has been included here. With all travellers it is essential to complete a risk assessment. This involves finding out some details about a) the traveller; including past/current medical history & medication(s), previous vaccines & malaria chemoprophylaxis and b) the trip, including; countries/areas within countries to be visited (urban, rural, coast, high altitude), date of departure and length of time away, type of accommodation and planned activities (i.e. adventure sports, aid work, visiting family/friends, pilgrimage). Advice for health professionals on how to conduct a pre-travel risk assessment is provided in 'Travel Health Nursing; career and competence development', Royal College of Nursing that is available at:

http://www.rcn.org.uk/__data/assets/pdf_file/0006/78747/003146.pdf

A 37 year old female and 39 year old male are travelling to Mexico for a two week holiday, leaving in two months time. The itinerary will include ten days jungle trekking in Oaxaca province, hiking in the Sierra Norte Mountains and visiting archaeological/cultural sites in the region and then five days in Brisas de Zicatela on the southwestern coast with the option for a variety of water sports and beach activities. The female is due to start in vitro fertilization (IVF) treatment three weeks after return to the UK. She has previously had problems conceiving and has never been pregnant before. The caller was concerned about contraindications to chloroquine, which are the recommended malaria chemoprophylaxis tablets for the area.

There is a low risk of malaria in the Oaxaca region of Mexico¹ and chloroquine is the malaria tablet of choice. The regime is two tablets weekly, to commence one week before travel to the risk area, during the time in the area and then to continue for four weeks after return. Chloroquine should generally not be used in pregnancy, but if travel is unavoidable then it can be used with caution.² The effects of its use on IVF treatment are unknown.

However, there is still a risk of developing malaria after return home – travellers should be observed for symptoms for 1 year and seek urgent medical attention if they become unwell during that time. She should be advised to discuss the trip with her specialist doctor. Options to consider would include re-consideration of the itinerary to perhaps avoid travel to malaria risk areas, or indeed to Mexico at all. Malaria tablets are not necessary in Mexico City and the peninsula including Cancun, but the risk is not non-existent. The other option would be to delay commencement of the IVF treatment until more than four weeks after return, so that the chloroquine regime has been completed. She would still need to be observant for symptoms for a year afterwards. Good mosquito bite avoidance measures, from dusk to dawn are important whether malaria tablets are taken or not.

The recommended travel vaccines would be a booster of diphtheria/tetanus/polio and hepatitis A, hepatitis B and rabies [NaTHNaC Country Information Page - Mexico]. The use of these vaccines in pregnancy is not contraindicated but a precaution and an off-licence use. The implications of their use prior to IVF treatment are unknown. The situation should be discussed with her specialist doctor. The majority of travellers are at low risk of typhoid, if they follow good food and water hygiene precautions.

There is a risk of dengue fever in Mexico and they should certainly use good insect bite precautions, during daylight hours but dengue has a short incubation period of only 5-8 days,³ so the risk of this emerging later once IVF has started is low.

Advice on food and water hygiene⁴ and management of traveller's diarrhoea would be important.⁵ Some gastrointestinal infections can have long term sequelae (such as *Giardia* spp. or *Entamoeba* spp.) and may require complicated treatment, which could affect IVF.

Recommendations are available on the NaTHNaC Country Information Page - Mexico.

50 year old male who is fit and well is travelling to Juba in Sudan for a 1 month business trip in 4 weeks time. What is recommended for him?

NaTHNaC continued

The country previously known as Sudan was divided into two separate countries (Sudan and South Sudan) in July 2011, after the people of the south voted for independence.⁶ The city of Juba falls in South Sudan. Recommendations would be diphtheria/tetanus/polio, hepatitis A, meningitis ACW135Y, typhoid and yellow fever. Hepatitis B and rabies for discussion. Cholera and tuberculosis not normally recommended. Malaria tablets are recommended for all travellers going to South Sudan. Recommendations are available on the NaTHNaC Country Information Page - South Sudan.

A 23 year old female is a new employee of a cruise ship company. She is travelling to Denmark and Florida on two separate cruises in one and two months respectively for four weeks each. Her occupational health department have told her to visit the Yellow Fever Vaccination Centre to get yellow fever vaccine. However the caller is concerned about this because she is not at risk on either of these itineraries.

There is no risk of yellow fever on this itinerary. However, certain individuals are required to be 'trip ready' to go anywhere in the world at very short notice because of their job, making exposure to tropical diseases an occupational hazard. They may not be able to be employed if they are unable to have certain vaccines or take malaria tablets. Members of this group of travellers include; diplomats, politicians, journalists, royalty, aid workers, criminal investigators, police, disaster relief workers (i.e. following an earthquake, tsunami or flooding), aircrew, ship's crew (cruise ships and cargo ships) and the armed forces.

The caller should discuss the situation with this individual to make sure that she understands the implications of receiving the yellow fever vaccine, when she is not currently at risk of disease. Information is available for travellers to help them make an informed choice.⁷

A 20 year old female is travelling to Cambodia (Phnom Penh and Siem Reap) to visit family and Bali for a beach holiday and then on to Borneo (Kuching in Sarawak) for a business conference. Leaving in one month she will be away for a total of one month. She has a medical history of multiple food allergies classified as Oral Allergy Syndrome, Birch Strain.

This includes nuts, wheat, fish, corn, maize and soya all of which may cause her to have a severe anaphylactic reaction if swallowed or in some cases touch the skin. She will carry two EpiPens whilst she is on the trip. She has had a discussion with her consultant allergy specialist and been in contact with the family that she will stay with in Cambodia and they will allow her to cook her own food. They will communicate in French. In the five star hotels in Bali and

Borneo she thinks it will be easy to communicate with restaurant staff in French.

Information about Oral Allergy Syndrome, Birch Strain is available.^{8,9,10} The advice of the on-call physician was sought to help answer this question. This is a high risk traveller; she is at significant risk of exposure to one of the allergens. When travelling in a different culture it can be difficult to be sure of what one is eating. The traveller's confidence that she will easily be able to communicate her requirements may be misguided. The option for a course of regular antihistamines should be discussed with her allergy specialist. These could be taken throughout the length of the trip to act as a prophylactic measure against allergy/anaphylaxis. The epipens should only be used in an emergency to treat an acute episode. Allergy to other substances was not mentioned (i.e. gelatine, latex or antibiotics) but this needs checking because allergy to these substances may have an impact on recommended vaccines, malaria tablets and treatment of any tropical diseases. For example, doxycycline capsules contain gelatine as a listed component, but malarone should be an acceptable option as a malaria tablet. Vaccines should be checked in case they contain latex in the vial or the needle and avoided accordingly. These details can be found either in the electronic Medicines Compendium, which contains a Summary of Product Characteristics (SmPC) for licensed medicines in the UK or by contacting the product manufacturer's Medicines Information Department; contact details will be available on the SmPC.

Recommendations are available on the NaTHNaC Country Information Page - Cambodia, Country Information Page - Indonesia, Country Information Page - Borneo (Malaysia).

A 46 year old female is travelling to Tanzania on a beach and safari holiday for two weeks, leaving in one month. Her partner who is travelling with her, had cholera vaccine at a different GP practice. The caller thinks that cholera vaccine is not indicated for this trip, but the traveller is unhappy about that advice.

The risk of cholera to most travellers is extremely low; 0.2 cases per 100,000 travellers.^{11,12} Studies show that the efficacy of cholera vaccines against traveller's diarrhoea in general is limited¹² and specifically to enterotoxigenic Escherichia coli (ETEC). Cholera vaccine is usually only recommended for aid workers who are travelling to a disaster area/ working in a refugee camp or those travelling to areas where an outbreak of cholera has been reported and they will have limited access to safe drinking water.¹³

Recommendations for travel to Tanzania are available on the NaTHNaC Country Information Page - Tanzania.

A 16 year old male is travelling to Botswana on a school exchange project to help build a school in a rural village for one month leaving in just over three weeks. He will be mixing with local people in the village and children who will attend the school. The caller is asking for advice on hepatitis B disease risk and which vaccine schedule would be most appropriate considering his age and departure date.

There is a significant risk of exposure to hepatitis B on this trip through an accident requiring hospital treatment or sexual contact. Hepatitis B vaccine is recommended because one month is regarded as long term travel. An accelerated schedule (at days 0, 7 & 21) of Engerix B® vaccine is a licensed use¹⁴ for individuals from 18 years of age. However, the Department of Health advises that in situations where it is important to provide rapid protection and to maximise compliance this accelerated schedule is considered acceptable in those aged 16 to 18 years, as a good response to the vaccine is expected.¹⁵

The risk of malaria needs consideration according to his exact destination.

Recommendations for travel to Botswana are available on the NaTHNaC Country Information Page - Botswana

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RESEARCH

Assessment of Adherence to Prophylactic Antimalarials in Taiwanese Travellers – Data from one Medical Centre in Northern Taiwan

B Chia-Chen Chang, Meng-Ting Tsou, Wei-Hsin Huang

ABSTRACT

Background

This study was conducted to assess the adherence behavior of Taiwanese travellers, who were recommended and prescribed one of three antimalarials (mefloquine, atovaquone plus proguanil, or doxycycline) in the travel clinic at a medical centre in Northern Taiwan.

Methods

Data was collected from travellers who visited the travel clinic at a medical centre in Northern Taiwan and were prescribed malaria chemoprophylaxis from January 2009 to December 2010. Each traveller was asked to return a short questionnaire on potential side effects of the chemoprophylaxis. Phone interviews were conducted from July 2011 to September 2011 to collect further data on drug adherence and side effects.

Results

Just over half of the 160 travellers (53.3%) completed the entire prophylactic regimen. The adherence rate was higher in those who received mefloquine (59%) and atovaquone plus proguanil (53.8%) as compared to those who received doxycycline (31.0%). The common reasons for non-adherence to malaria chemoprophylaxis were perception that the risk of getting malaria was low (32.5%), feeling it was unnecessary to complete the regimen after returning home (23.1%) and side effects from the medication (17.9%).

Conclusions

The adherence rate of prophylactic antimalarials for Taiwanese travellers is still not satisfactory. This is of concern especially with an increase in travel to malaria-endemic regions over recent years. Health practitioners and government policy should emphasize the risk of malaria and the importance of prophylactic antimalarials.

Introduction

Taiwan was registered by the World Health Organization in 1965 on its list of countries with successful malaria eradication.¹ Although there has been no indigenous case of malaria in Taiwan, cases have been imported continuously from abroad. With an increasing surge in tourism over the years, more trav-

ellers are also travelling to malaria endemic regions. According to Taiwan's Centre of Disease Control, there had been a total of 21, 17, and 12 imported malaria cases in 2010, 2011, and 2012, respectively.²

As seen in previous studies,^{3,5} many travellers were not aware of the risk of malaria infection and the importance of taking and completing the entire antimalarial prophylactic regimen. There have been few studies on this topic in Taiwan. Our study was conducted in one of the twelve health facilities in Taiwan that was registered by Taiwan's Centre of Disease Control for distributing prophylactic antimalarials.⁶ The aim of this study is to assess the adherence behavior of Taiwanese travellers who were recommended and prescribed one of three antimalarials (mefloquine, atovaquone plus proguanil, or doxycycline).

Methods

Data was collected from travellers who visited the travel clinic at a medical centre in Northern Taiwan and were prescribed malaria chemoprophylaxis from January 2009 to December 2010. The travellers were prescribed one of three antimalarials (mefloquine, atovaquone plus proguanil, or doxycycline) after consideration of their travel destination, length and type of travel, medical conditions and personal preferences. Each traveller was asked to return a short questionnaire on a prepaid postcard regarding side effects from the antimalarial drugs. The deadline for collecting the postcards was April of 2011. Telephone calls were made from July 2011 to September 2011 in an attempt to reach the travelers who did not return the postcards. In the telephone interview, we asked about side effects from the antimalarial drugs, drug adherence, and reasons for not completing the malaria chemoprophylaxis. In addition, travellers' opinions on their experience at the travel clinic and on how best to obtain this type of data were also asked.

The study was examined and approved by the Human Research Ethics Committee in Mackay Memorial Hospital, and was issued the project research number MMH-I-S-645.

Results

There was a total of 898 travellers who visited the travel clinic at this one Northern Taiwan medical centre and were prescribed malaria chemoprophylaxis from January 2009 to December 2010 (Table 1). Only Eighty-one of 898 travellers (9%) returned the pre-

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Presentation: Film-coated tablet containing rifaximin 200 mg. **Uses:** Xifaxanta is indicated for the treatment of travellers' diarrhoea that is not associated with fever, bloody diarrhoea, eight or more unformed stools in the previous 24 h, occult blood or leucocytes in the stool. **Dosage and administration:** Adults over 18 years of age: 200 mg every 8 hours for three days (total 9 doses). Rifaximin must not be used for more than 3 days even if symptoms continue and a second course of treatment must not be taken. Not recommended in children under 18 years of age. **Contraindications:** Hypersensitivity to the active substance, to any rifamycin (e.g. rifampicin or rifabutin) or to any of the excipients. **Warnings and precautions for use:** Not recommended for the treatment of travellers' diarrhoea caused by invasive enteric pathogens. If symptoms worsen, treatment with rifaximin should be interrupted. If symptoms have not resolved after 3 days of treatment, or recur shortly afterwards, a second course is not recommended. The potential association of rifaximin treatment with *Clostridium*

difficile associated diarrhoea and pseudomembranous colitis cannot be ruled out. **Interactions:** Due to the negligible gastrointestinal absorption of orally administered rifaximin (less than 1%), the systemic drug interaction potential is low. Rifaximin should not be administered concomitantly with other rifamycins and the tablets should not be administered for at least two hours after the administration of charcoal. **Pregnancy and lactation:** Rifaximin is not recommended during pregnancy and in women of childbearing potential not using contraception. The benefits of rifaximin treatment should be assessed against the need to continue breastfeeding. **Undesirable effects:** Common effects reported in clinical trials are dizziness, headache, abdominal pain, constipation, defecation urgency, diarrhoea, flatulence, bloating, distension, nausea, vomiting, rectal tenesmus and pyrexia. Other effects that have been reported are candidiasis, herpes simplex infections, clostridial infections, palpitations, increased blood pressure, liver function test abnormalities, blood disorders (e.g. thrombocytopenia) and anaphylactic reactions, (e.g. angioedema), hypersensitivity and skin reactions). **Licensing and legal category:** Legal

category: POM. **Cost:** Basic NHS price £15.15 (9 tablets). **MA number:** PL 20011/0021. **For further information contact:** Norgine Pharmaceuticals Limited, Norgine House, Moorhall Road, Harefield, Middlesex, UB9 6NS. 01895 826606. E-mail: medinfo@norgine.com. **Date of preparation/revision:** XIF/2960/JUN/12.

Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard. Adverse events should also be reported to Medical Information at Norgine Pharmaceuticals Ltd on 01895 826606.

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NORGINE

XIF/3147/NOV/12.

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Date of preparation: November 2012.

Assessment of Adherence to Prophylactic... *continued*

postaged postcard. 306 travellers were contacted by telephone calls. 511 of 898 travellers (56.9%) could not be reached despite several attempts at doing so.

Side Effects of Malaria Chemoprophylaxis

A total of 387 (81 via postcard and 306 via telephone interview) travellers replied the question about side effects from the antimalarial drugs. (Table 2) Three-hundred of 387 (77.5%) travellers received mefloquine as malaria chemoprophylaxis. The majority of the travellers who took mefloquine (221 of 300; 73.7%) did not have any side effects. Common side effects found in those taking mefloquine included headache(4.7%), nausea(4.3%), and loss of appetite(4.3%). Insomnia and depressed mood were found in 2% and 2.3%, respectively, of those who took mefloquine. Sixty-nine of 387 (17.8%) travellers received doxycycline as malaria chemoprophylaxis. Of those that took doxycycline, 62.3% did not have any side effects. However, nausea(13%) and epigastric pain(11.6%) were common side effects noted in those taking doxycycline. One traveller reported having vaginal candidiasis. A small percentage (18 of 387; 4.7%) of travelers received atovaquone plus proguanil as malaria chemoprophylaxis. The majority of them (13 of 18; 72.2%) did not suffer any side effects. A few individuals had headache, dizziness, skin rash, and skin itch after taking the medication.

Adherence of Malaria Chemoprophylaxis

A total of 306 telephone interviews were conducted concerning adherence. Among these, 76.8% were given mefloquine, 20.0%doxycycline, and 4.2% atovaquone plus proguanil, respectively, as malaria chemoprophylaxis. 300 with participants completed the questionnaire regarding adherence and the six not responding being prescribed mefloquine. In table 3, adherence level was divided into three groups—not used at all (did not take any medication); complete (finished all medication); incomplete (finished part of regimen, including prior to trip, whilst away and on return). More than half of the travellers (53.3%) completed the entire prophylactic regimen. The self reported adherence rate was higher in those who received mefloquine (59%) and atovaquone plus proguanil (53.8%) as compared to those who received doxycycline (31.0%). The percentage of travellers who did not take any medication of the prescribed anti-malarials was 12.3%, with a higher percentage noted in those prescribed doxycycline. 103 (34.3%) travellers took only part of the prophylactic regimen. More travelers chose to discontinue the regimen after returning home (15.7%) and during the middle of the trip (13.7%), as compared to before the trip. In addition, a higher percentage of those who took doxycycline (24.1% vs. 13.5% for mefloquine and 15.4% for atovaquone plus proguanil) for malarial chemoprophylaxis were noted to discontinue the regimen after

returning home.

The common reasons for non-adherence to malaria chemoprophylaxis were perception that the risk of getting malaria was low (32.5%), feeling it was unnecessary to complete the regimen after returning home (23.1%) and occurrences of side effects from the medication (17.9%). Some forgot to take the medication or refused to take the medication for other personal reasons.

Most travelers felt it was important to report on whether or not side effects had occurred from the anti-malarial drugs (256 of 290, 88.3%). 93 participants gave a reason for non return of the postcard; 57% because they forgot and 16% felt it was a troublesome process. Some postcards might have been lost in the mail because 15.1% reported that they did mail the postcard. When asked about the preferred reply method, most travelers chose telephone interview and internet survey.

Discussion

Slightly over half of the travellers who were prescribed prophylactic antimalarials from our travel clinic completed the entire regimen (160 of 300; 53.3%). This rate is considered fairly high compared with the adherence rate of less than 20% reported in travelers from other countries.^{3,4} Most of the travellers were made aware of our travel clinic from the internet or from family/friends who had visited previously. Our subjects seemed better aware of health-related behaviors, possibly explaining for the higher adherence rate of malaria chemoprophylaxis.

In our study, the adherence rate was higher in those who received mefloquine (59%) and atovaquone plus proguanil (53.8%) as compared to those who received doxycycline (31.0%). The same pattern was seen in a study on UK travellers who were prescribed antimalarial prophylaxis. In that study, statistically significantly higher adherence overall and post-travel was seen with atovaquone plus proguanil compared with doxycycline, and adherence to mefloquine appeared similar to or better than doxycycline and similar to atovaquone plus proguanil for categorical adherence.⁵ Another US study found high adherence rate (89%) for those who were prescribed atovaquone plus proguanil.⁷

The most common reason for non-adherence to malaria chemoprophylaxis was travellers' perception that the risk of getting malaria was low. A study conducted in China found that travellers all carried anti-malarial drugs for self-treatment and not for prophylaxis.³ Travellers' lack of knowledge in the importance of completing the entire course of prophylaxis was another common reason. Of those that started but did not complete the malaria chemoprophylaxis, most travellers chose to discontinue the drug regimen upon returning home. This was seen in other studies³ as well as our own.

In addition, dosing convenience was also of concern to the travellers. The dosing regimen for mefloquine was one tablet weekly, beginning one to two weeks before travel until four weeks after returning home. The dosing regimen for atorvaquone plus proguanil was one tablet per day, beginning one to two days before travel until one week after returning home. The dosing regimen for doxycycline was one tablet per day, beginning one to two days before travel until four weeks after returning home. From the dosing regimens, we could see that those taking doxycycline would have to take the greatest number of tablets, which could explain the lower adherence rate.

Some travellers had discontinued their medications due to occurrence of side effects. However, in our study, a high proportion of travellers (60-70%) did not suffer any side effects, regardless of the medication used. In addition, most travellers agreed on the importance of reporting side effects from the medications. The preferred reply methods were using telephone interview and internet survey.

The purpose of travel or those that came to the travel clinic include; leisure, business, volunteer work, and less often, for visiting families and relatives. Studies have shown the knowledge, attitudes, and practices (KAP) of travellers varied greatly among those with different travel purposes.^{3,8-12} Frequent business travellers and humanitarian workers tend to have better KAP.^{8,11} Those visiting families and relatives in their native countries were less aware of the risk of malaria and tend not to seek preventive measures.^{10,12}

Health professionals play an important role in delivering travel-related knowledge to the travellers. The practitioner's recommendation was highly important for 63% of travelers.⁵ A survey conducted in Taiwan revealed significant deficits in travel medicine knowledge among health-care providers.¹³ Another study in Greece also pointed out a need to increase awareness and education in professionals providing travel health services.¹⁴ It can be speculated that practitioner's emphasis on the importance of antimalarial chemoprophylaxis may have a big impact on adherence to the antimalarial drugs.

A limitation of our study was that we were unable to contact more than half of the travellers (511 of 898) who visited our travel clinic from January 2009 to December 2010. There might also be recall bias since telephone interviews were not executed until more than one year after the prescription of malaria chemoprophylaxis.

Conclusion

Although prevalence of infectious diseases has decreased tremendously over the years, it is still noted in less-developed countries. More and more people are venturing into those territories for adventure and for fun. This raises concern for possible transmission

of infectious diseases after they return to their homelands. Preventive methods for infectious diseases are thus an important concept that must be made known to travellers.

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Assessment of Adherence to Prophylactic... continued

Table 1
Characteristics of Study Subjects

	Reply Postcard (n=81, 9%)	Telephone Interview (n=306, 34.1%)	Unable to be contacted (n=511, 56.9%)	Total (n=898)
Gender (n%)				
Female	45 (55.6)	139 (45.4)	278 (54.4)	462 (51.4)
Male	36 (44.4)	167 (54.6)	233 (45.6)	436 (48.6)
Age (Y/O, mean ± SD)	44.8 ± 15.6	39.1 ± 13.4	39.3 ± 14.5	
Age range(Y/O)	19-75	13-81	5-75	
Country of destination (n, %)				
Africa	52 (42.2)	178 (58.2)	288 (56.4)	518 (57.7)
Americas	10 (12.4)	39 (12.8)	75 (14.7)	124 (13.8)
Europe	0 (0.0)	0 (0)	141(27.6)	141 (15.7)
Asia	18 (22.2)	81 (26.5)	7 (1.4)	106 (11.8)
Pacific	1(1.2)	8 (2.6)	0	9 (0.01)

Table 2
Side Effects from Anti-Malarial Prophylactic medications
(multiple choices)

Side Effects	Reply Postcard (n=81, 20.9%)	Telephone Interview (n=306, 79.1%)	Total (n=387)
Mefloquine (n, %)	65 (80.2)	235 (76.8)	300 (77.5)
None	44(67.7)	177 (75.3)	221 (73.7)
Nausea	3(4.6)	10 (4.3)	13 (4.3)
Vomiting	3(4.6)	7 (3.0)	10 (3.3)
Loss of appetite	8(12.3)	5 (2.1)	13 (4.3)
Headache	3(4.6)	11 (4.7)	14 (4.7)
Dizziness	2(3.1)	0 (0.0)	2 (0.7)
Pruritis	4(6.2)	0 (0.0)	4 (1.3)
Skin rash	6(9.2)	0 (0.0)	6 (2)
Insomnia	2(3.1)	4 (1.7)	6 (2)
Depressed mood	5(7.7)	2 (0.9)	7 (2.3)
Doxycycline	11 (13.6)	58 (20.0)	69 (17.8)
None	4 (36.4)	39 (67.2)	43 (62.3)
Nausea	4 (36.4)	5 (8.6)	9 (13.0)
Epigastric pain	3 (27.3)	5 (8.6)	8 (11.6)
Photosensitivity	2 (18.2)	2 (3.4%)	4 (5.8)
Headache	1 (9.1)	3 (5.2%)	4 (5.8)
Dizziness	1 (9.1)	1 (1.7)	2 (2.9)

Pruritis	1 (9.1)	2 (3.4)	3 (4.3)
Skin rash	1 (9.1)	0 (0.0)	1 (1.4)
Candidiasis	1 (9.1)	0 (0.0)	1 (1.4)
infection			
torvaquone plus	5 (6.2)	13 (4.2)	18 (4.7)
proguanil			
None	4 (80.0)	9 (69.2)	13 (72.2)
Nausea	0 (0.0)	0 (0.0)	0 (0)
Vomiting	0 (0.0)	0 (0.0)	0 (0)
Headache	1 (20.0)	1 (7.7)	2 (11.1)
Dizziness	1 (20.0)	1 (7.7)	2 (11.1)
Pruritis	0 (0.0)	1 (7.7)	1 (5.5)
Skin rash	0 (0.0)	1 (7.7)	1 (5.5)

Table 3
Adherence Rate of Malaria Chemoprophylaxis
(according to medication)

	Total (n=306)	Mefloquine (n=235, 76.8%)	Doxycycline (n=58, 19.0%)	torvaquone plus proguanil (n=13, 4.2%)
Adherence condition(n, %)				
Total answered(n)	300	229	58	13
No use at all	37 (12.3)	26 (11.4)	10 (17.2)	1 (7.7)
Complete	160 (53.3)	135 (59.0)	18 (31.0)	7 (53.8)
Incomplete, prior to trip	15 (5.0)	9 (3.9)	6 (10.3)	0 (0.0)
Incomplete, middle of trip	41 (13.7)	28 (12.2)	10 (17.2)	3 (23.1)
Incomplete, returning from trip	47 (15.7)	31 (13.5)	14 (24.1)	2 (15.4)
Reason for nonadherence(n, %)				
Total answered(n)	117	81	30	6
Forgot	18 (15.4)	12 (14.8)	6 (20.0)	0 (0.0)
Worry about side effects	12 (10.3)	11 (13.6)	1 (3.3)	0 (0.0)
Occurrence of side effects	21 (17.9)	12 (14.8)	8 (26.7)	1 (16.7)
Refuse to take medications	1 (0.9)	1 (1.2)	0 (0.0)	0 (0.0)
Low risk of malaria infection	38 (32.5)	26 (32.1)	8 (26.7)	4 (66.7)
No need to complete entire prophylactic regimen	27 (23.1)	19 (23.5)	7 (23.3)	1 (16.7)

Table 4
Travellers' Opinions on Preferred Reply Methods and
Other Related Issues

	Total (n=306)	Mefloquine (n=235, 76.8%)	Doxycycline (n=58, 19%)	torvaquone plus proguanil (n=13, 4.2%)
Do you feel it is important to report drug side effects?				
<u>Total answered (n)</u>	<u>290</u>	<u>225</u>	<u>52</u>	<u>13</u>
No	34 (11.7)	27 (12.0)	6 (11.5)	1 (7.7)
Yes	256 (88.3)	198 (88.0)	46 (88.5)	12 (92.3)
Reason for not returning postcard				
<u>Total answered (n)</u>	<u>93</u>	<u>73</u>	<u>17</u>	<u>4</u>
Forgot	53 (57.0)	41 (56.2)	11 (64.7)	1 (25.0)
Too troublesome	15 (16.1)	11 (15.1)	4 (23.5)	1 (25.0)
Occurrence of side effects	2 (2.2)	1 (1.4)	1 (5.9)	0 (0.0)
Lost the postcard	2 (2.2)	1 (1.4)	0 (0.0)	1 (25.0)
Felt it was unnecessary	4 (4.3)	4 (5.5)	0 (0.0)	0 (0.0)
Did not take the medication	2 (2.2)	2 (2.7)	0 (0.0)	0 (0.0)
Felt it would not be helpful	1 (1.1)	1 (1.4)	0 (0.0)	0 (0.0)
Postcard lost in mail	14 (15.1)	12 (16.4)	1 (5.9)	1 (25.0)
Preferred reply method (more than one choice)				
Telephone interview	146 (47.7)	116 (49.4)	29 (50.0)	5 (38.5)
Mobile phone message	35 (11.4)	26 (11.1)	5 (8.6)	4 (30.8)
Return postcards	15 (4.9)	11 (4.7)	3 (5.2)	2 (15.4)
Internet survey	82 (26.8)	71 (30.2)	17 (29.3)	2 (15.4)
Free gift upon reply	5 (1.6)	4 (1.7)	0 (0.0)	1 (7.7)



Factors that affect Obtaining Traveller's Health Services in Kuwait

I Shady and M Gaafar

Background

It is estimated that 30-60% of travellers experience an illness while overseas. Preventative measures that can be provided through a Traveller's Health Clinic (THC) should help to reduce the risk of such health problems. The objective of this study is to examine the characteristics of travellers visiting a THC in Kuwait.

Subjects and Methods

An analytical comparative study between visitor group that constituted all the travellers visiting the THC during the study period (May 2009 - December 2010) with an age and gender matched group of the who did not attend the THC (800 persons) recruited at Kuwait International Airport. A modified pre-departure health questionnaire was completed by both groups.

Results

The bivariate indicated that those Kuwaits (68.2%), travelling for the purpose of work (25.3%) or leisure (59.5%), living in camps (20.4%) or hotels (64.0%) and those with good knowledge about the THC from media (28.1%) or other sources (57.3%) are associated with high frequency of the visiting to the THC ($p < 0.001$). Also, travellers heading to Africa (47%) and South America (10%) visited the THC more frequently than the other group ($P < 0.05$). The multivariate analysis showed that nationality, followed by purpose of travel, then duration of stay and the choice of travel destinations are independent predictors for visiting the THC. The preventative services included quadrivalent meningococcal vaccine (90.7%), yellow fever vaccine (57.1%), tetanus toxoid (41.2%), typhoid vaccine (32.6%) influenza vaccine (16.2%) and malaria chemoprophylaxis (50.7%).

Conclusions

Nationality, purpose of travel, duration of stay and the choice of travel destinations are considered predictors for obtaining a pre-travel consultation from the THC.

Introduction

The progressive ease of mobility makes business connections between different parts of the world much easier, and has led to a large increase in tourism, which now involves all age groups and social classes in the Western world. As a result, it is estimated that every year as many as 50 million people from the industrialized world cross international borders to tropical or subtropical destinations, where they encounter different cultures, social habits and economic standards and a different microbiological environment.¹

The State of Kuwait is a country with a total population of about 3.6 million including approximately 1.2 million Kuwaiti citizens and 2.4 million non-Kuwaiti nationals.²

Approximately, 700 travellers (2-3 visits/10,000 Population) visit the travellers' health clinic (THC) annually. It's the only THC in Kuwait and can be easily approached by all transportation methods as it is located in the heart of Kuwait city.

The services provided include immunization, chemoprophylaxis for malaria, and health advice/information about the prevalent diseases/ health hazards in the destination country. Most of the preventive services are provided freely to all travellers except yellow fever vaccination for non Kuwaitis which is still cheaper than that of the private sector.³

The travel volume in Kuwait varies during the year with remissions and exacerbations. Its first peak occurs in summer months (June, July and August), and declines during the winter months (October, November and December), then has another peak in mid-term vacation of schools and universities during January and February.³

Many studies had been conducted in Western societies on travel health seeking behaviors, but there are few studies in travel health practices in Asia among residents and their reasons for visiting travel clinic. There is no study in Kuwait and even in the Gulf Area that addresses the issue of travel health seeking behavior and its determinants. The objectives of this study are to explore the factors associated with seeking travel health care and contents of this care.^{4,5}

Subjects and Methods

This study is an analytical comparative study that compares demographic and travel data for all travellers visiting the THC for pre-travel consultation (Visitor group), with data from a matched group of pre-departure travellers who had not received pre-travel consultation at the THC (Non Visitor group).

The study was performed from 1st of May 2009 to 31st December 2010.

Participants from the Travel Clinic (Visitor Group)

The study cohort constituted all the travellers visiting the traveller's health clinic (THC) in Kuwait whether, nationals and/or residents.

- All travellers who visited the clinic during the study period were interviewed and asked to fill the pre departure health questionnaire after explaining to them the importance and benefit of the data they will provide and all agreed to complete the questionnaire
- Each was interviewed for about 15-30 minutes.

Each questionnaire was reviewed for any missing data or questions that must be completed by the traveler.

- Travellers received the preventive measures identified according to the WHO rules and regulations set on the IHR (2005)9.

Participants form the airport study (Non Visitors Group)

Age and gender matched controls (800 persons) were selected from travellers in the Kuwait International airport after they finished their boarding process as they passed through a staircase to the transit hall. The numbers required was calculated from the monthly percentage of age and gender of the visitor group

We selected the control group (non visitor) every month using systematic random sample (Every 5th traveler) on the bases of 1:1 case/control ratio. If one of the selectees already visited the THC, we selected the next following passenger.

- A researcher waited on the staircase and selected passengers after identifying gender and being asked the age and if they had visited the THC.
- Exclusion criteria included non-resident visitors to Kuwait and those travelling permanently to their home country.

Both groups were subjected to a pre departure self administered health questionnaire based on the questionnaire designed by the WHO in the book International Travel and Health 2012.⁹

- We designed two versions of the questionnaire (Arabic and English) and those below 6 years were helped by their parents or older brothers/sisters and those couldn't understand or fill the questionnaire were helped by our staff members (Indian, Philippine and Indonesian nurses).
- The questionnaire included socio – demographic data (Gender, Age, Nationality and Occupation) , data regarding the travel trip (destination, purpose of travel, date of travel, duration of stay, location inside the country visited, activities intended to do during the visit, type of accommodation inside, history of past travel and source of knowledge about the THC).
- Occupation was classified into 4 types: Unemployed, Domestic Worker, White Collar Occupation (refers to a person who performs professional, managerial, or administrative work and was performed in an office or cubicle), Blue Collar Occupation (manual labor).
- Informed verbal consent was obtained from all participants of our study.

Data was collected and analyzed by Pearson's chi-square test and Fisher's exact test. Bivariate and mul-

tivariate analysis with logistic regression models were then performed on the outcome variable of visitors to THC with the input variables of significance or importance. Multivariate analysis was performed to determine the demographic groups and travel patterns that were more likely to result in visiting the THC. All analyses were performed using the statistical Package of Social Science (SPSS) version 16, with the level of significance set at $P < 0.05$.

Results

Figure 1 shows the monthly distribution of the groups (visitors and non visitors), and indicated that there are two peaks of visiting the THC during the summer months (July and August) and winter months (Jan, Feb and Marsh).

Table 1 presents the bivariate analysis and shows that Kuwaiti nationality (68.2%) is significantly affecting visiting to the THC ($p < 0.001$) and (OR=1.79). As for purpose of travel, those who travelled for work (25.3%) or leisure (59.5%) were more likely to have received pre-travel consultation at THC ($p < 0.001$) (OR=3.83 and 3.43 respectively). Travellers to Africa and/ or South America tend to visit the THC for pre-travel consultation ($p < 0.05$) and (OR= 1.37 and 1.61 respectively). Travellers staying in hotels (64.0%) and/ or camps (20.4%) were more likely to consult the THC for pre-travel consultation ($P < 0.001$). Previous knowledge about the services provided by the THC either from media or other sources affected the tendency of the visitors to the THC to obtain their pre-travel consultation more than those without any information about the THC ($p < 0.001$) and (OR=2.69 and 4.19 respectively). Blue collar employees, those with previous history of visiting more than 4 times, visiting rural or urban areas and staying between 4-12 weeks were less likely to visit the THC ($P < 0.001$). Non significant factors included gender and age groups ($p > 0.05$).

From the multivariate analysis (table 2), all significant factors resulted from the analysis were used to determine the predictors for obtaining pre-travel consultation by THC. We found that nationality, followed by purpose of travel, then duration of stay and the choice of travel destinations are considered predictors for visiting THC arranged in a descending manner (OR = 8.7,2.2,1.4 and 1.33 respectively).

Table 3 demonstrates the preventive measures provided to the visitors of THC. All travellers to Africa and South America received yellow fever vaccination. Meningococcal vaccination was given to travellers to all destinations in a range between (60.3% - 98.4%). About one third to two thirds of the travellers to Asia, Africa and S. America had a typhoid and tetanus toxoid immunizations. Influenza vaccine was given to travelers to all destinations except Africa by about 20%-47.7%. As, for malaria chemoprophylaxis, Mefloquine is given to 50.7% of the travellers while Doxycycline (Vibramycine or Doxydar) is given to

Factors that affect Obtaining Traveller's Health... *continued*

26.6% for Asia, Africa and S. America destinations. In addition, for all destinations, general health education message was given to 95.7% of the visitors and locality specific health education message was given to 76.4%.

Discussion

There are two peaks during the year with more travellers visiting the THC (July-August) and (Jan-March). This is due to school and university vacation during the summer, midterm and spring periods.³

This study's finding of 56% male gender among those receiving pre-travel consultation at THC and its difference from the Singapore⁸ and German¹² studies should not be ascribed to differences in gender ratios.^{2,10,11,12}

Nationality tends to significantly affect the visiting to the THC to get pre-travel consultation ($P < 0.001$), this was a reflection of many factors including the higher per capita income for Kuwaitis and the fact that most of the health services provided freely to them in comparison to others.

The age of the travellers did not affect the tendency to visit THC for pre-travel consultation ($p > 0.05$), although most of the travelers were from the active physical and financial age groups¹⁴ (30-45 years and 45-60 years). This was in agreement with the results of studies held in Singapore⁸ and Germany.¹²

Our study like the Singapore study⁸ found that the white collar employees tended to visit the THC more than other occupations and this may be attributed to their higher educational level and higher per capita income than other occupations. However, the differences were not statistically significant.

The current study shows that those who were travelling for leisure and work, visited the THC more than the other group ($P < 0.001$) and this was comparable to that found by Vernon J Lee and colleague, 2006⁸ in Singapore and Susanna Flec and colleague 2005¹² in Germany. This could be due to the fact that some purposes of travel are associated with greater likelihood of exposure to travel health hazards.

Travel destinations could significantly affect the tendency for visiting the THC especially for African and South American destinations ($P < 0.05$) and this is in agreement with other studies.^{4,8,18} This could be attributed to the fact that visitors perceived the destination-specific risk of Africa and South America as higher and therefore sought pre-travel health consultation at THC, whereas travelling to Asia, Europe or North America was not perceived as high risk.^{15,18-21}

Travellers staying in hotels tend to visit the THC more frequently ($p < 0.001$), in agreement with the Singapore study⁸ 2006 and it could be attributed to the high social class and/or the travel agencies arrangement that requested from the travellers to visit the THC in order to obtain the International Travel Certificate and travel advice.^{9,22}

Travellers with a duration of stay greater than 4 weeks were more likely to be frequent travellers and were less likely to visit the THC ($p < 0.001$) and as found by other studies.^{8,12,15-17} The explanation could be attributed to that those travelers with past history of frequent travels may become reluctant to seek preventive measures due to their previous travel experiences and also have already received travel health advice and immunization from previous visits.

Previous knowledge of the travellers about the services provided by the THC significantly affected the utilization of these as found by the Vernon J Lee in Singapore.⁸

Multivariate analysis identified the predictors for the travellers who visited the THC for pre-travel consultation which included; nationality, followed by purpose of travel, then accommodation as well as duration of stay and the choice of travel destinations. Similar results were found by the study in Singapore.⁸

The results of the preventive services provided could be attributed to travellers' perception of destinations specific risks and following the WHO recommendations on the IHR (2005) that put greater priorities on some diseases like meningococcal meningitis, yellow fever and malaria prophylaxis for specific destinations.^{9,22} These results are different than those of another study done in Singapore on 2006⁸ in which the travelers got Typhoid vaccine, Hepatitis A vaccine as well as D-T toxoid as the commonest vaccines given.

Strengths and Limitations

Being the only THC providing the pre-travel health consultation in Kuwait enabled us to interview all visitors of the THC and this helped us to exclude any selection bias.

One some limitation is that co-incidentally this study was conducted when A (H1N1) flu pandemic has first been detected in Mexico and America and its impact greatly affect traveling in general and impacted on visits to the THC.

Conclusion and recommendations

The present research examined the factors affecting or influencing travelers visiting THC as well as providing a clear prospective of the travel profile and services provided by the THC in Kuwait. We found that nationality, purpose of travel, duration of stay and the choice of travel destinations are considered predictors for getting the pre-travel consultation from the THC. More studies are needed on the travel habits of the populations in Gulf Countries, especially with the increasing affluence and diverse travel habits in the region.

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Table 2

Multivariate Analysis of the Factors influencing visiting THC

Variables	Exp (B)	95% CI	P
Nationality	8.7	(4.82, 13.68)	<0.001
Occupation	1.0	(0.93, 1.23)	>0.05
Purpose of Travel	2.2	(1.25, 4.00)	0.007
Travel Destinations	1.33	(1.18, 1.42)	<0.001
Place inside	0.7	(0.56, 0.79)	<0.001
Accommodation	1.4	(0.88, 1.91)	>0.05
Duration	1.4	(1.22,1.66)	<0.001
History previous travel	0.1	(0.08, 0.24)	<0.001
Know/T.H clinic	0.6	(0.39, 0.93)	0.02

Table 3

Preventative measures provided to the visitors to THC

Preventive measures	Total		Asia		Africa		S. America		Others	
	No	%	No	%	No	%	No	%	No	%
	755	100	196	100	355	100	76	100	128	100
• Yellow Fever	431	57.1	-	-	355	100	76	100	-	-
• ACWY meningococcal vaccine	685	90.7	193	98.4	348	98.0	63	82.9	81	63.3
• Typhoid	246	32.6	103	52.6	112	31.5	31	40.8	-	-
• Tetanus	311	41.2	73	37.2	213	60.0	25	32.9	-	-
• Influenza	122	16.2	40	20.4	-	-	21	27.6	61	47.7
• Malaria Drugs										
- Mefloquine	383	50.7	139	70.9	201	56.6	43	56.6	-	-
- Vibramycin	201	26.6	14	07.1	154	43.4	33	43.4	-	-
• Health Education										
- General HE message	723	95.7	193	98.4	355	100	76	100	99	77.3
- Specific HE message	577	76.4	160	81.6	312	87.9	43	56.6	62	48.4



Leptospirosis on a Rafting Tour in Thailand

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Summary

Tourists who are exposed to possibly contaminated water are likely to contact leptospirosis, especially in activities such as rafting.

Abstract

There have been reported cases of leptospirosis among foreign travellers in Thailand infected while on eco-tourism programs such as rafting tours. The current study investigated the leptospirosis cases in 2007 returning from a rafting trip along a flooded river in a southern Thai province. This study aimed to assess the risk factors amongst tourists on a rafting trip and tour guides at risk in the Sohl district of Thailand. Microscopic agglutination test (MAT) among tour guides and animals found along the river were also conducted. Risk for illness among the rafting participants showed no true association with open wounds during rafting (RR 1.96, 95% CI 0.37-10.43) and being submerged in water upon falling into the river (RR 3.69, 95% CI 0.78-17.53). The sero-prevalences were 59.8% among the guides, 76.2 % for the cattle, 68.2% among the dogs, and 100 % for the frogs. Of the infected guides, most were infected with *Leptospira interrogans* serovar Shermani and Bratislava, which were also present in the sera of cattle, dogs and frogs. The PCR assay for pathogenic strains was positive in kidneys of 1/13 frogs (7.7%) and 5/33 bats (15.2%). *Leptospirae* could not be purely isolated from all of the specimens.

Introduction

Leptospirosis is a zoonotic disease that can be acquired from infected animal reservoirs. In Thailand, the primary reservoir animals are rodents *Leptospira* can survive best in soil/mud and water with temperatures between 28-30°C for 2-6 weeks but can be eliminated in dry soil and sunlight within 3 hours. Essentially, humans usually become infected by contact of the skin, especially if abraded, or of mucous membrane with water, moist soil or vegetation contaminated with urine of infected animals.¹

The incubation period is approximately 10 days from 4 to 19 days.² In some areas where leptospirosis is common, most of the infected population may have no symptoms at all or few symptoms, which are hard to diagnose.^{3,4} About 41% of those who have contact with a contaminated environment will be infected and 40% of the infected persons show symptoms.^{5,6} Therefore, only 16% of those who have contact with a contaminated environment manifest symptoms.

The transmission of disease was found among water-sport enthusiasts (e.g., rafting). Fresh water swimmers (waterfall, lake or river), specifically

triathlon participants, have also been found to be infected continuously. In a 2007 medical report in Hong Kong,⁷ a tourist was found infected in Pa Ton Parivart Wildlife Sanctuary of Pungnga. In 2006, a German patient in the northern part of Thailand was found to be infected,⁸ and in 2001 a Dutch traveler was diagnosed with leptospirosis.⁹

Materials and Methods

Retrospective cohort study of rafting participants

44 officers and lecturers of Prince of Songklanagarind University who traveled in La Ghu, Stul were investigated. The program tour included a waterfall tour, cave exploring and rafting. Blood samples were collected from 38 of these travellers to detect antibodies by indirect immunofluorescence assay (IFA). Leptospirosis was identified as follows:

- Suspected leptospirosis patients who had fever, headache or muscle pain that started from December 2007 to January 2008, and returned from recreation in La Ngu, Stul in December 2006.
- Confirmed leptospirosis patients refer to suspected cases whose antibody titers, evaluated by the IFA technique, was $\geq 1:200$ for single samples or a 4-fold raise on the second sample (paired sera). Some cases without any symptom were found to have titer $\geq 1:400$.
- Epidemiological data were collected and analyzed in order to recognize the risk factors of infection in patients who returned from travel in December 2006. Relative Risk (RR) and 95% confidence interval was calculated.

In order to determine the possible sources of leptospirosis, the environment and animals within the vicinity were also investigated. This was done by tracing the routes of the tour and by collecting samples from soil in 8 locations, freshwater from 6 sources, 13 frog kidneys, 5 mice, 33 bats and 6 of bat urine samples. Polymerase chain reaction (PCR) using 16S rRNA gene was performed on the environmental and animal samples. These samples were also cultured to detect for the presence or absence of *Leptospira*.

Cohort Study on the prevalence of Leptospira infection amongst rafting and river guides

225 participants amongst rafting and cave guides in the Stul area volunteered to participate in this study. Of these 87 guides were selected by purposive sampling method. The guides consisted of 59 rafting guides, 7 guides working in Phupapetch Cave and the rest worked in both activities. The sera of these subjects were tested for the presence or absence of antibodies against 24 *Leptospira* serovars by microscopic

agglutination test (MAT). A positive result was set at a titre of 1:100 or greater.

Further blood samples were collected from 21 cattle, 22 dogs, 3 frogs and 1 cat in suspected areas of infection in Stul. The sera taken were tested using MAT.

Results

Study on rafting participants

Of the 44 travellers 2 who returned became sick, had fever, chill, severe headache and were diagnosed as being infected with leptospirosis. Thirty-eight officers consisted of 23 females (60.5%) and 15 males (39.5%). The median age was 41 (age range was 13-59 years old). Investigation reported that 7 officers (2 males, 5 females) were suspected of having *Leptospira* infection and their symptoms also fit in the definition of suspected leptospirosis patients. Median the age of the suspected cases was 49 (13-53 years old). The median incubation period was 18 days (4-20 days), as shown on Figure 1.

After the rafting tour, the patients presented with fever, and at least another symptom. Most of the 7 patients had severe headache (71%), muscle pains (57%), vomiting (57%), and other symptoms as shown in Figure 2.

Based on the result of antibody analysis by IFA technique, 6 patients were found to have a titer $\geq$ 1:200. Interestingly, 2 of the 6 had 4-fold raise in antibody analysis and 1 did not have any symptom but *Leptospira* infection was indicated by 1:3,200 titre. Risk factor analysis indicated that the travelers wore non-protective clothes, such as shorts and T-shirt, that made them prone to injuries. Furthermore, the tourists did not take any prophylactic medicines. Most of the travelers got wounds on knees and legs during the rafting and there was one who got wounded on the face. Those who got wounds did not clean their wounds, and showered with freshwater in resort. (Freshwater was taken from a canal without any treatment). Some were immersed (choked) and during 2 hours of the rafting because of a boat sinking. Based on the results of this study, having skin wounds and immersion in water are potential risks of infection (Table 1). There were no statistically significant differences however observed between these risks and infection.

One risk factor that may have caused leptospirosis among the tourists was that all of them were wearing shorts. Also, they had to walk bare foot through 5-10 meters of sharp rocks. Furthermore, 3 dogs and 1 cow were found along the canal. Additionally, there were bats in the humid cave, where the travellers had to pass through bat urine and excrement. The guides often suggested the tourists to gather under the water dripping point, to wipe their bodies and faces with flowing water. It is unlikely however to acquire wounds from the cave trekking on the grounds of

having safe paths. Moreover, tourists hardly got any wounds or accident from swimming in the waterfall as the waterfall is small and not many people spend much time in it.

Samples were collected from bats, rats, soil, and water from Phupapetch Cave and the white water rafting canal. These samples were examined by using a dark field microscope. Then, the PCR method was conducted and the results are shown in Table 2. *Leptospira* could not be purified from any of these cultures.

Study on the Guides

Fifty-two of the 87 guides (59.8%) were positive by MAT. These MAT-positive cases consisted of 42 men and 10 women. The median age of the cases was 20.5 years old (age range was 13-57 years old). Table 3 shows the distribution of the guides according to their workplace. All the guides did not experience any fever, shivering or muscle pains. The outcome of *Leptospira* antibodies test in the guides, who worked in the outbreak location related to the dogs and cattle within that zone. The highest serovars of *Leptospira* spp were found Shermani and Bratislava as shown in Table 5.

Results from animal blood samples

Results of antibody detection among animals in Ma Nang and La Ngu districts showed that 15/22 dogs (68.2%), and 16/21 cattle (76.2%) were positive MAT-positive (Table 4). All 3 frog samples had *Leptospira* antibodies.

Discussion

Tourists who are exposed to possibly contaminated water are likely to contact leptospirosis, especially in activities such as rafting by that they could cause wounds. Nevertheless, reports from the Ministry of Health still have flaws in the exact numbers of tourists who are infected since most of the travellers are not local people. It is quite hard therefore, to follow up Thai travellers. On the other hand, most of the reports regularly come from overseas, stating that foreign tourists are infected from travelling in Thailand.⁷⁻⁹

The most risky activity that tourists can engage in and may make them prone to leptospirosis, is rafting. In this activity, tourists are likely to have cuts or wounds and they may be submerged in water for a long time. Aside from rafting, a cave is also a risky location for its humidity, darkness, and presence of many reservoirs such as bats.

It appears that bats are contagions, showing by the evidence of PCR test in the guides that work in the caves are more likely to be infected by *Leptospira* (Table 3) comparing with guides in other locations apart from rafting activities.

Additionally, rafting is considered to accidentally cause people wounds to drink water from the infec-

Leptospirosis on a Rafting Tour in Thailand *continued*

tion source, though this issue has not been proven statistically owing to limited numbers of samples. There are some noticeable probabilities and trends which have to be researched further including locations and risk of the infection.

By conducting a MAT test in seeking antigen in 24 serovars of *Leptospira* the 52 guides have contracted the same pathogen *Leptospira interrogans* serovar Shermani and Bratislava. By using descriptive paradigm, this leptospirosis outbreak has the same location in which dogs, cattle and frogs are found to have the same antibody. Nonetheless, the antibody to serovar was not done by MAT in the tourists.

Interestingly, individuals who lived in endemic areas and exposed to *Leptospira* in daily lives had high prevalence of seropositivity but low prevalence of severe leptospirosis.^{10,11} It is possible that naturally acquired antibodies provide protection in these people. In this study, we have demonstrated that 55.9% of guides in flooded areas were seropositive for *Leptospira* antibody. However, they did not demonstrate leptospirosis manifestations. As suggested by several reports,¹²⁻¹⁶ the pre-exposure to *Leptospira* in their daily lives could induce antibodies to the organism which provide protection during later *Leptospira* exposure.

Nevertheless, many *Leptospira* serovars found in dogs, cattle, frogs or guides will not get us to the assumption that it is the main reason of the outbreak. It only tells us about how many these animals are infected or the number of serovars that are infected and might also be involved in the infection in people. Even though, this research may not tell the species of serovars in *Leptospira*, which found in bats rats and frogs in consequence of the limited sample of bat and frog blood but the solution to this issue is to use PCR testing in the bat, rat and frog kidney sample. The bat kidney sample could tell us the fact that bats can release the disease to the atmosphere.¹⁷ Besides, the frequency in discovering *Leptospira* in this case is dramatically high with 15.2% comparing to the *Leptospira* in the Amazon location, which is only 3.4%.¹⁸ This might be the reason why leptospirosis is found mostly in guides who work in the cave, comparing to guides who work in other venues. However, it is still to be debated whether bats are the main cause of outbreak due to the lack of capability in the disease testing process. Serovars infecting reptiles and amphibians (frogs) have not been shown to infect humans but have been suspected in Barbados and Trinidad. In carrier animals, an asymptomatic infection occurs in the renal tubules, with leptospiruria persisting for a long period or, especially in reservoir species, for life.¹

Conclusion

There was an outbreak of leptospirosis in the traveller attractions in La Ngu and Ma-nang district in Stul province. Proved by the infected historical data find-

ing in the guides and animals around the location. Guides are infected by the same type of *Leptospira* serovar Shermani and Bratislava as well as in cattle and dogs. We may not assume that these animals are the main contagion, because bats and frogs are also contagion. It is yet to be proven that the bat was the main reason of this outbreak.

Recommendations and Implementations

Since leptospirosis is a threat to humans and especially, in tourist attractions, makes this incidence much more harmful. Hence, there should be solutions and preventive measures to protect people from the disease. Fundamental solutions are:

- 1 Sanitation of resorts and communities around the canal should be improved. Maintaining sanitation of restrooms and refuse areas will keep away contagious animals.
- 2 Guides and tourists should be educated about rafting activity risks, appropriated outfits and emergency first aid in order to lessen the chance of being infected with leptospirosis.
- 3 Guides should be educated about misunderstood beliefs, which lead to insanitary behaviours. For example, the guides should not tell the travellers to gather the water dripping from caves to wash faces or bodies.
- 4 The registration system of sickness awareness should be improved by registering guests at the hotels and follow up if any guest is sick.

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Table 1

Risk factor analysis of the officers of Prince of Songklanagarind in travelling path

Risk Factor	Risk Factor		Non- Risk Factor		Crude RR (95%CI)
	Sick	Not Sick	Sick	Not Sick	
Waterfall*	5	20	1	8	1.80 (0.24-13.40)
Cave*	5	22	1	6	1.30 (0.17-9.38)
Rafting	6	27	0 (1)**	5	Undefined 1.09 (0.16-7.52)**
Got wounded before or while doing activities***	3	13	2	19	1.97 (0.37-10.43)
Immersion or drinking water rafting ***	4	9	2	22	3.69 (0.78-17.53)

Note: *4 people lacked information **substitute 0 with 1***1 person lacked information

Table 2

The prevalence of Leptospire found by conducting a PCR test in bats, rats, soil, and water in travellers on rafting in La Ngu and Ma-Nang district, Stul 2008

Species	Specimen	Samples	Samples positive <i>Leptospira</i> spp (%)	Pathogenic leptospire (%)	Non-Pathogenic leptospire (%)
Bat	Urine	6	2 (33.3)	0/8 (0.0)	2/6 (33.3)
	Kidney	33	26 (78.8)	5/33 (15.2)	21/33 (63.6)
Frog	Kidney	13	3 (23.1)	1/13 (7.7)	2/13(15.4)
Rat	Kidney	5	3 (60.0)	0/5 (0.0)	3/5(60.0)
Environment	Soil	8	7 (87.5)	0/8 (0.0)	7/8 (87.5)
Environment	Water	6	6 (100.0)	0/6 (0.0)	6/6 (100.0)

Leptospirosis on a Rafting Tour in Thailand *continued*

Table 3
The result of *Leptospira* antibodies by MAT in guides at La Ngu and Ma Nang, Stul province, 2008 divided by workplace

Guides' Workplace	Infection Rate (%)
Phupapetch cave	5/7 (77.4%)
Float raft downstream	11/59 (18.6%)
Phupapetch cave + Rafting	7/21 (33.3%)

Table 4
Results of MAT-positive (%) from serum samples among species examined in Stul province, 2008.

Species	No. of serum samples examined	No. of MAT-positive (%)
Cattle	21	16 (76.2)
Dog	22	15 (68.2)
Cat	1	0 (0.00)
Frog	3	3 (100.0)
Human	87	52 (59.8)

Table 5
Numbers (percentage) of each species examined, based on infecting serovar as determined by microscopic agglutination test (MAT), Stul province.

Serovars	Animals				
	Cattle	Dog	Cat	Frog	Human
Bratislava	0 (0.0)	5 (22.7)	0 (0.0)	3 (100.0)	40 (46.0)
Autumnalis	0 (0.0)	3 (13.6)	0 (0.0)	0 (0.0)	12 (13.8)
Ballum	1 (4.8)	1 (4.6)	0 (0.0)	0 (0.0)	1 (2.4)
Bataviae	1 (4.8)	1 (4.6)	0 (0.0)	0 (0.0)	0 (0.0)
Canicola	0 (0.0)	1 (4.6)	0 (0.0)	0 (0.0)	0 (0.0)
Cellidoni	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.2)
Cynopteri	0 (0.0)	1 (4.6)	0 (0.0)	0 (0.0)	0 (0.0)
Djasiman	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.2)
Grippotyphosa	1 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)	3 (3.4)
Hebdomadis	1 (4.8)	3 (13.6)	0 (0.0)	0 (0.0)	6 (6.9)
Icterohaemorrhagiae	0 (0.0)	3 (13.6)	0 (0.0)	0 (0.0)	8 (9.2)
Javanica	0 (0.0)	2 (9.1)	0 (0.0)	0 (0.0)	1 (1.2)
Louisiana	0 (0.0)	1 (4.6)	0 (0.0)	0 (0.0)	1 (1.2)
Manhao	0 (0.0)	1 (4.6)	0 (0.0)	0 (0.0)	0 (0.0)
Mini	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (3.4)
Panama	0 (0.0)	2 (9.1)	0 (0.0)	0 (0.0)	2 (2.3)
Pomona	0 (0.0)	1 (4.6)	0 (0.0)	0 (0.0)	1 (1.2)
Pyrogenes	1 (4.8)	3 (13.6)	0 (0.0)	0 (0.0)	4 (4.6)
Ranarum	16 (76.2)	6 (27.3)	0 (0.0)	0 (0.0)	0 (0.0)
Sarmin	0 (0.0)	1 (4.6)	0 (0.0)	0 (0.0)	1 (1.2)
Sejroe	0 (0.0)	2 (9.1)	0 (0.0)	0 (0.0)	2 (2.3)
Shermani	16 (76.2)	15 (68.2)	0 (0.0)	3 (100.0)	39 (44.8)
Tarassovi	0 (0.0)	1 (4.6)	0 (0.0)	0 (0.0)	3 (3.4)
Patoc	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Figure 1
Number of patients as to the first day of illness.

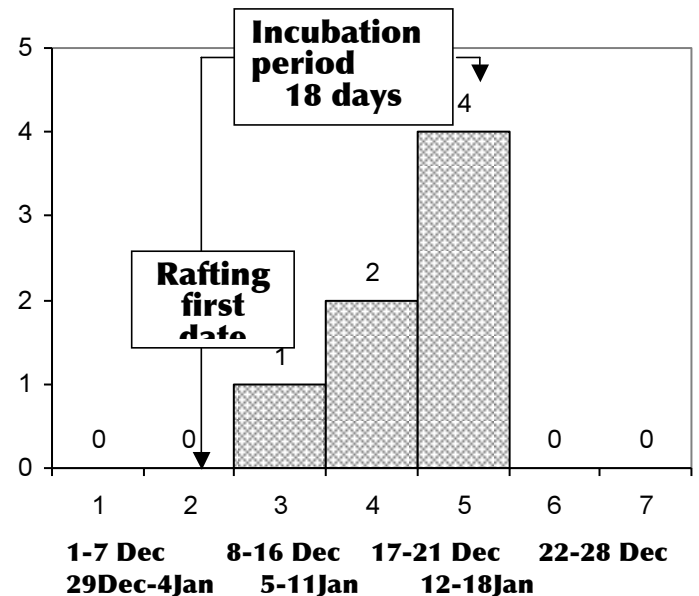
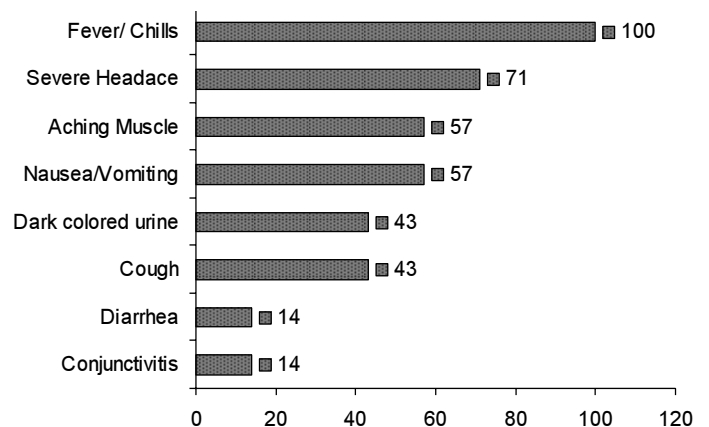


Figure 2
Signs and symptoms of seven suspected leptospirosis patients who returned from the rafting tour in December 2006, La Ngu, Stul province.



Journal Watch

Edited by M Townend & J Moore

Persistent detection of *Plasmodium falciparum*, *P. ovalecurtisi* and *P. ovalewallikeri* after ACT treatment of asymptomatic Ghanaian school-children.

Dinko B, Oguike MC, Larbi JA, Bousema T, Sutherland CJ. *International Journal for Parasitology: Drugs and Drug Resistance* 3: 45-50.

The authors screened 274 asymptomatic Ghanaian school-children aged from 5 to 17 years for malaria parasite by means of blood films. 155 were found to be microscopically positive and were treated with dihydroartemisinin/piperaquine (ACT). After 3 weeks the efficacy of treatment was 91.4% in respect of *P. falciparum* in the 117 children who attended all 5 visits. 152 children attended the final visit, of whom 22 were found still to be parasite-positive. 20 of these had *P. falciparum*, 4 had *P. ovale* and 2 had *P. malariae*, with and 4 being mixed infections.

The authors state that these findings represent a hitherto unrecognised obstacle to malaria elimination in the form of persistent low density infections following antimalarial treatment.

Novel coronavirus: how much of a threat?

Pebody R, Watson JM, Zambon M. *BMJ*2013;346:f1301

This BMJ editorial sums up the current state of knowledge of novel coronavirus (NCoV) following the recognition of a further case in the UK. To date there have been 13 reported cases worldwide since September 2012, 4 of them in the UK. The latest case is the third in a family cluster in the West Midlands; one member of this family cluster had travelled to Saudi Arabia and Pakistan, whilst the other two had not travelled abroad and had probably acquired the infection from their travelling relative. The previous UK case appears to have acquired the infection in Qatar.

Coronaviruses cause respiratory symptoms ranging from the common cold to the much more severe SARS seen in 2002-3. NCoV is genetically similar to other coronaviruses but as yet its reservoir and mode of transmission to humans remain unknown. It is possible that there is an animal reservoir with intermittent zoonotic transmission to humans and, as in the case of the recent UK cluster, subsequent human to human transmission. The origin of the outbreak of NCoV appears to be in the Middle East. 12 of the 13 cases so far identified in humans have been sufficiently severe to need hospital admission and 11 have needed intensive care.

Comment: It is not yet clear how much of a threat will be posed by NCoV in the UK or indeed elsewhere in the world. For the time being it is worthwhile for travel health advis-

ers to consider it as a possibility in travellers returning, particularly from the Middle East, with severe respiratory symptoms and to warn travellers to the Middle East to seek urgent medical advice should they become ill with respiratory symptoms during or after travel there.

Leptospirosis Acquired by Tourists in Venice, Italy.

Lagi, F., Corti, G., Meli, M., Pinto, A. and Bartoloni, A. (2013), *Leptospirosis Acquired by Tourists in Venice, Italy*. *Journal of Travel Medicine*, 20: 128-130. doi: 10.1111/j.1708-8305.2012.00669.x

This short communication describes the case of two Australian tourists aged 25 and 26 years who, after immersion in a canal in Venice, developed severe leptospirosis. After a 1 week history of fever, headache, myalgia, and vomiting they developed jaundice and renal failure. Complete remission was achieved by antibiotic therapy and hemodialysis.

Comment: This paper highlights the facts that infectious disease risks for travellers are not confined to far-flung exotic destinations. Relatively few travellers to familiar European destinations consider seeking pre-travel health advice, but health care professionals must be aware of the possibilities when faced with travellers who present ill after European travel.

Impact of Travelling to Visit Friends and Relatives on Chronic Disease Management.

Gurgle, H. E., Roesel, D. J., Erickson, T. N. and Devine, E. B. (2013), *Impact of Traveling to Visit Friends and Relatives on Chronic Disease Management*. *Journal of Travel Medicine*, 20: 95-100. doi: 10.1111/jtm.12010

The authors conducted a nonrandomized, retrospective observational study of adult VFR travellers who received care from an internal medical clinic serving immigrants and refugees. The primary objective was to determine the impact of VFR travel on markers of chronic disease management including: blood pressure, glycosylated hemoglobin, body mass index, serum creatinine, and anticoagulation:

Of the 110 VFR travellers in our study, 48 travelled to Africa and 62 travelled to Asia for a mean duration of 59 (range 21-303) days. Of the 433 points discussed at pre-travel visits, 71% were infectious disease prevention, 16% chronic disease related, and 13% travel safety. A total of 63 patients (57%) reported one or more health problems while traveling. Of these, 35 (32%) experienced a problem related to a chronic condition. In comparison, 24 (22%) patients experienced an acute infection. Sixty percent of patients were non-adherent to medications during travel. An average increase in diastolic blood pressure of 3.6 mmHg among

Journal Watch *continued*

patients with hypertension was the only statistically significant change in a chronic disease marker when values before and after travel were compared. Subgroup analysis revealed that travel to Africa and non-adherence to medications were also associated with worsening blood pressure control, and patients traveling to Africa experienced a decrease in body mass index.

The authors identified a high proportion of problems related to chronic conditions during VFR travel, while pre-travel appointments tended to focus on infectious disease prevention. They concluded that greater emphasis on medication adherence and chronic disease management during VFR travel is needed during pre-travel preparations

Comment: This study shows the importance of taking into account all aspects of the traveller and the journey. There is much concern about VFR travellers not seeking or receiving pre-travel health advice in respect of travel related health problems, but it is equally important to take into account the previous and current medical history of all travellers together with a review of their medication.

Improved Glycemic Control in Moderate Altitude Type II Residents.

Hessien M. *High Alt Med Biol* 14 (1), 27-30, 2013

The author compared glycaemic control in Type II diabetic resident at moderate altitude with residents at lower altitude. He found that both fasting blood sugar and HbA1c were lower in the moderate altitude residents ($p < 0.01$). He suggested that hypoxia increases insulin sensitivity and consequently improves glycaemic control in Type II diabetes.

Comment: This study was carried out on long term residents at moderate altitude. It is not clear how long residence would need to be for the observed effects to occur, and the results of this study cannot necessarily be extrapolated to short term travellers to altitude.

Efficacy of Residence at Moderate Altitude Versus Low Altitude on reducing Acute Mountain Sickness in Men Following Rapid Ascent to 4300m.

Staab JE, Beidleman BA, Muza SR, Fulco CS, Rock PB, Cymerman A. *14 (1)*, 13-18, 2013

This study compared a group of 18 sea level residents with a group of 9 moderate altitude residents (around 2000m) on rapid ascent (2 hours by road) to 4300m. It was found that ventilator and haematological acclimatisation acquired from residence at moderate altitude resulted in significantly reduced acute mountain sickness (AMS) scores on rapid ascent to high altitude. The moderate altitude residents had spent from 5 to 46 months at such altitudes prior to the study.

Comment: Other studies have shown that periods of even a few days at moderate altitude can reduce the incidence of AMS significantly. This study confirms the findings of previous studies and suggests that if there is a likelihood of being required to travel rapidly to high altitude, for example for rescue or military purposes, residence at moderate altitude

Neisseria gonorrhoeae antimicrobial resistance among men who have sex with men and men who have sex exclusively with women: the gonococcal isolate surveillance project, 2005-2010.

Kirkcaldy RD, Zaidi A, Hook EW 3rd, Holmes KH, Soge O, del Rio C, Hall G, Papp J, Bolan G, Weinstock HS. *Ann Intern Med.* 2013 Mar 5;158(5 Pt 1):321-8. doi: 10.7326/0003-4819-158-5-201303050-00004.

Gonorrhea treatment has been complicated by antimicrobial resistance in *Neisseria gonorrhoeae*. The authors of this paper examined 6 years of surveillance data from 30 US cities on men who have sex with men (MSM) and men who have sex with women (MSW), a total of 34,600 episodes of symptomatic urethral gonorrhea. In all U.S. regions except the West, isolates from MSM were significantly more likely to exhibit elevated MICs of ceftriaxone and azithromycin than isolates from MSW ($P < 0.05$). Isolates from MSM had a high prevalence of resistance to ciprofloxacin, penicillin, and tetracycline and were significantly more likely to exhibit antimicrobial resistance than isolates from MSW ($P < 0.001$). Limitations of the study were stated to be that sentinel surveillance may not be representative of all patients with gonorrhea. HIV status, travel history, and antimicrobial use data were missing for some patients. The conclusion was that men who have sex with men are vulnerable to the emerging threat of antimicrobial-resistant *N. gonorrhoeae*. Because antimicrobial susceptibility testing is not routinely done in clinical practice, clinicians should monitor for treatment failures among MSM diagnosed with gonorrhea. Strengthened prevention strategies for MSM and new antimicrobial treatment options are needed.

Comment: This study highlights a worrying trend of antimicrobial resistance in *N. gonorrhoeae*, especially amongst men who have sex with men. This needs to be borne in mind by all who deal with returning travellers. A careful sexual history should be part of their assessment should there be any symptoms suggestive of gonococcal infection, together with monitoring of the results of treatment and investigation of antimicrobial resistance to commonly used chemotherapeutic agents.

Suppressive chemoprophylaxis invites avoidable risk of serious illness caused by *Plasmodium vivax* malaria.

Baird JK, *Trav Med Inf Dis* 11:60-65, 2013

This paper draws attention to the fact that *Plasmodium vivax* malaria is not the relatively benign illness that it is frequently said to be and that it is capable of producing severe malaria. A relatively low parasite load found in peripheral blood may be misleading as *P. vivax* has a predilection for haemopoietic tissue, and bone marrow sampling may give a more accurate picture of the parasite load. Standard suppressive chemotherapy, i.e. chemotherapy active against blood stages of the parasite, does not prevent the occurrence of hypnozoites in the liver, with a risk of relapse of 10%-90% depending on where infection is acquired, with up to 10 relapses being possible. Primaquine is capable of preventing this from occurring, but appears to be under-used. The efficacy of primaquine against hypnozoites requires the use of an appropriate partner drug for radical cure, and evidence of the safety or efficacy of primaquine for this purpose is available only when primaquine is used with chloroquine. Such evidence is not available for its use with drugs such as doxycycline or atovaquone/proguanil (Malarone). The paper also makes a case for the use of primaquine for primary prophylaxis, as it kills early liver stages of both *P. falciparum* and *P. vivax* and avoids the formation of hypnozoites. It should not, however, be used in pregnancy and requires the establishment of the patient's G6PD status before use. Atovaquone/proguanil (Malarone) has been shown to have a similar effect in *P. falciparum* malaria but its effect against *P. vivax* has not been demonstrated. The author concludes that "Today and for the foreseeable future, primaquine is the only widely available drug offering good evidence of safety, tolerability and efficacy against primary infections of both *P. vivax* and *P. falciparum* during exposure, and against relapse of *P. vivax* in the months following exposure".

Comment: This is an important paper which gives a timely warning of the potential danger of *P. vivax* malaria, which received wisdom has long taught is a relatively benign illness. It also challenges received wisdom about malaria prophylaxis, which has been based largely on avoiding the risk of *P. falciparum* malaria by the use of suppressive chemotherapy which is effective only against the blood stages of malarial infection. Indeed, given the propensity of *P. vivax* to form hypnozoites in the liver, standard anti-malarial chemoprophylaxis could be said to do no more than postpone the onset of *P. vivax* malaria. We must ask ourselves whether the time has come to re-think our approach to the risk posed by *P. vivax* malaria and to its prophylaxis and treatment.

Pneumococcal Infection – Low Awareness as a Potential Barrier to Vaccination: Results of a European Survey.

Lode H, Ludwig E, Kassianos G. *Adv Ther* (2013). DOI 10.1007/s12325-013-0025-4

Elderly people and adults with chronic disease or compromised immunity are at increased risk of pneumococcal infection, yet vaccination rates remain low. The authors of this paper contacted 1300 primary care physicians and 926 specialists from 13 Western European countries, as well as members of the public over the age of 50 years, to assess their awareness of pneumococcal infection and their attitudes to vaccination. They found that in physicians that there was a high level awareness of pneumonia as a result of pneumococcal infection but a low level of awareness of invasive pneumococcal disease (50% in primary care physicians and 71% in specialists). Awareness of specific conditions amongst primary care physicians and specialists was 54% and 60% respectively for meningitis, and for sepsis/septicemia 25% and 36% respectively. Members of the public had a good perception of vaccination, with little fear for vaccines or their side effects. The main driver for vaccination was recommendation from a health care professional. The main factors regarding vaccination taken into account by health care professionals were the patient's health condition, recommendations by health authorities and tolerability of the vaccine.

Comment

It appears from this paper that both primary care physicians and specialists need to be made more aware of the serious risks of pneumococcal infection other than pneumonia. This is likely to make them more likely to recommend vaccination to patients in high risk groups, an important point, as physician recommendation is the single factor most likely to lead to increased uptake of pneumococcal vaccine.

Sun Exposure Behaviour and Protection: Recommendations for Travellers

Diaz, J. H. and Nesbitt, L. T. (2012), *Journal of Travel Medicine*. doi: 10.1111/j.1708-8305.2012.00667.x

Although there have been recent advances in the development of photoprotective clothing and broad-spectrum sunscreens, few peer-reviewed publications have focused on photoprotection recommendations for travellers. Internet search engines were queried with the key words as search terms to examine the latest references on photoprotection and the epidemiology of UV-associated skin cancers.

Observational studies have demonstrated that the public knows little about proper sunscreen protection, selection, and use, and often abuses sunscreens for

Journal Watch *continued*

intentional UV overexposures. Cohort studies have identified special populations at increased risks of UV-associated skin cancers without the proper use of sunscreens and photoprotective clothing including children, fair-skinned persons, patients taking photosensitizing drugs, and organ transplant recipients.

Recommended photoprotection strategies for travellers should include avoiding intense sunlight, wearing photoprotective clothing, wearing sunglasses, and selecting the right sunscreen for their skin type. Travel medicine practitioners should counsel travellers about photoprotection and encourage travellers to take advantage of recent advances in the development of more effective broad-spectrum sunscreens and photoprotective clothing for themselves and their children.

IBM

Risk Perception and Travellers

Leggat, P. A. and Franklin, R. (2013), *Journal of Travel Medicine*, 20: 1–2. doi: 10.1111/j.1708-8305.2012.00663.x

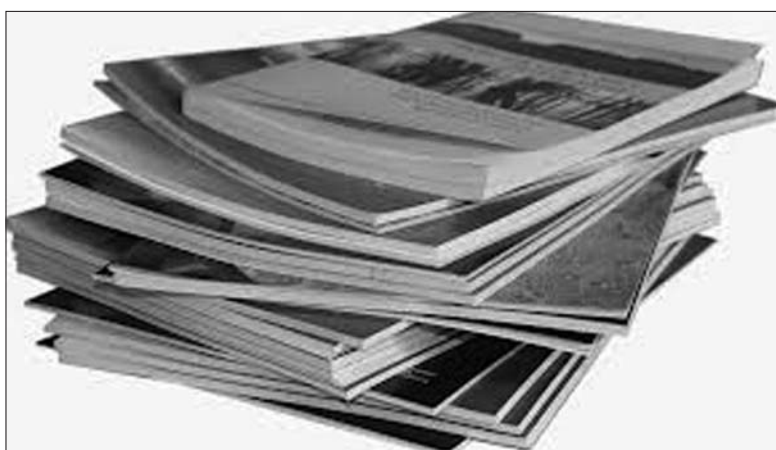
International travel can expose travellers to various risks to health, which depend on many factors including the destination and the person. Risk assessment usually involves an examination of the epidemiologi-

cal evidence, relevant policies, clinical considerations, and even travellers' responses and preferences. Judgments generally pervade any assessment of risk, including the definition of outcomes that matter, the breadth of the effects to be considered, and measures of consequences

A degree of uncertainty exists in the pre-travel risk assessment, which must also be managed. This is also compounded by travellers who may only know the general location where they are planning to visit. Travellers' responses to pre-travel advice are influenced by their perceptions of risk, familiarity and concerns about treatments, and the preferred risk management strategies. In risk perception, travellers may confound the likelihood and severity of outcomes, and also tend to be influenced by attributes of the hazard apart from its actual consequences: 'The severity of the threat,' their susceptibility to the threat, the risks, costs, and benefits of taking action, their own ability to successfully undertake the required action.

The study of risk, risk perception, and risk mitigation in travelers needs greater attention so that the clinician can provide advice that is both meaningful as well as impactful in ensuring safe travels.

IBM



In the News

PREGNANCY AND "BABYMOON."

A "babymoon" can be an excellent health boosting-break but pregnant travellers need to weigh up the benefits of a holiday versus the risks to the pregnancy from air travel and location-specific diseases. The main considerations are deep vein thrombosis (DVT) or lung clots and the possibility of miscarriage. Pregnant women with known clotting disorders are particularly at risk of DVT.

It is unwise to travel by plane within six weeks of an expected delivery date.

Very few cruise lines will let the pregnant travel with them if more than 23 weeks pregnant.

Pregnant women should avoid visits to malarial areas. Chloroquine and Paludrine in pregnancy, although better than nothing, do not give the same level of protection as other recommended drugs.

Pregnant women can have all the non live vaccines such as diphtheria, tetanus, polio (injected), hepatitis, typhoid (injected but not oral), meningitis and rabies, and currently they are advised to get the seasonal flu vaccine and the vaccine against whooping cough (the latter to protect the baby).

At the destination activities such as scuba diving, water skiing or parasailing should be avoided and women should be advised that heat stroke and dehydration can put the pregnancy at risk.

CRUISE SHIPS

Carnival Triumph was left drifting in the Gulf of Mexico after an engine room fire left it without power. It took a complex rescue operation to tow the boat into port. With no lights, no functioning lavatory and the smell of sewage permeating the ship, the Triumph reached shore four days later than planned. The engine room fire knocked out power, leaving 3,100 passengers to cope with unsanitary conditions.

Over the past 12 months, cruise industry bodies in North America and Europe have implemented new safety measures. For example, safety drills must be held before the ship sets sail rather than within 24 hours, as had previously been the case, and crew are now instructed to check cabins to make sure everyone attends. During manoeuvres, crew must be trained to lower a lifeboat when it is full of people, rather than empty, and extra life jackets must now be stored close to the ship's lifeboats, rather than solely in passengers' cabins. The life jacket policy applies to new ships only, so most lines have yet to stop the crazy practice of

sending passengers to their cabins to collect life jackets in the event of an emergency.

The issue hardest to address, highlighted by the marine insurer Allianz Global Corporate and Specialty (AGCS) in a report, is human error. The firm claims that this was the key factor last year in 75% of marine accidents, including the Concordia which sank killing several passengers.

Against expectations, confidence in cruising appears to have recovered. The number of British cruise passengers rose by two per cent last year to a record 1.72 million, according to the Passenger Shipping Association (PSA). Another two per cent rise is forecast for 2013.

AIR SAFETY

The producers of the documentary, *The Crash*, arranged for a Boeing 727 carrying cameras, sensors and crash-test dummies with breakable "bones" to be deliberately crashed into the Sonoran desert in Mexico. After hitting the ground, the front of the plane and the first 11 rows of seats were ripped off. A force of 12G was recorded in this section, falling to 6G farther back. Experts concluded that none of the plane's first class passengers would have survived, but 78 per cent of the other passengers would have, with their chances increasing if closer to the rear of the aircraft.

Popular Mechanics magazine analysed hundreds of crashes since 1971 and found passengers in the rear seats (behind the wing's trailing edge) were safest. The survival rate was 69 per cent as opposed to 56 per cent over the wing and 49 per cent at the front. The world's two biggest aircraft manufacturers insist that no conclusive evidence is available. The most common cause of injury on aircraft is when a plane is jolted by turbulence and passengers are wandering around the cabin, or not wearing a seat belt.

One government analysis of all 568 plane crashes in the United States between 1993 and 2000, involved 53,487 passengers and crew. Contrary to popular belief, the majority of plane crashes are survivable. statement is supported by a University of Greenwich study, which checked the accounts of 2,000 survivors in 105 accidents. Those sitting more than six rows from an exit were found to be far less likely to survive. The odds of being killed on a single flight are one in 4.7 million.

The Dreamliner

Boeing promised the Dreamliner would take the pain out of flying long haul. Technology in the seats senses

In the News *continued*

and counteracts turbulence, with Boeing predicting an eightfold reduction in the number of passengers experiencing motion sickness. An “electrochromic dimming system” means the windows can be electronically dimmed at the touch of a button, while the plane’s lighting system mimics the light of the day outside – supposedly reducing the effects of jet lag. The windows are bigger, and humidity and oxygen levels in the cabin are higher than usual. There’s also more headroom and more space for luggage. The advanced nature of the Dreamliner has led to repeated problems in the production process in scheduled flights. It has just returned to service after battery problems caused fire.

Air Travel and a weight problem

Samoa Air became the first airline to charge passengers according to their weight. Those flying on the South Pacific carrier, which largely operates domestic routes, must now pay one Samoan tala for each kilo that they, combined with their luggage, weigh.

DISABLED TRAVEL

Enable holidays (0871 222 4939; enableholidays.com), a travel company which specialises in finding accommodation for people with disabilities.

New Safety Rules are now in force on the high seas. P&O Cruises is threatened by a boycott from disabled passengers angered by new rules that say wheelchairs and mobility scooters must be stored inside cabins when not in use. Collapsible wheelchairs can be stored in any cabin, but scooter users need a disabled one with a wider door, or a suite or mini suite.

The policy came into force on P&O ships Oriana and Oceania in March and is being rolled out to others, including those of sister company Cunard. Fred Olsen Cruise Lines and Cruise & Maritime Voyages also require on-board wheelchair or scooter users to book a disabled cabin.

A safety review at the end of last year raised concerns that wheelchairs and scooters left in corridors block emergency escape routes. Too many scooters were being left outside cabins.

The decision complies with the American Disabilities Act (ADA), UK Equality Act 2010 and EU maritime passenger rights legislation brought in last December. There is now a limit on the number of scooters allowed, which varies according to the ship. Once all the disabled cabins, suites, and mini-suites have been filled, no more scooters, collapsible or not, will be allowed on board. Wheelchairs that fold away into a wardrobe will be allowed.

Ocean cruising may not be suitable for those with mobility problems because of issues related to going ashore, especially at tender ports.

HEALTH TOURISM

David Cameron’s campaign to tackle health tourism has been criticised. Earlier this year, Mr Cameron promised tighter controls to limit immigrants access, saying “what we have is a free National Health Service not a free International Health Service”. Jeremy Hunt, the Health Secretary, subsequently claimed that health tourism was costing the health service £200 million a year. However, figures released by the Department of Health showed that the NHS had written off bills worth only £11 million from foreign patients. A spokesman for the Department of Health said that the £11.5 million figure represented the “tip of the iceberg” because many overseas patients are using the NHS without being properly registered.

Under current rules, non-resident foreigners can use the NHS and their governments are supposed to repay the cost of care. However ministers say that poor enforcement has led to a surge in health tourism.

HEALTH INSURANCE

While EHIC holders are entitled to the same levels of medical treatment given to the citizens of the country they’re visiting, systems in place abroad don’t always operate in the same way as the UK’s National Health Service. Travel insurance, unlike the EHIC, can cover costs of emergency treatment at private medical centres and other high costs such as ambulance transfers, X-rays, laboratory tests and prescribed medications. FCO figures show that 21 per cent of over 55s who do take out insurance are willing to risk invalidating it by not declaring an existing medical condition. Fifteen per cent also say they wouldn’t update their policy if they developed a medical condition or were prescribed new drugs – again risking their policy cover.

Travel insurers are using “vague” small print and complicated terms and conditions to get out of paying. Which? Journal has warned of terms in the small print where the insured has to declare the pre-existing medical conditions of all close relations and “anyone upon whom the journey depends”.

SKIING

The chance of dying in a ski accident on piste remains remote. For every 1.4 million people who spend part or all of a day on the slopes, one death can be expected – and this includes those arising from natural causes. In Austria so far this season 2,333 skiers and

snowboarders have suffered injuries that required rescue, compared with 3,011 by the same period last winter. The number of deaths stands at 25, compared with 13 by this stage last year. However, conditions made for faster skiing in January and February than in the same period last year. The seasonal total is likely to even out at the average of about 40 deaths on piste. Each winter skiers in Austria alone make 555 million journeys by lift and consequent descents. Collisions with another skier or with a tree or pylon account for less than 10 per cent of all injuries, but they do happen.

Resorts must conform to strict safety standards and mark obstacles where they can – including providing padding and netting for snow cannons. The biggest problem is that modern equipment allows relatively novice skiers to go very fast and perhaps ski beyond their own level of ability. Advice is to make sure that children wear a helmet at all times. Back protectors are also sensible for children doing tricks in the snow park. Encourage all members of the family to ski within their capabilities.

YELLOW FEVER BOOSTERS

World Health Organisation (WHO) states that a single yellow fever vaccine offers lifelong immunity. A report by the Geneva based global health agency said that a booster every 10 years was no longer necessary because a single dose is able to offer “sustained immunity and lifelong protection” from the disease. A booster may remain an entry requirement in many countries for years to come. Yellow fever is the only remaining disease for which a formal international vaccination certificate requirement still exists. When cholera certificates were abolished by the WHO in 1973, it took 17 years for all countries to change their entry requirements.

ROAD TRAVEL

The Association of British Insurers (ABI) wants whiplash injury cases from RTAs dealt with by health professionals, as there are many spurious claims.

In the UK whiplash accounts for 70% of personal injuries:

- 44% in Germany
- 32% in Spain
- 3% in France

Claims have increased by 25% in 4 years despite decreasing number of road accidents.

TICK DISEASE

More than half of Britain's deer population needs to be culled every year because of the damage they do to the environment, scientists have warned. Although the deer population has never been measured, the ani-

mals are thought to number at least 1.5 million, and 50 to 60 per cent need to be shot each year just to keep the numbers from growing, experts said. Now Britain's six species are out of control, destroying woodland and ruining farmers' crops. They caused 14,000 road accidents last year, with 450 injured motorists – and eight deaths. Some species are even encroaching into urban areas in search of food. The animals bring their ticks with them which can bring health risk to the people they encounter.

BALLOONING

In Britain, ballooning is considered one of the safest of all airborne pursuits. Since the inception of commercial air balloon flying in the late eighties, about 2.5 million people have flown, and there has been just one death.

Recent incidents in Egypt have again led to the grounding of all flights there. They appear to have involved explosions. The British Association of Balloon Operators, pointed out that balloons in Britain are fuelled by propane gas –not readily available in other countries. “Ground crews in developing countries mix butane up with other things, which can be quite dangerous”.

EHIC PROBLEMS

The EC has threatened Spain with legal action because of increasing complaints from tourists that Spanish hospitals are refusing to provide emergency care to British tourists unless they pay. The hospitals are refusing to use the EHIC card and charging Britons when they are entitled to the same emergency service for free as Spanish citizens. In some cases patients have been told the EHIC card is not valid, or that they have to use travel health insurance cover. Others believed they were being treated under EHIC rules and then discovered a bill had been sent to the insurance company.

The wife of a case history patient who had an epileptic seizure was asked for evidence of travel insurance cover before her husband was taken to hospital by ambulance. The staff at the hospital waved aside the proffered EHIC card and charged emergency health care against the travel health insurance company. This practice seems quite wide spread and negates the reciprocal value of emergency care implicit in EU regulations.

Book Reviews

Virology – An illustrated colour text

Stephen Korsman, Gert van Zyl, Louise Nutt, Monique Anderson and Wolfgang Preiser.

Publisher:

Churchill Livingstone Elsevier

www.elsevierhealth.com

ISBN: 978-0-443-07367-0

Price: £31.99 At end of December 2012, found on Elsevier website discounted to £21.59

(<http://www.elsevierhealth.co.uk/product.jsp?isbn=9780443073670&navAction=jump&requestid=823031>)

Virology comes in a handsome 140-page book in the series of ICTs (Illustrated Colour Texts). This guarantees quality of presentation; well illustrated throughout, with drawings and photographs in colour, colour used on every page. The text is kept brief and to the point, with the majority of the topics covered in two facing pages – a very hard discipline to follow for any author.

This is one of the best books on virology I have ever come across. It is easily read with the information given distilled to the important points, yet so concise, comprehensive and accurate. I could have done with this book when I was training in my medical school, or when I was a junior doctor. Yet, even now after so many years in medicine, I found it a pleasure to read, to be able to revise on virology using such an attractive, down to the point book.

Its contents are well set out. After an introduction

on viruses, it goes on to discuss virus infection and viral disease, principles of viral diagnosis, prevention and treatment of viral infections. The next section is on specific viruses; DNA viruses, RNA viruses, and subviral agents. For each virus the reader gets information on the virus, epidemiology, pathogenesis, clinical picture, virological diagnosis, specific treatment, and prevention. There are colour figures, diagrams, and photographs of patients. The key points are summarised in a box. All this comes in no more than two pages of text for each virus.

If you are a medical or nursing student, a junior doctor, or a doctor or nurse in practice and you want to revise on virology, look no further. This is the book for you.

George Kassianos

Clinical Pharmacology and Therapeutics

GA Mackay, JL Reid, M Walters, 8th edition ISBN 978

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The popularity of this Lecture Notes book merits an 8th edition publication. Its title tends to belittle the value of contents of interest to a wide range of health professionals. It will sit beside MIMS in the GP surgery, be at hand for the prescribing nurse and be an aide memoire for pharmacist and trainer. Presented in easily accessible format, it provides a current review of drug prescribing over the major clinical conditions. Practical prescribing information can be easily assimilated and many topics are supplemented by case scenarios which question understanding and appropriateness of therapy. Summaries and tables make for quick reminder reading.

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