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The Secretary,
c/o Mina Sedani
De Montfort University
Leicester LE1 9BH
Tel: 0845 003 9197
Email: info@btha.org
Website: www.btha.org

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Editorial Sub-committee:
I McIntosh, J Gallagher,
J Wilson-Howarth.

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Editorial

These are challenging times for the individual, associations and charities. Many associations like the BGTHA face financial constraints as sponsors meet budgetary burdens and rein in their largesse. There has been an impact on personal world travel, with about a 10% decrease in air travel from the UK reflecting the tightening of business and family budgets. Travel health clinics, pharmacies and drug companies are affected by these changing circumstances. The discipline is also widening interests and remit, with greater emphasis on health care in the global context. Tourists now travel to the most remote and exotic destinations and in emergency are exposed to the limitations of health care in these locations. Quality and availability of local facilities can determine whether the ill or injured traveller is treated well and these have to be concerns for our association. With that in mind, and your acquiescence, we are adding "Global" to the BGTHA name. The journal since its inception has always reflected the global aspect of international travel health care.

Your executive committee has been zealously exploring new sources to fund the associations many activities and new avenues of endeavour in this changing world scene. Web access to information is advantageous to members and brings monetary saving to the BGTHA. Travelwise will become an electronic publication in 2012. We hope to expand its content and frequency, but this will as always depend upon members' willingness to provide support with articles and comment.

The Journal will continue its twice yearly appearance in traditional format, as many member still prefer to peruse paper copy and retain journals for later reference. Our publications depend upon members input and as always, I encourage you to send us case histories, comment and articles. If these publications fail the fault will not lie with your hard working, committed editors, for issues are dependent upon the willingness of each member to be actively involved. The publications provide a rare opportunity for budding authors and novice writers to get into print. BGTHA Membership has to be a two way process of give and take, of privilege and responsibility. The committee provides ever more resources for members, but for the association to continue to thrive, we need each member to give a little in return. Consider whether you can meet this obligation by contributing to the journal or Travelwise in this new year. May you all meet with success and prosperity in 2012.

Iain B. McIntosh, Editor in Chief. BGTHA Publications.

Report from the Chair

Welcome to a further excellent edition of the BTHA Journal. I have decided to change the format of the letter from the Chair to hopefully allow easier reading of what has been happening with the Association over the last 6 months. On behalf of the Executive Committee I would like to thank all members who have offered help and input over the past year and would urge other members to consider playing a more active role in the Association by participating in one of the many sub committees. Travel and Global Medicine remains a small speciality on a UK basis and it is important that we present a strong voice and have an active Association to support that voice.

Administration: The Executive Committee proposed at the AGM, a name change to Association. The Executive Committee felt this name change would more represent the actual work the Association and its members were undertaking. The motion to change the name to the British Global and Travel Health Association was accepted unanimously at the 2011 AGM. The Committee expect this process to take up to 18 months to complete. The secretariat was changed from Mrs Diane Jones based in Sale Manchester to Ms Mina Sedani, at De Monteforte University, Leister.

It was decided that Liability Insurance for the Executive Committee and the Association should be sought. We await the final quote for this. Once Liability Insurance is established the On line Forum can be opened to the Membership. Wylie and Bisset, specialist charity accountants based in Glasgow continue to be the Accountants for the Charity.

Activities: The Global Health Out reach Programme was established in June 2011. This will allow members to use the BGTHA charity number to receive donations in the UK that they then wish to take abroad to areas of need. Members are aware that in using this programme the BGTHA takes no responsibility for delivery of the donations to areas of need and can provide no financial help to members who utilise this programme. It will however allow Members to gain access to donations from UK donors who need a UK Registered Charity to make the donation to. For further information about this programme please email Mina at info@btha.org

The Annual Conference was held at the London School of Hygiene and Tropical Medicine. The Conference theme was Travel Health from the Global prospective, and delegates enjoyed a very successful day. The BGTHA was delighted to have Professor Louis Loutan from Geneva to give the key note lecture. This lecture was kindly sponsored by the ISTM .

Publications: The Association continues to produce 4 newsletters per year and 2 scientific journals. These are distributed to all current members.

Membership: Membership has remained stable. The Committee have made cleaning up the membership database a priority. Lapsed members have been removed from the mailing list. Student members receive publications in electronic format only.

Fellowships: Mrs Fiona Genasi, Nurse Consultant Travel Medicine, Health Protection Scotland, and current President of the ISTM, was appointed as a Fellow of the BGTHA.

Julie M C Gallagher

Accidental Trauma and the Vacationer

I Mackay

World travellers are more likely to suffer a traumatic incident than an infectious disease, (excluding diarrhoea), a fact not always appreciated by health advisors, or the public. Most travellers believe that infectious disease is the most likely hazard to health while travelling abroad. In terms of chronic morbidity, trauma is a more likely occurrence.[1]

Road traffic accidents are one of the leading causes of mortality in travellers. Greater awareness of this particular hazard might ensure that more of the travelling public take sensible safety precautions in their journeys abroad. Overwhelmed by the impact of new cultures, unaware that safety regulations and legislation may fall far short of those at home, and carried away by holiday euphoria or over-indulgence in alcohol, or drugs, many people fail to practise simple measures of personal safety when overseas. Accidents cause more than20% of all deaths among overseas travellers.28% of these are due to road traffic accidents (RTA) and many more people are injured. Compared to the UK, the chance of vehicle accident doubles in near Europe and triples in Greece and Portugal.[2]

While conventional measures to protect against disease are important, more emphasis ought to be put on the traumatic dangers to health by travel health clinics and health promotion staff, when advising the traveller. Advice on accident prevention tends to be neglected, yet it has the potential for reducing morbidity and mortality. Victims of accidental trauma often require expensive evacuation to return them home and then they place a heavy burden on health service resources People should be encouraged to maintain the same and ideally, more rigorous safety measures abroad, as in the home environment. In a review of pathologies requiring medical evacuation, road traffic accidents (RTAs) were the most common cause.[3] In 1369 consecutive medical problems advised by foreign travellers, 30.9% were due to trauma of varying severity and only 1.7% involved tropical or exotic infections. The main presenting features were predominantly falls, sports injuries and RTAs. and a survey of medically-assisted repatriated travellers found that in 40.5% of cases the pathology was due to trauma.[4]

In launching the Campaign of Action for Road Safety, 2011,the UN commission reported that road related trauma is the biggest killer of young people world wide.[5] The RAC Foundation found that teenagers and males in particular, are most at risk with 42 deaths per million of the general population per annum. Young males have an even higher rate of 127 per million.[6]

Accidents are a major source of avoidable disability and death for UK travellers, especially in those under 30 years of age. Risk is diminished by safety measures such as safety belts, motor cycle helmets, annual vehicle roadworthiness tests, and improved vehicle safety design and inflation bags. Many of these preventive measures do not exist in countries frequented by tourists and businessmen. A third of British traffic also travels on motorways which are safer than non-segregated traffic routes.

There is a considerably greater risk of RTA in many regions abroad, especially those that are economically undeveloped with poor quality and heavily congested roadways Developing countries often have no motorways or separated traffic lanes and have 20 times more traffic accidents per mile than in the developed world.. Death rates for motor vehicle crashes per 10000 vehicles are 2-3 for many West European countries and the USA, 28 for Mexico and 54 for Guatemala.[7]

Increased trauma risk for travellers is due to:

- Inadequate, or unenforced legislation
- Unpoliced road and vehicle regulations
- Unfamiliar, hazardous environments
- Absent or poor health and safety regulations
- Narrow, truck-congested routes
- Poorly maintained, poorly engineered roads
- Poorly maintained roads
- Proliferation of bicycles, animals and pedestrians
- Unmarked, unlit, unmade roads
- Ancient vehicles without safety devices and routine checks for road worthiness
- Unlicensed, untested drivers and those under influence of alcohol/drugs
- Hired vehicles'[8]

Traffic accidents in foreign countries are an important cause of death for Peace Corps volunteers and American Missionaries.[9] Dutch workers in developing countries have a mortality rate double the population living in Holland, with traffic accidents a principal cause When adjustment is made for number of registered vehicles the RTA fatality rate in developing countries is much higher than in developed countries. A greater proportion of pedestrians is involved in these countries compared with the developed world, where the greater proportion of injuries deaths occur to vehicle occupants. Drivers are often young, inexperienced males, with a cavalier attitude to their vulnerability.

Many underdeveloped countries are undergoing very rapid industrialisation and motorisation goes with it. Where motors, cycles animals pedestrians intermix, there is traffic chaos and injury,In China and Asia motor vehicle registrations are growing at a phenomenal rate. The number of road deaths in China and India is over 50,000 per year per country with road trauma a major cause of fatality.

Accidental Trauma and the Vacationer *continued*

Tourists in deluxe coaches are not insulated from traffic frenzy commonplace in Beijing, Delhi, Cairo, Istanbul, Lima and many of the world's capitals or on rural byways where camel and donkey traffic may reign supreme. These cities attract the vacationer intent on seeing the world. Coach drivers can be unskilled, overworked, on drugs or under the influence of drink..

Case Histories

1 A tour group was driven in a coach along the narrow, truck-congested road between Istanbul and the Mediterranean,by a driver who had been driving constantly for 10 hours by the time he picked the passengers up. He was high on hashish and insisted on driving with his feet on the steering wheel, until forcibly removed from his seat by terrified passengers.
2 A tourist coach driver in Nicaragua had been quietly imbibing alcohol over the lunch break. His performance on the road in the afternoon was erratic and accompanied by frenzied bursts of singing and waving his hands in the air. He failed to negotiate a turning and the bus smashed into a bridge, injuring some of the passengers.
3 An fear provoking journey occurred in Bhutan, which is still creating its first roads and has few cars and very young drivers. The latter vie with one another in death defying journeys along precipitous narrow roads. One tour group driver endeavoured to emulate fellow drivers who had squeezed past an Indian army munitions convoy. He underestimated the gap between a truck full of ammunition and nearly blew up his vehicle as it scraped the length of the truck. Sparks flew into the air as metal smashed on metal, until he hit a large boulder and came to an abrupt stop. Passengers' remonstrations to the tour organiser, conditioned to reckless driving, only brought an amused, uncaring, response.

Many travellers have a cavalier attitude to their vulnerability regarding road travel while overseas, which is unrealistic in terms of risk, and all the more remarkable in terms of admitted travel fears to another transport mode-air travel. Perceived risk may not be the same as actual risk.In a large survey few people stated that they had worries about road travel while abroad. Twenty per cent, admitted to considerable anxieties experienced about flying.[10] Yet flying is a remarkably safe form of transport with only one accident reported per half million flights. According to Trevarthen being killed in an RTA is 1000 times more likely than in a flying accident.

Compared with being in an air-travel accident, the traveller is:

- Four times more likely to have a chance accident
- Eight times more likely to suffer mishap while out walking
- Eight times more likely to be involved in a boating incident
- Ten times more likely to have an accident at work[11]

High risk Groups

Children using bicycles, **young adults** hiring motorcycles, mopeds, scooters and bicycles have high accident rates and **the elderly** are also at particular risk. Older drivers find it more difficult to judge speed, intentions and directions of other road users and are more likely to have problems with a change of environment. About 21% of all car drivers killed on the road in UK are over 60 years of age.[8] The risk of fatality or serious injury increases with older age.[9] Young adults are more likely to drive under the influence of drink while abroad, are less likely to wear helmets on bicycles or motor bicycles while overseas and often fail to check the roadworthiness of hired vehicles. Smaller children unaccustomed to different road rules and at play are also more likely to become casualties in unfamiliar surroundings. Those who become involved in sports activities while abroad are at high risk. In many parts of the developing world client safety is ill considered by watersport, climbing, bungee jumping, para gliding and quad biking agencies. Safety precautions are absent, not considered, or ignored.

A new form of individual vacationer transport, the personal Skegway machine, is a dangerous platform for the unsteady, the elderly and those with poor balance.[12] The Segway PT is a two-wheeled, self-balancing transportation machine. Computers and motors in the base of the device keep the Segway PT upright. A user commands the Segway to go forward by shifting weight forward on the platform, and backward by shifting weight backward.These are an attractive mode of transport for older travellers with a reluctance to walk very far.They can do 12 miles per hour and are appearing in many holiday resorts overseas, without sufficient attention being paid to pedestrian safety. Injuries and deaths can be a price to be pay for innovation.[13]

Emergency aid response

If an RTA involves the individual abroad, they may be fortunate enough to be treated promptly by doctors or paramedics and be whisked to an emergency unit with intensive care back-up. Even in developed parts of Europe and North America however, good trauma care systems may be some distance away however Geography and location can present obstacles to the speediness and quality of care rendered to the injured.[8] In many parts of the world, emergency medical aid is far from immediate. A European was badly injured in a RTA in the hinterland of Jamaica.

Transport to a distant clinic with emergency facilities was only possible after an unwilling passing taxi driver was paid detour across the island.

Travel health insurance cover is only partly protective. It is only as good as the proximity of facilities, their quality and that of their staff. In many parts of the world hospitals can be distant and lacking in equipment, medication and trained staff. Blood for transfusion may not be available or, if stored, may be suspect in terms of HIV infection. Reusable needles and giving-sets are at a premium and a badly injured RTA victim is in no position to oversee the quality of care, sterility of equipment and blood products.

Recommendations

- Travel clinic personnel should advise on the risks of and from, trauma while people are abroad.
- Provision of simple advice and instructional leaflets may save lives and morbidity.
- Gap year students, teenagers and young male and elderly travellers should be specifically targeted

Health Professional Advice should cover

- Identification of risk,
- Risk assessment,
- Evacuation
- Proximity of emergency facilities,
- Quality of care,
- Repatriation
- Travel health insurance protection

Recommendations for travellers

- Hire roadworthy vehicles
- Hire vehicles with safety features such as seatbelts and child seat restraints and check efficacy
- Wear helmets on scooters , motor bikes and Skegways
- Avoid of driving on unlit, unmade roads after dark in developing countries
- Consider hazards related to blood transfusions while overseas
- Remember paucity of proximal casualty facilities in many areas.
- Consider that holiday locations lack first aid equipment and trained d staff to deal with RTAs
- Keep in mind dangers of driving when suffering from jet lag and under the influence of alcohol
- Personally check equipment to be used in sporting activities away from home

Summary

Travel affected trauma brings mortality, morbidity and returning travellers who can be a burden on health resources . The travel industry and travel clinic personnel should ensure that tourists and businessmen are aware of traumatic risk and encourage world travellers to be proactive in pursuance of personal safety. Exhortations to travel safely may save more lives than prevention of infection while people are abroad.Educational effort by travel health professional working in travel clinics and with the travelling public can help to address the distorted individual awareness of risk and vulnerability. High-risk groups should be targeted for special advice about RTApossibility while abroad.

Ian Mackay is a former gp. and repatriation physician,with a special interest in risk assessment.

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The Health of the Older World Traveller (Part VI)

Psychological Aspects of Global Travel and Older People

I B McIntosh

Global travel is part of life style for many older people. A sizeable proportion of the population however, both old and young, are fearful of travelling by air, under and over water, a prerequisite for those departing from Britain. The phobic may exhibit avoidance behaviour and refuse to contemplate leaving the UK to the disadvantage of spouse and partner. Recent climatic, terrorist and financial events have made all forms of transportation a more worrying experience adding to common fears of travel in a ship, aircraft, or through a long tunnel.

Realistic concerns about aeroplane mechanical failure do not now predominate as in early days of aircraft travel, but recent well publicised events have enhanced worries about this mode of transportation. The financial recession has resulted in airline economies bringing decline in customer care and failure to address passenger's legitimate anxieties regarding airport congestion, luggage loss, flight delays, cancellations and rerouting.

Air travel is regarded as the most dangerous and anxiety provoking travel option by the general public.[1] Flight anxiety is an emotional state of worry triggered by an appreciation of risks usually disproportionate to the actual risks involved in air travel. Recent media reports of thousands of travellers marooned for days in airports in Britain and Europe has altered public perception of risk relating to air transportation and focused it on airports.

Terminal 5 shambles brings chaos

▶ Baggage failures ▶ Passengers stranded ▶ Flights cancelled

Phenomenal loss of luggage, cancelled flights, rerouting and stranding has however brought anxieties about this travel mode more in line with the proportionate risk of an unwanted event occurring to the traveller. Paradoxically as the risk of mechanical aeroplane failure and physical danger has waned the likelihood of major psychological trauma in air travel has increased markedly. Major delays, prolonged waits in packed airline lounges, vast queues in airports and the uncertainty of arrival and departure have impacted on the public psyche. Land and sea transport has not been exempted from weather and terrorist anomalies, with passengers marooned on motorways and rail lines and in terminals.

These events are bringing behavioural change, particularly in seniors. The old are more psychologically vulnerable to uncontrolled situations. Common features of old age such as indecisiveness, slower problem solving, inflexibility in purpose, poorer memory and cognitive decline aggravate personal reaction to the frenzied environment in airports and rail stations, when all onward movement abruptly ceases. Pre-flight worries and anxieties are added to the concerns older travellers have of actually flying. Their cumulative effect can promote tension and angst with the psychological effects resulting in adverse physiological responses, cardiac stress and possible heart attack and stroke.

There has been a fall in air travel in 2010 disproportionate to that relating to financial recession. Saga travel, an operator specialising in elderly travel, reports a coinciding increase in passengers seeking to avoid the fly part of the cruise experience by use of UK ports for arrival and departure. The Passenger Shipping Association reports that 650,000 passengers shunned airports and set sail from a UK port in 2010, 10% more than in the previous year. Older people who are not time-pressurised like the young, are avoiding potentially stress-provoking airports.

Older people also often have a wealth of travel experience of adverse events relating to air travel which may generate fears and anxieties, not affecting the phlegmatic young with less exposure to air travel and unaware of potential travel problems. Younger people are more likely to consider adversity an adventure.

Flight anxiety is one of the most debilitating experiences for air travellers. Flight anxieties are common phenomena observed in 10-40 % of air travellers dependent on pre-flight and in-flight situations.[2] This proportion is likely to have increased with the deleterious change in the pre-flight experience and terrorist threat to aircraft. They can result in undesirable consequences. Flight anxiety may predispose passengers to stress-related illnesses and cardiological problems, which may result in-flight emergencies.[3] Apart from potential health damaging effects, it may have an adverse effect on social interaction.[4] Stress of air travel has been found to disrupt passengers' behaviour.[5] Stressed and anxious passengers may become more demanding, dissatisfied and easily agitated in communication with the crew or other passengers. Fatigued and overwrought they can exhibit disruptive behaviour ranging from verbal aggression to severe physical aggression.

Air transport related anxieties may be enhanced in anxiety prone personalities, the vulnerable old and be affected by cultural values and external environmental influences.[6] All shape the subjectively experienced cognitive and emotional impact of the overall flying experience. Airport environments and flights often pose novel situations where personal control is limited and bureaucracy, overt and covert regulation and rules add to frustrations.[7] Attribution of blame and satisfactory redress from front line staff, which might diffuse build-up of stress rarely occurs, as they too have scant control over the predicament. The air travelling public people are reacting to these psychological pressures by changes in behaviour, belatedly being recognised by the transport industry.

Travel related stress in older travellers starts before departure with change from home- established routines. The land journey can be affected by adverse road/rail conditions and the traveller can be stressed by time of arrival at the departure terminal. Stress mounts incrementally with progression through airport security, now a major source of psychological disturbance for passengers. There is invasion of individual privacy with potential embarrassment on the luggage search, enforced taking off of shoes, belts and body frisking. Authoritarian demands of security staff are objectionable and the process an unwelcome reminder that the aeroplane may be blown–up in en route. Restriction on hand luggage is an additive irritant for most travellers, adding to the increasing frustration engendered by passage to the aeroplane. The passenger has been reduced to a mere seat number in an uncaring bureaucratic process.

Communication failures are tension-causing when systems collapse under overload. The procedural process is annoying, diminishing and demeaning and added to inevitable flight delays and failures, continued frustration brings increasing stress, tension and aberrant behaviour in airport or the air and physiological change which may endanger health.[6]

In a study undertaken at Heathrow airport in 2007, passengers had heart and finger monitors fitted to record blood pressure and pulse rate while in the airport en- route to flight departure. Skin conductance-a reliable measure of stress- was also measured. Readings were correlated with the amount of psychological stress they experienced.[7]

Passengers passing through the airport, who were healthy and not exercising, showed monitored stress levels equivalent to on-duty riot police. During the test, there were marked physiological changes. ECG and BP monitors showed immediate and sustained changes:-Within minutes of entering the terminal, heart rates had increased from 55 beats per minute to over 70 per minute in the non-exercising state.

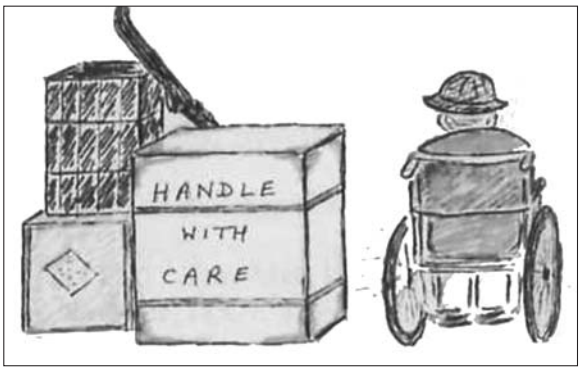
In the average 4 hours it took to board the aircraft, rates continued to rise to more than 200 beats per minute in transit with a rise also occurring in blood pressure.

Queues at check-in and security increased blood pressure levels from average of 123/81 mm Hg to 170/99mm Hg. There was a marked increase in skin conductance with a rise 100 times that in a relaxed state. Associated stress levels peaked four times but were sustained at a high level overall.

Causes of peaking were queues, unfriendly, unhelpful staff, lack of or misinformation.

Monitoring on the return journey revealed that return transit through the air port was almost as stressful as departure, primarily because of queues at immigration, security channels and lost luggage.

A similar study on passengers travelling by, road and train confirmed the stress felt by delayed passengers. Pulse rate of train passengers increased with the queue for departure and while the train was in the Channel tunnel. Car drivers were stressed on boarding the ferry and adapting to foreign driving. Only coach passenger remained relaxed during travel.[8]



A study of 1009 passengers transiting an airport reported that 69% stated that rude staff were a contributory problem to stress with 52% considering this a major cause of travel related stress.[9] Behavioural responses are also evident with 42% of travellers admitting to repeatedly checking travel documents prior to the flight and international journey, with these obsessive compulsive tendencies greater in women. A third admit they check passports at least five times from arrival at the departure point to boarding, although they do not normally exhibit obsessive behaviour.

Coping strategies for Air Travel Anxieties

Half of all worried travellers do nothing to minimise their anxieties. Many admit behavioral responses.[10]

Several coping strategies are adopted by passengers for air-travel worries:

- 9% avoid flying if possible
- 16% use relaxation and distraction techniques
- 13% use alcohol drinking for relaxation in flight
- 6% resort to sedatives

Virgin Atlantic now offers in-flight audio medita-

Psychological Aspects of Global Travel and Older People *continued*

tion programmes with tips on relaxation from a psychotherapist to help diminish passenger stress. Many travellers resort to cognitive strategies to diminish and deal with the travel experience and affluent older passengers particularly can reduce the effect of adverse circumstances by travelling in first class.[11]

Coping strategies or mechanisms are thinking patterns and cognitive frameworks that individuals use when stressed and aroused, in order to regulate their emotional state and alleviate anxieties Passengers distract themselves by reading, writing, utilising relaxation techniques or other activity which directs attention from flight or pre-flight experience. Music listening can induce calmness. Alcohol, smoking and tranquilliser pills are also used to handle stress.

Younger air travellers are most likely to minimise the seriousness of their flight experience, reflect on personal fears and anxieties over flying and remind themselves of pleasant experience, either relevant or irrelevant to the flight situation, as strategies to cope with current distress. Insistently thinking about the risks of flying,picturing the worst possible scenario to minimise one's fear and blaming other people are the least frequently utilised strategies. However many older people admitted to brooding over worst scene scenarios as day of departure approached.[10]

New coping strategies are being developed in passengers exposed to airport environmental challenge, but they are however limited in potential adaptation manoeuvres. Weight restrictions limit food, drink and pastimes to be taken airside to ameliorate prolonged waiting and make it almost impossible to prepare for prolonged delay or a night or two spent on a departure lounge floor. Maladaptation results in aggressive behaviour and has brought a resultant increase in reported police intervention at major airports.[12]

Passengers are now adopting the classical response to potential stressful situations – avoidance. They are seeking alternative means of reaching destinations. Long distance train companies report increased business with more well used and more trains. Ferry companies to the continent are attracting more travellers. The cruise lines diligently survey regular and potential passengers and they report an increasing demand for UK port to port cruises. The arrival of fly cruising 20 years ago had driven these from the scene, but they are regaining popularity.

Intending passengers approach health professionals for anxiolytics and sleeping pills to reduce travel anxieties but their prescription should be resisted. The latter may result in deep vein thrombosis on long flights due to limb immobility and cognitive behavioural techniques are advised rather than anxiolytics in older people who may already be on other drug medication and risk adverse drug interaction.[13]

The travel health professional should have an understanding of passengers' subjective experiences and anxieties over flying and the use of coping strategies. Adequate knowledge on psychological aspects of air travel and specifics of worry experience, along with anxiety provoking situations should inform management and direct pretravel advice to minimise psychological and physiological stress.

Coping strategies for air travellers

Use alternatives to air transport when possible.
Book into airline courtesy lounges.
Travel in best affordable class.
Book into local hotel accommodation, the night prior to departure.
Assume delay and take reading material, games, emergency food and water, a ground sheet and small pillow.
Avoid air travel in winter, the strike season and round public holidays.

Travel related phobias

Flying phobias and fear of tunnels are common and affect old and young. They can inhibit sufferers from undertaking global travel. With good management, disabling fear, disturbed conditioned responses and frantic avoidance behaviour can be replaced by rational activity.

Anticipation, apprehension, fear and phobia

Typically, the older phobic presents to the family doctor a few days before a long planned flight, traverse of the Channel Tunnel or ship passage to a popular holiday resort. Months previously the family have convinced grandmum or dad that they can overcome reluctance to fly or sail and the vacation is arranged. As the time for departure draws ever closer, apprehension increases with anticipation and shortly before the dread day it becomes apparent to the patient that he or she cannot face the perceived ordeals of an air, sea or tunnel passage. An acute anxiety state results which reaches crisis proportions as the family becomes teed up for departure. This presents as a specific phobia which may be associated with panic reaction.[14]

The majority of phobics appear to be women although women may be more likely to report their fears that men. Travel phobias represented 2.81 per cent of phobias reported by women in surveys.[15,16] In a

10 per cent random sample of 7,074 patients in general practice based on a structured questionnaire listing 13 common fear-provoking objects or situations, 16 per cent admitted to having a phobia and 13 percent of this sub-group reported fear of flying with a female to male preponderance of 2:1.[17]

Disproportionate reaction

Fear is of course a normal and essential condition for everyday living. It is a response to a real or imagined threat with a behavioural element which is often pronounced. Minor fears are within the cultural norm and there is a continuum between mild and intense fears with the latter usually described as phobia. This is considered *a morbid response disproportionate to the causative stimulus.* Sufferers often structure their lives to avoid fear-provoking situations.

In a **Phobia:**
The degree of anxiety and fear is:
out of all proportion to evoking situation.
cannot be explained or reasoned away.
beyond voluntary control.
leads to avoidance.

Definition

The phobic reaction is totally out of proportion to the situational trigger, is involuntary and cannot be explained or reasoned away by the individual involved. It leads to incapacitating avoidance behaviour and it is likely that there are many more people with flying phobias than the statistics suggest, as most simply avoid any likelihood of exposure to air travel. Those with such a condition have an irrational, uncontrollable fear resulting in avoidance behaviour which may disturb their lifestyle.

To understand the phobic's reactions one has to consider the cognitive, physiological and behavioural components involved. The *psychic element* appears as overt anxiety and an exaggerated arousal response when exposed to the feared situation or even consideration of exposure, e.g. as the day of the dreaded flight draws closer. The *physiological response* results in a sweating, tremulous, palpitating and breathless patient with assorted pains from muscle tension. The primeval fight or flight reflexes poorly prepared such people for today's flight demands. *Avoiding behaviour* by the travelling executive or salesman, or the housewife's refusal to contemplate air travel thus depriving her family of a holiday in the sun, introduces a *social element* which often finally forces the patient to seek professional help.

The phobic cycle is open to curative intervention at three levels through different components.

Relaxation can be taught to control physical symptoms.

Cognitive therapy helps control and change fear-provoking thoughts.

Exposure treatment can help overcome the restrictions in lifestyle.

In most cases it is not known how a phobia has developed. Sometimes there is a clear cut trigger such as an unhappy incident occurring on a flight or to an aircraft before or after travel. Some are simply conditioned fear reactions. It is likely that we are more genetically predisposed to make fearful links with some situations and objects than with others; as humans we are phylogenetically prepared to learn certain stimulus responses than alternatives. A Freudian approach to the condition would accept that, when someone shows fear of something he knows to be harmless, then the phobic object or situation is associated with or symbolises something else that is genuinely dangerous. Freud believed that the inner conflict in such a case is then repressed and repressive aspects of it are displaced on to alternative external objects symbolising the repressed complex.

Components occurring in phobic states
Cognitive element – person is subjectively afraid
Behavioural response – avoidance of feared situation
Physiological Manifestation – tachycardia;
hyperventilation which often lead to:
A social component – disruption of normal living

Therapeutic approach

Given time, therapy can usually bring alleviation of symptoms and cure and, even at the eleventh hour, patients can be helped towards and along the frightening path from airport to aircraft and on with the flight. A phobia specific to flying can be dealt with most easily but air travel involves more than boarding the aeroplane. Crowded departure lounges will disturb the agoraphobic, the closed inescapable environment of the jet-liner frightens those with a fear of closed spaces, climbing the steps to the doorway of a jumbo jet towering above will upset those with a fear of heights, and the necessity to eat in public will give anxiety to those with a social phobia. All these possibilities must be kept in mind when preparing to treat the patient who wants to make the feared flight and the even more dreaded return.

Approached at the last moment a harassed family physician, battling through a busy surgery, will probably reach for the prescription pad and prescribe a tranquilliser. This hurried response might get the patient on to the aeroplane where, with the added boost of recourse to in-flight duty free alcohol, the flight might just be made tolerable. The prescribed drug does nothing to cure the underlying condition, however, and merely treats the symptoms with the risk of initiating dependence upon anxiolytic drug therapy. Other therapies are available which can usually cure the patient. When drugs are used they ought to be prescribed for the very short term.

Benzodiazepines[18] are givem for general anxiety,

Psychological Aspects of Global Travel and Older People *continued*

with higher dosage in anticipation of the phobic event, and the patient advised to refrain from taking alcohol or a hypnotic on the flight. Beta-blockers are used to control peripheral sympathetic responses such as palpitations. In entrenched agoraphobia with travel phobic manifestations there is some evidence that clomipramine has an antiphobic effect but it has to be given in high dosages. Any anti-depressant may well lift a specific phobia which has been a symptom of an underlying depression.

Behaviour modification

Given time before the need to travel, behaviour modification is widely used in clinics to treat phobics.[19] The principal is to expose the patient to the situation which causes distress until he gets used to it and attempts are then made to extinguish the fear by relating it to a pattern of response which provokes no anxiety. The problem behaviour needs detailed study in order to arrive at a hypothesis about its genesis and identify appropriate intervention.

Desensitisation[19] consists of ***two features; muscle relaxation and reduction of anxiety and the construction of a graded hierarchy of aversive stimuli*** from information provided by the patient. Such a hierarchy for a flying phobia would consist of arrival at the airport, proceeding to the departure lounge, walking on to the plane, experiencing take-off and landing. The hierarchy can be presented to the patient, either in imagery or in reality, and film and tape recordings can be used effectively in desensitisation. Treatment can be assisted by vicarious or participant modelling. Here the therapist approaches the feared object or situation and demonstrates his confident response to it before asking the patient to do likewise. This procedure has three functions; the model encourages new patterns of behaviour to be adopted, unnecessary responses are inhibited or disinhibited and the expression of already established responses can be facilitated.

Desensitisation works well with social and specific phobias and British Airways and several universities and hospitals have run courses for phobic travellers with success. These often culminate in a short flight round the local town to demonstrate to the sufferer that the phobia has been extinguished. The disadvantage is that the process is time-consuming and often requires many sessions. Desensitisation can be carried out, however, with minimal therapist contact using tape recordings and book instruction on relaxation and desensitization procedures.

The use of hypnosis for phobias[20] borrows both from behaviour modification and desensitization but therapy is facilitated by induction of a trance state.

Teaching the patient auto-hypnosis, whereby at a coded signal he can recreate the relaxed state acquired at earlier sessions, decreases the risk of dependence and diminishes the time required for therapy. Graded desensitisation and flooding are both practicable within the trance states and visual imagery and vicarious modeling can also be used. A modified flooding technique is used and it is very effective for specific phobias such as flying.[21]

One of my patients, who had patiently built up his business, had a unique opportunity presented to his firm for advancement and profit in the Far East, but he had long had a phobia for air travel. Unable to resist the opportunity for expansion he made his plans, bought his tickets, and the day before departure succumbed to panic and terror at the thought of many hours incarcerated in an aircraft. In the surgery he was in a state of agitation but refused to consider a drug prescription as he wished to be mentally fit for tough business negotiations upon arrival in Hong Kong.

He accepted the offer of hypnotherapy with alacrity and, providing to be good subject, was quickly in a trance and relaxed. Soon he was able to create a visual image of himself boarding and sitting in the aeroplane and, with continued suggestion of calmness, muscle and mind relaxation and freedom from tension, he was able to fantasise himself through a prolonged exposure to the feared situation. Given post-hypnotic suggestions that he would remain calm throughout the flight, and that the standard pre-take off and recorded music would relax him, he went off to make a successful return flight and business deal. Even when the jet-liner was buffeted badly by turbulence and suddenly dropped 500 feet, with the dramatic appearance of personal passenger oxygen masks from their overhead stowage, he was able to keep calm. Now after a decade and many air trips he remains undisturbed by his once disabling phobia.

"Gentle words, quite words are after all the most powerful words. They are more convincing, more compelling, more prevailing and successful," an elderly lady wrote to me on return from her first successful air trip after years of phobic avoidance. However the removal of psychosomatic symptoms before the patient is ready, and has built up more socially satisfactory defences, can precipitate more serious difficulties and therapists have to keep this in mind. It seems likely, however, that desensitisation can be carried out with little therapist contact using tape recordings to carry out relaxation and desensitisation procedures, and these are certainly a useful adjuvant in desensitisation and hypnotherapy. Book and computer instruction courses offering graded and detailed programmes of relaxation and exposure are available, and have proved of value to many phobics.

Conclusion

Although phobias of air travel and flying are common and likely to become more prevalent, the phobic air traveller need not despair as there are thriving phobic societies and several books and many therapists available to proffer support and guidance. With good man-

agement, the disabling fear, disturbed conditioned responses and frantic avoidance behaviour can be replaced by rational activity and more normal, socially acceptable reactions and conditioned responses.

BEHAVIOURAL DISTURBANCE

Air Rage. Elderly people are not immune to the behavioural disturbance referred to as *air rage*. A build up of fatigue, frustration and anger can result in verbal and physically aggressive behaviour to fellow travellers and staff. Over indulgence in alcohol drinking and medication interaction can result in behavioural misconduct and they should be aware of this risk. Alcohol intake on long flights is best avoided by those on routine medication and affected by a measure of kidney failure – a consideration for many older travellers as a third of those over 80 will be affected by grade 3a chronic kidney disease.

Early Alzheimer's disease can be seen in the aberrant behaviour displayed by some elderly vacationers.[13] Sometimes solo travellers they can be seen wandering round cruise ships and getting lost from tour groups. Their fellows are usually tolerant and supportive but they put themselves at health risk on ships and in road traffic. Unaccustomed surroundings and travel related stressors add to their confusional states.

They are particularly likely to become disorientated in airports In 40% of these early cases some measure of agitation, sleep disturbance , wandering increased irritability and aggression are apparent.[13]

Locational change tends to increase their mental stability and they should be discouraged from participating in holidays with an ever changing environment such as cruise, coach or, train tour. If they do travel anti-psychotic medication should be reviewed before departure. They should travel with a companion and provisional plans should be in place for unwanted illness in the accompanying person.

Case History

A 75 year old man had travelled alone to Australia despite a diagnosis of senile dementia. His visit to family was successful but on the return, tired, dehydrated and confused he became disturbed and wandered around Heathrow for many hours while transferring aeroplanes. Totally disorientated he missed his onward flight and was only identified as ill and lost by a patrolling policemen after the last flight of the day had departed. He never fully recovered his former cognitive state and was institutionalised when he finally arrived in his home town.

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Iain B McIntosh,
BA(Hons), MBChB, DGMRCP, FFTMRCPS(Glas).
Former gp and hospital practitioner in geriatrics rehabilitation.

Travel Medications and Older Travellers

L I Goodyer

A number of pharmacological interventions may be made to prepare the traveller going overseas, which include immunisation, malaria chemoprophylaxis and medication for self- treatment, included in a medical kit.

This article considers the range of medications that may be prescribed or purchased by the elderly traveller. There are four important principles for consideration:

1 Is the prescribed medication likely to interact with other medication taken for chronic conditions. Poylpharmacy is common in elderly people, so a medication history should always be sought at consultation.
2 Is the medication prescribed for travel likely to be contraindicated? Again the elderly person is more likely to suffer multiple pathologies than a younger individual.
3 Is the way that the drug is handled by the body (Pharmacokinetics) likely to be affected in older age e.g. declining liver or renal function.
4 Do much older people tend to respond differently when compared to a younger population (Pharmacodynamics).

Other points are also worth considering when preparing the traveller who will be carrying any form of medication:

- Carrying medications across international borders can meet restrictions even when intended for personal use. This particularly applies to those which are designated narcotic or psychotropic drugs. As a rule of thumb, this would cover any medicine that has an effect on the central nervous system and in particular if it could potentially be abused. Carrying a prescription or note from the prescriber and keeping the medication in its original packaging is advocated, but there are some countries, such as the United Arab Emirates, where a range of medicines is completely banned.
- Adherence to medication may be affected due to a change and disruption in routines whilst away from home.
- It is always advisable for medications to be purchased before leaving home rather than relying on a local supply even if this is much cheaper. It is estimated that in some countries of Africa and Asia, up to 60% of medicines are counterfeit and many locally produced medicines are of poor quality. Each of the common drugs prescribed in the elderly for travel will be discussed below with consideration to these four principles.

First though a brief review briefly of the principles that influence Pharmacokinetics and Pharmacodynamics in old people.[1,2]

Medication Handling in elderly people

The subject of drug handling is usually considered under headings with the pneumonic ADME; absorption, distribution, metabolism and excretion. Also of particular relevance to the elderly are changes in drug response due to general declining homeostatic mechanisms.

Absorption of drugs by the gastrointestinal tract is not particularly impaired in the elderly. Gastric Ph tends to be slightly higher in older people but there is no particular evidence that this makes them more prone to travellers' diarrhoea. It is worth bearing in mind that, conditions such as heart failure can potential reduce blood flow to the GIT and thus affect absorption. Drugs with anticholinergic properties such as hyoscine can also potentially reduce drug absorption.

Distribution of drugs around the body can be influenced by the higher proportion of fat and lower proportion of water in the body composition of the elderly person. Further, reduced drug binding to plasma albumin can markedly alter the pharmacokinetics of certain drugs. It is beyond the scope of this chapter to describe the consequences of this in detail, but it can contribute to changes in drug response. One particularly important change in distribution is that drugs tend to cross the blood/brain barrier more readily in the elderly. Thus any drug with potential CNS side effects may be more likely to cause an undesirable outcome and such medication should be prescribed with greater caution. In general, a decline in regional blood flow due to a fall of cardiac output with ageing can reduce the response in target tissues.

Metabolism of drugs. This decline in blood flow is the major factor contributing to a lower ability to metabolise certain drugs by the liver in the elderly leading to an increased half-life. Other drugs are affected by the decline in liver enzyme activity sometimes manifesting as a reduced first pass affect.

Excretion of drugs by the kidney is also impaired with advancing age, due to the decline in renal function, again manifested by an increased half-life of certain drugs. These affects are particularly important in the presence of extremes of liver/renal dysfunction, or failure.

One important contributor to the general observation that the elderly are more prone to the adverse effects of drugs is the decline in homeostatic mechanisms. For instance the elderly are more prone to postural hypertension which is exacerbated by prescribing any medication that can lower blood pressure. Another example of a potential travel scenario might be, the elderly person taking an ACE inhibitor and diuretic who contracts a prolonged bout of travellers' diarrhoea. In such a situation there is a greater potential for serious fluid and electrolyte disturbances

Commonly prescribed drugs in travel medicine and implications for the elderly traveller

Drug – drug interactions where clinically relevant need to be considered, as the elderly are more prone to issues relating to polypharmacye.g. potential contraindications of prescribed travel medicines to conditions more commonly encountered in senior citizens, such as cardiovascular problems and diabetes should also be considered.Seniors are frequently more prone to the adverse effects of drugs,discussed where they are particularly clinically relevant. The points below are not an exhaustive or complete list of all of the prescribing issues, but are presented as an illustration of the principles for careful use of all medicines in elderly citizens.

Antimalarials – It has been reported that some antimalarials lower insulin requirements in diabetic patients and can lead to hypoglycaemia in those treated with insulin or oral hypoglycaemics such as glibenclamide. However, the evidence is only available for treatment doses of such antimalarials rather than prophylaxis.There have been limited case reports of an interaction between warfarin and proguanil and atovaquone/proguanil resulting in a raised INR. A similar effect has been observed with doxycycline. It is wise to monitor the INR of patients taking warfarin after commencing any additional medication such as antimalarials. Also INR should be self monitored for those away longer than 2-3 weeks due to changes in diet and difference in time zones.Chloroquine has been reported to cause a rise in digoxin levels in animal models but no clinically important interactions have been observed. Both chloroquine and mefloquine also have the potential to increase the risk of arrhythmias if given with other antiarrythmic agents such as amiodarone. It is best to avoid a range of cardioactive drugs including beta blockers, antiarrythmics and calcium antagonsists in combination with mefloquine. This is due to the risk of prolonging the QTc interval and inducing other cardiac adverse effects. Tetracyclines such as doxyclyine can have their absorption and therefore efficacy greatly reduced by coadminsitration with antacids based on magnesium, aluminium or carbonate compounds. One ACE inhibitor –quinapril- contains a magnesium carbonate in its formulation sufficient to cause a significant fall in the absorption of teracyclines. Chloroquine absorption is also reduced by these antacids.Although caution is recommended when prescribing chloroquine in the presence of renal impairment, no dosage adjustment is necessary in prophylactic use.

Tetracyclines such as doxycycline can cause oesophageal damage if not swallowed correctly, sitting upright with ingestion of plenty of water. This could be an issue for those with any swallowing difficulties or prone to oesophageal reflux. There have been reports of increased hypoglycaemia developing in diabetic patients taking glibenclamide when prescribed ciprofloxacin, which seems more commonly to occur in the old and in epileptic patients. It is best to avoid quinolones in this case and also in elderly patients on chronic NSAID treatment due to the risk of convulsions. Tendonitis and tendon rupture have been reported to occur, sometimes within 48 hours of commencing therapy with ciprofloxacin and the risk seems to be greater in those over 60 years of age. It is wise to warn that therapy be discontinued at the first sign of tendon pain, though in most cases, just a single dose is needed to treat Traveller's Diarrhoea.

Azthromycin and others in its class – the macrolides, can cause a rise in digoxin levels, so the combination is best avoided. They should also not be given in combination with other drugs that can prolong that can prolong QT interval,

Loperamide – The elderly may be more prone to fluid and electrolyte disturbances resulting from a moderate to severe bout of travellers' diarrhoea and the use of oral rehydration therapy is justified. Antidiarrhoeals such as loperamide can also be used as to help control the symptoms though more prolonged therapy may result in constipations.

Analgesic – E.g. Codeine – Over the counter narcotic analgesics may also cause constipation and for reasons discussed previously are best avoided when carrying the products across international borders, NSAID induced peptic ulceration is more likely in the elderly as well as the more recently recognised risks of the cardiovascular and renal adverse effects associated with NSAIDs. For occasional use for acute pain, ibuprofen can be carried in the medical kit, but paracetamol is the drug of choice.

Hyoscine containing products for motion sickness are best avoided in the elderly, due to the anticholinergic side effects resulting in potential cardiovascular or other problems, such as urine retention. Hyoscine patches in particular seem to be associated with a high incidence of confusion in the elderly. There is also some evidence of an increased risk of death and mental decline when the over 65s take a combination of drugs with anticholinergic properties, including antihistamines such as chlorpheniramine.

Proton pump inhibitors (PPIs) and H2 antagonists – This group of medicines are commonly used by older people for self-treatment of dyspeptic symptoms as well as prescribed for peptic ulcer disease. PPIs in particular raise the gastric Ph sufficiently to allow a greater burden of potentially pathogenic organisms to reach the gastrointestinal tract and result in a higher incidence of severe formsof travellers' diarrhoea, a particular problem in the elderly. Those travellers who require continuous PPI therapy might be considered for antibiotic chemoprophylaxis to offer protection against GIT infections.

Acetazolamide – Acetazolamide has been associated with a higher risk of metabolic acidosis in the eld-

Travel Medications and Older Travellers *continued*

erly, those with diabetes and in those with reduced renal function. The clearance of acetazolamide is reduced in the presence of a poor renal function resulting in higher blood levels. There is limited data on the occasional use of low dose acetazolamide in the elderly for preventing acute mountain sickness but it should be prescribed with caution in such individuals. It is well doumented that acetazolamide when used in the treatment of glaucoma can produce metabolic acidosis of clinical significance especially in elderly patients and in those with other medical problems. There is also evidence that the elderly have higher blood concentrations of acetazolamide. The BNF recommended dose is 250-1000mg daily, and many patients take a dosage towards the higher end of that range. There is little evidence of the effects of low dose acetazolamide (e.g. 125mg bd as some authorities recommend for the prophylaxis of AMS). In one study of elderly glaucoma patients 75% had blood concentrations increased by a factor of 2, which would equate to a dose of 250mg bd. Extrapolating this to the use of the drug for AMS, it seems likely that elderly people taking it for AMS are indeed at risk of significant metabolic acidosis.[3,6]

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Larry Goodyer, PhD MPharm, FTMRCPSG.
School of Pharmacy, De Montford University Leicester.

Travel and Health in Older People

A practical guide for travel health professionals

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The ageing process adds to the health hazards of international travel. This book has chapters written by prominent members of the association and will prove a valuable guide for general practioners, practice nurses and pharmacists who have consultations with older vacationers and travellers.

It covers risk assessment and management, travel illness, prevention and prophylaxis and the effect of ageing and pre-existing disease on travel related illness. Transportation, high risk group care, the disabled, infirm and the adventurous elderly traveller are considered.

For consultant and carer there is a wealth of pragmatic information and research based advice. It is a definitive resource which will aid those involved in the travel health field to ensure that elderly travellers can journey afar and return in good health.

Water Sport and Foreign Travel

A Melrose

Water sports provide a great attraction for many who holiday abroad. Warm seas, shelving beaches, roaring surf, trade winds, racing rivers and winding waterways each attract the enthusiast. Expert and novice intent on sailing, surfing, canoeing, rafting, windsurfing and water-skiing throng shorelines and dot the seas. Less intrepid holidaymakers, overheated by tropical and Mediterranean sun, plunge into swimming and rock pools, lochs, lakes and lagoons to sport themselves and cool off. On, in and even under the water, tourists thrust through, over and under the waves. Many do so unaware of the health hazards associated with water sports and the particular dangers to which they expose themselves in foreign places and exotic climes.

Each year there are avoidable deaths from trauma and disease in overseas visitors. Drowning, hypothermia, diving injuries, boating and surfing accidents take a remorseless toll of travellers' lives. Sports-induced infections can cause acute and chronic disease and prolonged morbidity. An awareness of risk and precautions can save life or prevent a spoiled holiday. For swimmers, water in a hotel swimming pool, river, lake or open sea demands respect as a potential source of hazard and neglected foreign swimming pools have to be treated with caution. The safest swimming place is a chlorinated hotel pool, but if inadequately treated with chemicals, it may be polluted, or harbour bilharzia.

Tragically young people break necks and are killed or paralysed regularly by diving too steeply into unsuspected shallow pools.[1] The majority are men of average age 24 years and many have been drinking alcohol before they dive. The most common location for this kind of injury is Spain and Greece. The bone injury is usually a crush fracture of a lower cervical vertebra, usually C5, with direct injury to the cord. Fatality and tetraplegia might be avoided if swimmers shunned alcohol before taking to the water, checked depth before they dive, refrained from diving into less than 1.5m of water and used a flat projectory dive.

Freshwater swimming away from the resort hotel has its own inherent dangers. Many popular world-wide coastal resorts now have sewage-polluted coastal waters. Conjunctivitis and ear infections can result. Swimmers in the Mediterranean have been shown to have more gastrointestinal upsets. than non-swimmers. Algal bloom can frequently contaminate freshwater lakes as well as maritime waters.[2] The blue-green algae (cyano bacteria) can be toxic and swimmers should avoid contact with algal scum and the water around it. Exposure to water contaminated with rat urine may also expose the swimmer or water sportsman to leptospirosis.

CASE HISTORY

Two British travellers set off independently to travel the world and met on a wooden raft expedition in Thailand. The raft capsized and they swallowed a considerable amount of river water. A week later both were admitted to a Bangkok hospital with the abrupt onset of severe headache, myalgia and high fever. No diagnosis was made and they were discharged after a few days and returned to Britain. Within days of each other they, were admitted independently to an infectious disease unit of an English hospital with aseptic meningitis as a result of leptospirosis.

Monsoon rains can flush out bank rodents and their nests and heavily contaminate river water with leptospires. Through much of Africa and the Middle East, lakes and pools are infected with bilharzia (schistosomiasis). The eggs of the intestinal worms hatch in water and infect certain kinds of snails. The larvae develop in the host and multiply, with some swimming free to seek out and penetrate the skin of a human host. In much of Africa, parts of the Middle East and Brazil the majority of the population is infected. All those who swim in infected streams, rivers and lakes or indulge in water sports, especially where there are large areas of surface water, are at risk of infection. Even deep water, far offshore is not safe, lagoons can harbour S. mansoni and even small patches of water far divorced from human habitation can be infected. It should never be assumed that freshwater is free from infection in an endemic area. Salt water, brackish water and chlorinated water are safe but neglected swimming pools can become colonised by the snails. Rubber boots and wetsuits offer protection for the water sportsman but external clothing must be dried quickly in the sun immediately after use. Artificial man-made lakes such as the Karibba dam are particularly notorious for the risk of infection.

Dangerous Fish

'Swimmers itch' is caused by schistosome larvae which have penetrated the skin and died there.

They do not develop further but cause an intense itch, a variety of cercarial dermatitis. It can occur in temperate as well as tropical countries and also in the USA. Fortunately, antihistamine tablets or ointment is all that is required for treatment. Unknown foreign waters do not only bring the risk of attack by sharks, groupers, stingrays and crocodiles, but they also present offshore winds, underground swells, thundering surf and treacherous beaches, which can all place the swimmer at added risk. There is the ever-present risk of drowning and hypothermia can strike in colder waters. Recent tsunamis in Indonesia, India and Sri Lanka have drawn attention to the risk from huge tidal waves and any sudden withdrawal of coastal water must be treated as the herald of death- threat-

Water Sport and Foreign Travel *continued*

ening advancing inundating tidal wave.

CASE HISTORY
A slimly built teenager was swimming and snorkelling without wet or dry suit protection off one of the Galapagos Islands in a high ambient air temperature. Totally absorbed in swimming in the company of sharks, he failed to appreciate that the cold water of the Humboldt current was robbing his poorly insulated body of heat. He became semi-conscious and was drowning when his plight was appreciated by a buddy and he was rescued. Severely hypothermic, he nearly succumbed and only frantic rewarming saved his life.

Menstruating women may be apprehensive that menstrual blood would attract predators but sharks and piranha are not attracted when blood is absorbed into sanitary towels or tampons. Aquatic leeches will gorge on any unprotected flesh in parts of South east Asia where they are prevalent. They will crawl into mouth, nostrils and eyes and are best avoided by refraining from swimming in forest pools and streams. In Amazonia a tiny fish can swim up urinary streams and enter the urethral canal. Candiru is a fish-like parasite that can swim through the urine stream into the urethra and develop in the bladder. Many fish and also sea anemones can inflict painful and dangerous stings. The coelenterates possess stings, especially on the tentacles. Contact results in severe burning pain, followed by erythema and weals. With extensive stings from the Portuguese man of war, collapse may follow. Abrasions from corals can cause coral ulcers which can take weeks to heal.

Dangerous Diving
Brilliantly-hued fish beneath the waves entice the swimmer and tempt many into snorkelling, an apparently benign underwater pursuit. Use of a goggle without a nosepiece, however, risks blood-shot or black eyes. Hyperventilation in an effort to prolong the dive before starting is hazardous, for it delays the build-up of carbon dioxide. The snorkeler may use up all his/her oxygen and lose consciousness before the urge to surface and breathe again is felt. Hyperventilation before a dive has led to many deaths by drowning.

Sub-aqua enthusiasts are attracted to the Caribbean and Red Seas where warm, clear waters can tempt even experienced divers into the indiscretion of deeper dives and nitrogen narcosis.[4] This is a physiological phenomenon of aqualung diving, not an irreversible pathological condition. When diving deeper than 16m with compressed air the higher absolute partial pressures of nitrogen in the compressed air cause light-headedness, giddiness and impairment of concentration which disappear on returning to the surface. However, an intoxicated diver can act in a bizarre way when experiencing the 'Rapture of the Deep', disregarding safe diving principles and ignoring safe ascent procedures thus incurring decompression sickness.[5]

This is caused by the formation and circulation of bubbles of nitrogen gas which come out of solution and body tissues during ascent. These bubbles form if the diver is submerged for a relatively long time or comes up too fast to allow for the nitrogen dissolved in the tissues to remain in solution in the blood stream and be eventually exhaled. They can occlude small arteries and veins and cause physiological dysfunction in joints and bones, the central nervous system and the lungs. Divers visiting developing countries may find equipment less than reliable and compressed air supplies of variable quality. Novice divers can be encouraged to undertake dives without adequate training and super-vision and gastrointestinal upset, the scourge of the traveller, can be dangerous if individuals dive while so affected. Abdominal cramps, dehydration and diarrhoea and fever, which are not uncommon in foreign travel, are contraindications to safe diving.

Hypothermia
Even in tropical waters, hypothermia can develop, if only a light shirt and trunks are worn wet, when there are high winds .If water temperature is less than 21°C protective suits must be worn. An unclad swimmer in water at a lower temperature than this, will lose heat faster than the body can create it, as water conducts heat 25 times more rapidly than air. Chilling and hypothermia can soon follow. An unprotected swimmer at 5°C will be endangered within 20 minutes of entering the water and will be dead within one hour and forty minutes. Temperature drops with increasing depth with the greatest change occurring after the first 10m below which the sun's warming effects cease to operate.

Scuba-divers risk decompression sickness if they fly home immediately after a dive as aircraft cabin pressure will allow enough of a pressure gradient, between lesser cabin ambient pressure and higher tissue pressures of remaining nitrogen from the dive, to cause some bubble formation and sub-sequent decompression sickness. No dive greater than 9m should be taken within 24 hours of a flight and, even after shallow no-decompression dives, 12 hours at least should lapse before flying.

Pulmonary problems
Easy access to scuba facilities attracts novices to the sport and standards of equipment, and instructions on diving safety are often much below those in Britain. Novice divers in foreign resorts may be taught by poorly qualified instructors and language constraints may make for communication difficulties. A quick financial return is often sought by diving operators and instruction may comprise a short, superficial pro-

gramme designed only to get the novice to pay the fee, get into gear and plunge into the water. Inadequate instruction at the very earliest stage can be hazardous and the diver may risk barotrauma even when practising in deeper swimming pools. If novice aqualung divers hold their breath during a rapid ascent from depth, air embolism, pneumothorax and mediastinal emphysema can result. Expanding air inside the lungs may rupture the alveoli with tracking of the air into the pulmonary venous system and interstitial tissues. Warm foreign waters entice women to explore under the water Women divers with significant pre-menstrual symptoms should not dive, as severe cramps can effect concentration and mimic signs of decompression sickness.6 Pregnant women are advised not to dive at all as little is known of the potential dangerous effects on the developing foetus

Asthmatic divers are at special risk as many are unaware that they should not dive for 48 hours after a wheezy attack.[7] Optimal diving conditions abroad encourage the wheezy diver into following his/her sport when mildly wheezy. There is a risk of sections of lung being incompletely ventilated as the diver ascends and the sections may fail to empty sufficiently, resulting in pneumothorax or even gas embolism. Divers using borrowed equipment can be reassured regarding the risk of AIDS infection. The UK Health and Safety Executive has published 'AIDS, HIV infection and Diving, "which confirms that HIV cannot be transmitted by breathing apparatus or during first-aid procedures taught to divers.[9]

Surfing and boating

The sight of experienced surfers, "hot dogging" across the face of a 10-foot curl on a breaking wave attracts many to this sport. Injuries are common especially in the novice, usually as a result of being struck by the owner's or someone else's board. Abrasions and gravel burns are common. Bodysurfers are, however, at greatest risk of severe injury. 10 Injuries are sustained, when the wave is steep and breaks precipitously; the resulting wave is known as a 'dumper' and injury results when the person is rammed head first onto the sea-bed like a pile driver. The neck is forcefully flexed and rotated and fractures of the skull and cervical spine are common. Steep dives at the water's edge can also force the head onto an unsuspected sandbank with resultant fracture and the likelihood of tetraplegia.

Windsurfing is a popular pastime but collapsing booms, falling masts and frequent capsize make the sport potentially hazardous. Even in the tropics, sportsman clad only in swimsuits can suffer from hypothermia and fatigue and exhaustion can overcome them if the board is swept out to sea. Novice windsurfers should always set off by sailing into the wind and along the shores. Falls off surf boards into shallow lagoons may also impale the feet on sea urchins' spines which can even penetrate plastic beach shoes.

Water-skiing

Water-skiing attracts the young traveller and off crowded holiday beaches, collision with other skiers and swimmers is always a possibility. Skiers also risk contact with algal waters and contact with algal bloom which present in fresh, estuarine and marine waters can result in pneumonia. Women water-skiers risk foreign-body penetration of the vagina and high-speed vaginal douching. The in-rush of contaminated water can promote ascending infections and they should wear adequate costumes covering the perineum. Barefoot water-skiing has its devotees and it quires much skill and courage. As the tow boat has to be travelling at least 45mph it is responsible for a share of spinal cord injury. Lesser known trauma affects the perineum by water hitting it at high speed. Sudden catastrophic failure of wet-suit stitching results in high speed rectal and vaginal douching with rectal and vaginal tears and salpingitis recorded.

CASE HISTORY

An orthopoedic surgeon has graphically recorded the massive muscle breakdown from the high speed barrage of water which he experienced while learning to learn the art of barefoot skiing. He developed haematuria and myoglobinuria as a result. Adequate body protection must be worn in this sport, a consideration easily forgotten in warmer waters of foreign vacation resorts.[11]

Freshwater Skiing has been suspected to be a significant recreational risk factor for primary Amoebic Meningoecephalitis.[14]

Small boats Sailing

Small sail boats have their enthusiasts and they throng holiday beaches. Canoeists are recorded as having developed pneumonia from algal-covered waters and there are reports of leptospirosis in canoeists in rat-infested waters. The organisms of leptospirosis complex can enter the body through a cut or an abrasion, or more commonly through the gastrointestinal tract. Surfers sailboats, pedalos. rowing boats and yachts are hired out at holiday resorts. Swinging booms knock sailors into the water and render them unconscious and fast currents or tidal races, sweep them away. The risk of drowning, exposure and dehydration are constant reminders that water-sports demand caution and safety awareness. It has been estimated that 150,000 people die by drowning annually many of whom might have been avoided by sensible bathing precautions.[13]

Risks for on-shore water enthusiasts

On-shore water enthusiasts still risk infection from

Water Sport and Foreign Travel *continued*

larva migrans. The hookworm larva infects the sand above the waterline. Discarded from the intestine of dogs and cats, it burrows into human skin and, although it cannot develop further, it wanders under the skin causing red itchy lines.[12] Infection can be avoided by wearing sandals on the beach. However, all who expose themselves by the sea or in the sea, risk contact with mosquitoes and sand flys and other air-borne vectors. Exposure of large areas of skin by those indulging in water-sports brings the risk of serious sunburn and many forget that UV rays penetrate through water and thin blouses and shirts to their peril.

Conclusion

Despite a catalogue of morbid possibilities, the majority of tourists travel the world and enjoy water sports free from major health disturbance. An awareness of potential hazard and maintenance of sensible precautions, with a constant appreciation of risk and respect for strange locations will allow most to enjoy the waters of world in safety.

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Allan Melrose is a retired gp a sailor, snorkeller and windsurfer.

Behavioural Change in Tourist Air Travellers

T I Blackwood

International air travel has been increasing exponentially for a decade helped with the advent of budget airlines and the opening of new routes. Many more people have been flying and for most vacationers it is an integral part of the holiday. A sizeable proportion remain fearful of air transportation however and others who have flight phobias refuse to contemplate travel in an aircraft.[1] Although concerns about aeroplane mechanical failure do not predominate as in the early days of aircraft travel, recent events enhance and support concerns about this mode of transportation. The financial recession in the west has brought the demise of several airlines with others struggling to maintain services. Enforced economies bring decline in customer care and less airline willingness to address passenger's legitimate anxieties regarding airport congestion, luggage loss, flight delays, cancellations and rerouting.

The last year has been made difficult for operators with volcanic ash, blizzards, heavy snow ,staff strikes and terrorism adding to their woes. Flying across the world was once the prerogative of the few and viewed as a great adventure by those who could afford it. Cheaper mass air movement brought the travel mode within the reach of all. Air travel is however still regarded as the most dangerous and anxiety provoking travel option by the general public.[2]

Flight anxiety is an emotional state of worry triggered by an appreciation of risks usually disproportionate to the actual risks involved in air travel.[1] However the national media reporting of travellers marooned for days in airports in Europe has altered public perception of risk with air transportation. Loss of luggage, cancellation of flights, rerouting has brought anxieties about this transportation mode more proportionate to the risk of an unwanted event occurring to the traveller. As the risk of mechanical air failure has waned the likelihood of psychological trauma with air travel has increased markedly. Delays, prolonged waits in air line lounges, queues in airports and uncertainty of arrival and departure, impact on public psyche. People are reacting by changes in behaviour now recognised by the transport industry.

Young and novice travellers driven by financial constraints, the desire to travel the world, without experience of anxiety provoking air travel and possibly more resilient to stress and delay, still tolerate the venture into the skies. Their seniors and older people in particular are taking up alternative options which are now affecting the travel scene. Flight anxieties are a common phenomena previously observed in 10 to 40 percent of air travellers depending on the pre-flight and in-flight situation. This proportion must have increased with the deleterious change in the pre-flight experience and terrorist events on aircraft.[3] The

latter starts with home departure affected by adverse road/rail conditions prevalent this past winter.

Stress mounts incrementally with progression through security, which is now a major source of psychological disturbance for passengers. There is invasion of individual privacy with potential embarrassment with the luggage search, enforced taking off of shoes, belts and body frisking. The authoritarian demands of security staff are objectionable and the process is an unwelcome reminder that the aeroplane may be blown out of the sky. Restriction on hand luggage is another minor but additive irritant for most travellers adding to the increasing frustration and angst engendered by passage to the aeroplane. The whole unfortunate process resembles sheep being herded passively and powerlessly from freedom to the abbatoir. The passenger has been reduced to a mere seat number in an uncaring bureaucratic process. Communication failure is a further tension causing feature when the system collapses under overload. The whole procedure is annoying, diminishing and demeaning .Added to the inevitable flights delays and failures, continued frustration brings increasing stress ,tension and aberrant behaviour in the airport or in the air.

Coping stategies are being developed in passengers who are however limited in potential adaptation manoeuvres. Weight restrictions limit food, drink and pastimes to be taken airside to ameliorate prolonged waiting and make is almost impossible to prepare for a night or two spent on a departure lounge floor.

Maladaptation results in aggressive behaviour and resultant increase in reported police intervention at major airports. Many are now adopting the classical response to potential stressful situations – *avoidance*.

They are seeking alternative means of reaching destinations. As an island nation with air travel the obvious fast means of transit this is not too easy, but route changes are occurring. Long distance train companies report increased business with more well used

Behavioural Change in Tourist Air Travellers *continued*

and more trains. Ferry companies to the continent are attracting more travellers. This may be partly due to income restraints due to the financial recession, but there are changes in cruise shipping which have been driven by affluent passenger demand. The cruise lines diligently survey regular and potential passengers and they report an increasing demand for UK port to port cruises. These had been driven from the scene by the arrival of fly cruising 20 years but they are regaining popularity.

Out of the school vacation season, "cruisers" are predominantly elderly people with time on their hands. They are less resilient to change than the young and cope less well to stress. The hassle, nuisance, discomfort and mental anguish engendered by air port transition disturbs them considerably. In the 48 hours before a cruise ends dominant topic for discussion in their ranks is the air return home. All have suffered prolonged delays, rerouting and transit discomfiture in their experience and all dread a repeated incident. Now they are voting with their feet and booking up for sail-aways direct to and from Britain to avoid the air travel component of their vacation. Years ago only a handful of ships served this market but most of the dominant cruise lines are now offering these "stress free" routes to a maritime vacation. Train companies are also marketing services direct to the ports. Trans Atlantic crossings, once shunned, are being accepted, with the recognition that 4 days stress free ship travel is an excellent alternative to the drudgery and uncertainty of air transit. Geological, climate change, terrorist events and bureaucratic and systems failure have brought behavioural change in passengers. With faster train services the change is likely to be permanent, and one that the airlines may ignore to their peril. A loss of passengers may finally force then into a belated recognition that airport transit and air travel should be designed to be pleasant experience and not the stressful dreaded event perceived by many of the public.

Coping strategies for stressed air travellers

- Use alternative transport when practicable.
- Be prepared for cancellations and rerouting. Research alternative flights and transportation before flying.
- Book into airline courtesy lounges when in transit.
- Seek overnight airport hotel accommodation before an early flight.
- Assume delay and take books, games, emergency food, water, ground sheet and inflateable pillow.
- Avoid air travel in the winter and the public holiday season.
- Stop travelling by air!
- Choose direct flights, upgrade seating if possible.

T.I. Blackwood is a former nurse and travel clinic organiser.

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INFECTION

The Forgotten Disease (Hansen's Disease)

A Vickers

LEPROSY (Hansen's Disease) is a word that generates images of leonine facies, deformed hands and, with victims in mediaeval times ostracised to sit outside the walls and gates of towns, shouting "Unclean! Unclean!" to warn passers-by of the dreaded disease. The bacillus causing the disease, Mycobacterium leprae, was actually the first bacterium to be seen under a microscope and the first bacteria to be identified as a causative agent of a human disease. Norwegian pathologist Armauer Hansen made the connection in 1873. The bacteria's waxy coat stained bright red, similar to the bacillus that causes tuberculosis. Contrary to common reports, leprosy has NOT been eradicated. Recently, the UN reported 300,000 newly diagnosed cases and in the Congo and India, numbers of new cases are actually increasing.

Babies are not born with leprosy, and two thirds of babies born to leprous mothers will never get the disease, even if the mother keeps the child with her. 90% of adults have a natural immunity. It is thought that nasal secretion droplets or skin to skin contact are the ways leprosy is spread. Household contact is a factor, but only one out of ten patients transmits it to their partner.

In past centuries, missions and governments established leprosaria where patients could be isolated, often for the remainder of their lives. Now in many countries, leprosaria have been closed and the patients treated as outpatients. Today, leprosy is found mainly in Angola, Brazil, the Central African Republic, the Democratic Republic of Congo, India, Madagascar, Mozambique, Nepal, and the United Republic of Tanzania. These countries account for 75 % of the global leprosy burden.

Despite millions of bacteria present in skin and nerves, leprosy never directly kills a person. The bacillus has a predilection for nerves near the surface of the skin, as it thrives at lower temperatures near the skin surface. As a result of the bacterial infection, the body's defence mechanisms produce neural inflammation with the resultant loss of sensation and muscle function causing physiological dysfunction. Over many years of insensitivity, ulcers and deep infection, fingers or toes shorten. Even then, portions of the finger nails can be found on hand stumps. With treatment and active intervention, slow finger absorption can be avoided.

Without sensation in the fingers, people with leprosy often suffer trauma and burns, failing to appreciate the temperature of objects and their sharpness. They are prone to burn fingertips on hot cooking utensils and fail to feel the pain. Burned areas develop infection, bones are absorbed, and in some cases the fingers almost totally disappear. If patients are educated in how to avoid directly touching hot objects, the infected ulcer and finger absorption can be avoided.

Just a few days of treatment can stop patients infecting anyone else, and with reconstructive surgery and rehabilitation, most patients can be returned to families and communities to lead productive lives. Today, the diagnosis and treatment of leprosy is easy and most endemic countries are striving to fully integrate leprosy services into existing general health services. Access to information, diagnosis and treatment with multidrug therapy (MDT) remain key elements in the strategy to eliminate the disease as a public health problem, defined as reaching a prevalence of less than 1 leprosy case per 10,000 population. MDT has been made available free of charge to all patients worldwide since 1995 by the WHO, and provides a simple yet highly effective cure for all types of leprosy.

Treatment of leprosy uses antibiotics to kill Mycobacterium leprae. However, the bacteria can be resistant to certain antibiotics therefore several antibiotics are often combined. The three most commonly used antibiotics are: Dapsone, Rifampin, Clofazimine. Other antibiotics, such as clarithromycin, ofloxacin, levofloxacin, and minocycline, also have excellent antibacterial activity against Mycobacterium leprae. Patients who suffer from claw-hand deformities, can have reconstructive surgery, with transfers of tendons of working forearm muscles, to restore balance to the fingers so they are again functional. The management and treatment of leprosy has been a WHO success initiative.

Update – The Forgotten Disease

Case History
The disease had badly deformed her hands. Some fingers were shortened. Muscles at the "ball of the thumbs" were flattened, and she could not oppose the thumbs to the tips of her other fingers.There was early clawing deformity of fingers, and an ulcer on her left palm, caused by use of a machete ,grasped by a hand that had lost feeling. She had leprosy.

Her situation appeared beyond treatment, but was not hopeless. A combination of drugs can free the afflicted of the bacillus, Mycobacterium leprae, in one to two years of treatment. In many patients presenting for the first time, similar nerve damage and deformities, have already occurred. The "claw hand" deformities seen in leprosy can involve all five fingers. The little muscles within or intrinsic to the hand are affected by ulnar nerve involvement at the elbow and the median nerve at the wrist level by the disease. Because the long muscles and tendons from the forearm still move strongly, without the balancing forces of the little muscles found in the hands, the fingers "claw" or go into flexion at their last two joints. For patients who suffer from these deformities, reconstructive surgery, with transfers of tendons of working forearm muscles, can restore balance to the fingers so they are again functional. However without surgeons trained to perform these surgeries, many African patients in places like the Congo must simply live with their deformities. This is however an extremely treatable disease.

About 90% of adults have a natural immunity to leprosy. Just a few days of treatment can stop patients infecting anyone else, and with reconstructive surgery and rehabilitation, most patients can be returned to their families and communities to lead productive lives.

A Vickers, world traveller.

Scenarios from the NaTHNaC Telephone Advice Line

A Stillwell

The National Travel Health Network and Centre (NaTHNaC) is funded by the Department of Health, England and operates in partnership with the Hospital for Tropical Diseases (London), the Liverpool School of Tropical Medicine, London School of Hygiene and Tropical Medicine and the Health Protection Agency Centre for Infections.

The telephone advice line service provides detailed advice for health professionals advising travellers with special needs or complex itineraries. The line operates Mondays to Fridays between 9am - 12pm & 2pm - 4.30pm. Queries are answered by the team of specialist nurses, with medical cover provided. For more information on NaTHNaC refer to the website at www.nathnac.org

Scenarios from the queries to the advice line might prove informative to health professionals and so a selection has been included below. 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, previous vaccines/malaria chemoprophylaxis and b) the trip, including; date of departure, length of time away, the countries to be visited and the areas within those countries (i.e. urban, rural, coastal, altitude), type of accommodation and any planned activities (i.e. adventure sports, disaster relief/aid work, visiting family and friends). Advice for health professionals on how to conduct a travel health risk assessment is available at: http://www.rcn.org.uk/publications/pdf/travel_health_medicine.pdf

Scenario One

A 56yr old woman is travelling to Viet Nam (Hanoi, Halong Bay, Hue, Da Nang, Hoi Ann, Ho Lak, Mekong Delta-near Cambodia border, Cai Be, Long Xuyen and finishing in Ho Chi Minh) for 21 days. Date of departure is unknown. There is no medical history of note or regular medication.

Does she need malaria chemoprophylaxis and if so what would be recommended?

There is a high risk of malaria in rural areas of Vietnam. There is a very low risk in cities, the coast between Ho Chi Minh and Hanoi, and the Mekong River delta, until the border area with Cambodia.[1] Reference to an atlas shows that the traveller is at risk from malaria on this itinerary from Ho Lac through to Long Xuyen. The other places are cities or coastal areas where the risks are very low. The recommended chemoprophylaxis for this traveller would be atovaquone/proguanil or doxycycline; there is evidence of resistance to mefloquine in some of these areas so this would not be recommended.[1]

Insect bite avoidance measures[2] should be practiced and the traveller should be advised to urgently report any incidence of illness (e.g. headache, fever, 'flu-like' illness, diarrhoea, myalgia etc) and have a malaria blood test.

Scenario Two

A 58yr old female is travelling to India for three weeks in 3½ months time. She will be visiting her family in a rural area of Gujarat state. Three years ago she had intra-abdominal tuberculosis for which she was treated and then a year ago she had a renal transplant due to advanced renal failure. She is now fully recovered from the TB and very well post transplant. She takes a lot of medication, but all the caller knows is that she takes calcium tablets and Septrin antibiotics, the rest are not known. The renal consultant has already recommended atovaquone/proguanil (Malarone®) for malaria chemoprophylaxis. She has regular blood tests organised by her hospital consultant, the results from one month ago are shown below with normal ranges in brackets;

- ***serum creatinine 79micromol/L (44-80micromol/L)***
- ***eGFR 68***
- ***urea 5.6mmol/L (2.5-7.5mmol/L)***
- ***sodium 142mmol/L (135-145mmol/L)***
- ***potassium 4.7mmol/L (3.5-5.3mmol/L)***

Trends:

- ***serum creatinine 72 - 5 weeks ago; 71 - 3 months ago***
- ***eGFR 76 – 5 weeks ago; 78 – 3 months ago***

The caller has rung for advice about how the intra-abdominal tuberculosis will affect the recommendations for the trip.

The advice of the on-call physician was sought to answer this question. This is high risk traveller whose immune system is compromised. The advice for the trip is not changed by the history of intra-abdominal tuberculosis, the biggest risks she faces are due to the renal transplant and her regular medication.

Transplant recipients usually take immune suppressant drugs for life to prevent rejection of the transplanted organ. A consultation with her renal specialist was recommended as soon as possible, in order to review her blood test results and medication.

Arrangements for travel insurance and plans for accessing medical care in India should be made in case of problems.

A discussion followed about renal function and which malaria chemoprophylaxis would be most appropriate; it was felt that doxycycline would probably be the best option. It was felt that the clearance of proguanil through the kidneys is not very good if the

NaTHNaC *continued*

kidney function is compromised.[2] However, there is also a potential problem with doxycycline and immunosuppressive medication. Doxycycline may increase the plasma concentration of ciclosporin. Co-administration should only be undertaken with appropriate monitoring.[3] The situation would need review by the renal consultant. If doxycycline is taken they would need to be taken at 2-3 hours interval from the calcium tablets to minimise the risk of a drug interaction which would result in poor absorption.[4] Repeat blood tests nearer the departure date in order to assess choice of prophylaxis. A drug interactions check would need to be made between the prophylaxis of choice and her regular medication.

Vaccination recommendations would be typhoid[5], hepatitis A[6], diphtheria[7], tetanus[8], polio[9], hepatitis B[10], influenza[11], pneumococcal[12], Hib[13], meningitis C[14] and consider rabies[15] (post exposure rabies advice would be crucial). These are all inactivated vaccines, so there are no contraindications to their use, but drug-induced immune suppression may result in a sub-optimal response.

Other advice; food/water hygiene[16], hydration and oral hydration salts in case of travellers diarrhoea/vomiting[17], consider taking antibiotics for self-treatment of gastrointestinal problems (Septrin will not help with this), insect bite precautions to reduce malaria and dengue fever exposure.[18] She would be advised to seek advice early in case of illness during trip or for one year after return.

Scenario Three

A 31yr old husband and wife are travelling to India and Thailand in three days for five weeks business trip in urban areas. The female had a 'typhoid' vaccine from a street doctor in Bangkok during a previous trip to Thailand 18 months ago, there are no records of the vaccine that she received. Three months later she contracted 'typhoid', according to a local Thai doctor for which was treated locally and recovered. They are now both concerned about typhoid because they will be returning to similar living and working conditions to their previous trip. The caller wants to know if the lady has immunity to typhoid? Is vaccine contra-indicated on this occasion because of her history? Should the husband receive vaccine?

As there are no vaccine records it is not possible to confirm that the vaccine she received was typhoid. Without laboratory confirmation it is not possible to confirm that the disease she suffered was typhoid. Immunity would require a cell-mediated and humoral response.[19] Typhoid vaccine[4] was recommended for both travellers.

Scenario Four

A 27yr old female is planning to travel the world with her husband who is in the merchant navy. She has a medical history of depression which is well controlled with citalapram and mild asthma for which she takes ventolin inhaler when necessary. There is no trip planned at present. She has come to the GP practice for yellow fever vaccine.

The caller is concerned about giving yellow fever vaccine.

This is a situation where the traveller needs to be 'trip ready'. The exact destination(s) are unknown but there is a realistic possibility that the lady will travel to areas where yellow fever vaccination is recommended at short notice.[20, 21] As her husband works in the merchant navy there is a possibility of them travelling on from risk countries where an International Certificate of Vaccination or Prophylaxis is a requirement.[22] The traveller needs to be informed about the possibility of adverse events from the vaccine to the general population.[23] If she makes an informed decision to receive vaccine this would seem to be justified.

Travellers who suffer with a long term medical condition should be aware that they are at risk of having a relapse, or a problem with their regular medication. Travel health insurance should be organised well in advance of departure, making full disclosure of any pre-existing conditions.[24] Life on board ship during long periods at sea, could be boring and lonely. Separation from family/friends and normal support networks could mean a relapse of depression.[24] Access to medical care and supplies of medication on board ship will be limited. Restrictions apply to some medications being transported into some countries. Advice on carrying medication whilst travelling is available.[25] The options for malaria chemoprophylaxis need to be discussed with this lady, in case she spend time overnight in malaria risk areas. The use of mefloquine would be contraindicated due to her medical history of depression.

Scenario Five

A 46yr old male is travelling to Belize in two months. He will be going on a jungle survival course so he can gain a qualification to take television crews on expeditions to remote areas.

The caller would like to know if rabies and hepatitis B are a risk and would vaccines be recommended?

There would be a significant risk of hepatitis B and rabies; a discussion followed about how the diseases are transmitted to humans;[10, 15] both vaccines would be recommended for this traveller. The caller was advised to review the WHO Position Papers on these diseases and use of vaccines.[26, 27]

Scenario Six

A 31yr old female is travelling to Senegal and Gambia for a 4 month business trip in three days. She has no medical history of note; she takes the oral contraceptive pill and tranexamic acid to combat menstruation pain. As well as travel vaccines, she is undergoing a primary course of diphtheria/tetanus/polio vaccines

and received the first of two measles/mumps/rubella (MMR) vaccine at her GP surgery two weeks ago, she is due to receive the second MMR on return to the UK. She was not vaccinated as a child because her parents did not approve of vaccination.
The caller is a travel clinic nurse at a Yellow Fever Vaccination Centre that she has attended for yellow fever vaccine. There is a concern that receiving yellow fever vaccine today is contraindicated because she received MMR two weeks ago.

The risk of measles in many parts of the world is significant and there have been several large outbreaks across the world in 2011.[28] All travellers are recommended to be up to date with MMR vaccine.[29] This individual will not be fully protected until they have received their second dose.

There is a significant risk of yellow fever in Senegal and Gambia.[20]According to the International Health Regulations 2005 [IHR 2005] a mandatory requirement for an International Certificate of Vaccination or Prophylaxis (ICVP) will apply to travel between Senegal and Gambia.[22]

Live vaccines should ideally be administered at the same time or separated by an interval of four weeks. The rationale for recommending four weeks interval is based on limited data.[29] It has been suggested that administration of a second live vaccine within four weeks may result in a reduced response as a result of interferon generated from the first live vaccine.[30]

However, there is no evidence that the incidence of post-vaccine adverse events is more likely.

The yellow fever vaccine was recommended for this traveller due to the known risk of disease at the destination, the extended period of the trip, the mandatory ICVP requirement and the low risk of adverse effects post vaccination. However the traveller should be informed that the vaccine takes 10 days to seroconvert[31] and that is why the ICVP is not valid until 10 days post vaccination;[22] so she will not be protected against disease for a departure date in three days and will not have a valid ICVP to cross the border until 10 days have elapsed.

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NaTHNaC *continued*

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Alexandra Stillwell Specialist Nurse (Travel Health)
RGN, BSc (Hons) Dip. Trop Nursing, MSc Trav. Med. FFTM (RCPSG)

Book review

Travel and Health in Older People
(A Guide for Health Professionals)
Fastprint Publishing. Peterborough £8.89
Ed. Iain B. McIntosh

This is the second edition of this paper-back book which has been rewritten with much expanded content and extensive references. Guest authors have contributed to chapters on infection, physical and psychological illness, cardiac and diabetic disease, travel related medications and adventure travel. A comprehensive definitive guide on disease, illness, trauma, health risk, prevention and prophylactics, this book is an invaluable aid to doctors, nurses, pharmacists and all those working in clinics and the travel health field. Older travellers account for a large proportion of those cruising the oceans, exploring exotic and remote destinations and many suffer from travel related illness en route, at destination or on return. The effects of international travel-induced illness and prophylactics on this cohort are poorly researched and addressed in the literature and this book is a rare contribution intended to assist older people to travel the world and return home in good health.

The introductory chapter considers physiological changes that come with ageing and their impact on the older world traveller. These effects can make elderly individuals more vulnerable to recognised health risks associated with international journeys and residence abroad, particularly in developing parts of the world with poor hygienic conditions and local health care. There is a very useful chapter for those working in clinics with intending travellers in regard to risk assessment, specifically targeting the old and vulnerable. With consideration of many variables, it includes practical assessment tools. Following chapters deal with the effects of different modes of transportation and global relocation upon the traveller. Air travel is considered in depth, with risks from deep vein thrombosis, effect of pre-existing disease and hypoxia identified and suggestions for preventive measures to decrease risk. Land and sea travel get attention with an in-depth study of environmental travel induced illness and means of protection

Disabled travellers whether suffering from common arthritis or major infirmity receive little attention in travel health literature and this chapter considers their problems and needs and there is content on the psychologically disabled with travel associated phobias. Travel health insurance, and emergency health care is important for the elderly traveller, but rarely considered by the health professional and the topics are well covered.

A digital age printing production some of the illustrations lack clarity and the book would have benefitted from larger point size of script. The section on phobias should have drawn more attention to the use of cognitive behavioural techniques the therapy, however the book is a lone professional publication considering the health of older travellers and is very good value for money

This book does provide comprehensive coverage of conditions that relate to a sizeable proportion of the travelling public and merits a place in the travel clinic library and moderately priced, deserves to be a companion aide memoire for all those working with elderly potential world travellers.

C Young

CASE HISTORIES

Altitude Sickness in the Himalayas

On my gap year I attempted to climb the 6400m Mera peak. It appears to be a straightforward climb, but the altitude can make it deceptively difficult. We flew into Lukla (at 2800m) and started our ascent that same day, camping at 3200m. It was a long walk through lush terrain and remote villages with fine views of the mountains. After five invigorating days of climbing we were into snow and going well for the summit of Mera. I was fit and enjoying the challenge despite poor conditions.

When we reached a plateau, I thought that the going should have felt easier, but I started to feel unbelievably tired. It wasn't the fatigue you get at the end of a hard day. Every couple of steps, I had to lean on my ice-axe to gasp in some air. At High Camp (5800m) it was blowing a gale and we needed cover. My guide gave me tent pegs to shove in, but I just stood there bewildered not knowing what to do with them. I slept okay despite a mild headache but at 2am when we should have got up, my head felt like it was going to explode. I knew the pain would only get worse if I went for the summit so I went back to sleep. I awoke to a beautiful clear dawn and the headache had gone.

Diamox (aka acetazolamide) speeds acclimatisation and can be used to prevent or cure high altitude headache and mild AMS symptoms. Someone weighing less than about 60kg takes 750mg and heavier people take 1000mg at once; this cures the headache in a couple of hours. Alternatively it can be taken as one tablet daily for five days beginning a couple of days before ascent. Diamox needs a private prescription in the UK but is available over the counter in Nepal.

As I was short of time I decided to take Diamox as a prophylaxis to allow me to ascend faster than the recommended rate of 300 vertical metres per day. In retrospect it would have been better saved for high attitude headache. If I'd ascended slower and not relied on Diamox I wonder if I would have made the summit.

Alex Howarth, Physiotherapy student.

A shorter version of this case history was published in *Himalayas – Nepal* magazine August 2011. (www.himalayasnepal.com)

[Climbing too high, too fast, too far and sleeping too high increases likelihood of acute mountain sickness – a potentially lethal condition. Ed.]

An Unwanted Souvenir from Mysore?

In September 36-year-old man, GS, returned from working in Mysore for two years. He presented at a routine GP appointment complaining of feeling flat since returning from South India. On questioning he admitted to an erratic bowel habit with loose stools; his libido was also low.

One of the three fresh stool samples we sent for microscopy showed the protozoan *Blastocystis hominis.* They were also reported as semi-formed.

I explained to GS that there was continuing debate about whether *Blastocystis* is pathogenic, but he was keen to try taking treatment in the hope that this would improve his energy levels. I prescribed a week of metronidazole.

By December GS's symptoms had not improved and he wondered whether the metronidazole he'd taken was counterfeit and ineffective. He told me that he'd discarded my prescription and instead took a course that he'd brought back from India, where metronidazole is cheap to purchase. He thereby avoided paying a prescription charge. This was why he returned to request another prescription for metronidazole.

He took the course I prescribed and reported that his symptoms improved, although in April he returned requesting a further stool check. This confirmed that the *Blastocystis* had been eradicated and this somewhat anxious patient was reassured. He has subsequently fathered a child so I presume that his libido is also improved.

It is unclear how useful the metronidazole was in contributing to GS's recovery and it is likely that at least some of his symptoms were due to reverse culture shock and all the other things people have to cope with after returning from a long overseas trip.

J Wilson-Howarth

Case Histories *continued*

Health Care Dilemmas

CASE 1
A 62 year old man was recently repatriated from southern Spain. He had developed chest pain 17 days previously, was hospitalised, submitted to angiography followed by triple by-pass surgery and within ten days was ready to return home by air. A similarly aged patient in the next bed had an almost identical history, but was anxiously worrying about future medical care and home return. He had an ECG result which confirmed myocardial infarction but had only been able to have the ECG on the previous day, which confirmed the need for cardiac surgery. This was too expensive for him to afford and, he was denied access to a flight by the airline. He was contemplating a long road and rail transfer back to the UK, where he would join a long waiting list for surgical intervention. The only difference between the 2 patients was that the first had bought travel health insurance and the second had not purchased any emergency protection. The latter was dependent upon reciprocal European Community arrangements for emergency medical and nursing support and was now facing bills for hospital care. The former had access to the benefits of prompt insurance company attention, immediate medical and surgical intervention and assured speedy repatriation.

CASE 2
A patient died suddenly in Tibet. Direct communication between the British insurer and the involved family could only be established via a fellow traveller's satelite telephone link with the USA through an associated company. Repatriation of the body was beset with difficulties and was only achieved by land transfer via Nepal. Failure to provide the company with a report promptly may negate the contract and expose the claimant to substantial costs they cannot meet. It also deprives them of the support and expertise of the organisation at a time of greatest need. Telephone contact may be difficult to access however.

CASE 3
An old lady with renal calculi had travelled to USA for many years. Despite her medical condition she had no travel health insurance cover. She developed severe renal colic when in Florida and was hospitalised for a month with a prolonged convalescence. She was forced to sell her family home to cover the costs and never travelled abroad again.

CASE 4
An elderly gentleman had a myocardial infarction on a ship cruising off Greenland and had to be helicoptered to hospital in mainland Europe. The bill was expected to be £30,000 and he left behind a disabled wife who had to be disembarked at the first port of call and flown home at additional cost. Insurance covered his care but not his wife's needs, an expensive oversight.

CASE 5
A woman tourist collapsed at the entrance to the Oregon State Legislative building. An onlooker phoned the emergency service and a fire-truck arrived within minutes. The paramedic crew ascertained she was still living. Their second check was to seek and find her insurance document. This was perused. She was promptly placed on a trolley and sped off to a private health unit, examined and warded within an hour. In its absence she would have been taken to the local state hospital, with a very lengthy wait for attention and admission problematic.

CASE 6
A patient returned from a holiday in Morocco having paid a considerable medical care bill when he developed severe chest pain for which he was hospitalised. He believed his health insurance company would foot the bill, but the small print specifically excluded ill health of cardiac cause after he had suffered a previous coronary artery. He had failed to read the insurance document before the premium was paid –an expensive mistake not uncommonly made by members of the travelling public

CASE 7
A 70 year old lady on an inland tour from a cruise ship berthed in Leningrad ate infected ice cream and became ill with vomiting and diarrhoea. The hotel doctor dispatched her in the middle of the night in a van to an infectious disease unit in the city. It was surrounded by high walls with an electrified fence and entry gates. She was admitted to a ward. Prostrated by loss of fluid and electrolytes, she was stripped, placed under a shower and hosed down with cold water. None of the staff spoke English and she had been admitted without money, passport and day clothes. A doctor prescribed mist. mag. trisil et pulv. given to the patient on the hand of a nurse and forced into her mouth at regular intervals. Told by sign language that her group had continued on their tour, she had a dreadful, neglected few days before making a recovery. The nurses expected bribes for bed-making and provision of bedpans. Only the intervention of the tour group leader eased her discharge.

CASE 8
In an elderly group of travellers in Chile, a man developed a myocardial infarction. In pain he waited three hours to see the only doctor available, and as the sole

ambulance was in use, he had to be transported by bus to a hospital 3½ hours away. After several hours waiting to be seen there, he had an ECG which confirmed the infarction. He was advised that facilities were so inadequate in the hospital that he should return to his hotel. He had travelled 7 hours in total to have the diagnosis confirmed but remained untreated. He was eventually repatriated back to the UK by air.

CASE 9

In the same group, a lady developed a rasping cough which went on to pneumonia. She deteriorated despite antibiotic therapy. With poor local investigative resources, she was forced to abandon her holiday and return to Santiago. The UK tour operators did not provide on-going support. Intercontinental communication between the insurance companies and the tour operator were not as good as they expected. The patients' care was desultory and anxiety provoking, adding psychological trauma to the event.

IBM

Ill-Prepared for Travel

A 37-year-old holiday organiser living in Thailand was trekking in the mountains of Nepal. She was struggling with bilateral anterior knee pain that was worse on long, steep descents. Until you've walked in the Himalayas it is impossible to appreciate how hard trekking is on the legs, and strong quads prevent injury and accident. I was fit when I went there but even so I was astonished just how tender my quadriceps became – they were sore to touch for the first week.

I met the 37-year-old in the middle of her trek, several days walk from the nearest road. She wore tubigrip on both knees and used walking poles as support. She mentioned that she had not done any preparation for her trip and that she had a desk job.

I suggested that had she done even a basic quads strengthening programme prior to her trip she might not have suffered as much and would have had a more enjoyable time. I would recommend 'wall sitting' which means putting your back against a wall, sliding down until the angle of your hip, knee and ankle joints are at 90 degrees and build this up so you can hold the pose for two minutes. This should be done twice a day. Running or walking up extra flights of stairs is also good preparation, and I'd say do 10 flights daily for at least a couple of weeks before the trek. Then you'll be in pretty good shape to enjoy it.

Alex Howarth, Physiotherapy Student, Brunel University.

CASE REPORTS

Reports from the Tropical Medicine Bureau

A selection of reports issued by the Tropical Medicine Bureau of Ireland

G Fry

Readers should note that the information given in these reports is gathered from a number of sources throughout the world and the Tropical Medicine Bureau cannot check each one for accuracy. They are of a very general nature and given purely to assist in the overall healthcare of the overseas traveller. They must not be used in place of a detailed medical consultation under any circumstance

The major source of the material is as follows:
ProMed: http://www.promedmail.org>

These and other reports are available on the Tropical Medical Bureau web page facility at www.tmb.ie

NEW ZEALAND
ProMed Newsgroup
10/10/2011 09:05:00

Measles in Auckland still not under control

Date: Tue 4 Oct 2011
Source: Radio New Zealand [edited]
http://www.radionz.co.nz/news/regional/87329/'no-sign'-of-auckland-measles-outbreak-abating

There is no sign that the measles outbreak in Auckland is being brought under control. The latest weekly update from the regional health authorities shows 24 new cases in the past week, compared with 11 new cases a fortnight ago. Some 203 cases have been confirmed since the outbreak began at the end of May this year [2011]. The authorities say 3 people were in hospital over the weekend, and 31 have needed hospital care since the latest outbreak began. A Wellington student diagnosed with measles has been discharged from hospital, but it is not clear yet whether this student infected others in Dunedin during a visit there. Auckland's medical officer of health Richard Hoskins says there is no sign of the outbreak abating. He says it is affecting all age groups from babies to people in their 60s, but mainly those under age 4 and those in their 20s and 30s. Ministry of Health deputy director Darren Hunt says there is no sign yet of any significant wider spread of measles throughout the country.

[TMB: The reports of Measles from other regions in New Zealand are still causing a concern for the international public health authorities as over the next weeks many thousands of travellers will be returning home following the rugby world cup series. The incubation period for this disease is typically between one to two weeks and it starts with symptoms similar to a standard 'post air travel' cold (coughing, runny nose, fever, muscle aches and pains etc).

Unfortunately the disease is quite infectious in the first days of the illness before the classical symptoms appear and so during this time many of the travellers colleagues at work can be exposed and infected. Folks returning from regions where Measles is a particular risk such as New Zealand should be aware of the problem and seek medical attention as early as possible. Having the work force vaccinated with the Influenza Vaccine will of course limit the risk of this disease also being transmitted as it has quite similar early symptoms.]

NEW ZEALAND
AGENCE FRANCE-PRESSE
09/10/2011 19:08:00

Seafood warning from New Zealand's Bay of Plenty after oil spill

WELLINGTON, Oct 9, 2011 (AFP) - Barges began scooping up an oil slick on New Zealand's pristine Bay of Plenty on Sunday, as salvage crews prepared for the delicate task of pumping fuel from a crippled container ship stuck on a reef. The New Zealand navy also had two ships on the bay testing equipment designed to contain oil that spilled when the 47,000-tonne vessel Rena hit a reef off the North Island on Wednesday, Maritime New Zealand (MNZ) said. MNZ on-site controller Rob Service said an Auckland-based tanker normally used to refuel cruise liners had arrived, and salvage crews hoped to begin pumping the 1,700 tonnes of heavy fuel aboard the Rena onto it later Sunday. The government has warned that the accident could become the country's worst maritime pollution disaster in decades if the Rena sinks, spewing oil into the pristine bay, which is home to whales, dolphins, seals and penguins.With weather conditions expected to deteriorate on Tuesday, the Rena's owners, Greece-based Costamare Inc., said removing the oil from the stricken vessel was the top priority. While the Liberian-flagged vessel was badly damaged when it hit the reef, Costamare said "evaluations so far indicate that hull stresses are within allowable limits and that there is no deterioration of the ship's condition". Toxic discharge has already killed a number of seabirds, with six Little Blue penguins and two shags receiving treatment at wildlife rescue centres after

being found coated with oil, MNZ said.Teams were scouring the Bay of Plenty's beaches and islands for any other affected wildlife but indications so far were that none of the five-kilometre (three mile) oil slick had blown ashore, it added. Some 200 people, including specialists from Australia, Britain, Holland and Singapore, have joined the oil slick response team, with 300 defence personnel on standby if needed for shoreline clean up work. *New Zealand health authorities on Sunday warned people not to eat seafood from the bay until further notice.* "Any seafood that has off or petrol-like odours should be avoided," it said.

[TMB: This column frequently advises our readers to avoid the consumption of shellfish (or other undercooked fishes - eg sushi) due to the risks associated with their filtering of waters and concentration of whatever toxins may be present. The oil spill in the Bay of Plenty adds an extra risk from pollution so perhaps that may help to encourage people to be more circumspect!]

BAHAMAS
ProMed Newsgroup
04/10/2011 23:39:00

40 suspect cases of Dengue in Bahamas

Date: Tuesday 4th October 2011
Source: A ProMED-mail post
http://www.promedmail.org

Bahamas (Grand Bahama). 20 Sep 2011. 2 weeks ago, there had been only 6 suspected cases of dengue fever in Grand Bahama. The minister of health has confirmed that 40 are now being investigated, but not all meet the dengue case definitions. One month ago, Dr Hubert Minnis revealed that of the 6 samples sent off for testing, 2 of them had returned with positive results. http://freeport.nassauguardian.net/national_local/15750565879510.php >

[TMB: There are many reports of Dengue Fever being received at present from expected regions of the world like India, Viet Nam, Thailand and Brazil featuring quite prominently. However there are still reports from less recognised foci of infection such as Taiwan, El Salvador, Kenya, Mexico and the USA (Florida State) as well as the one above from Bahamas. Avoiding mosquito bites will reduce the risks and travellers should be encouraged to always leave home with adequate supplies as well as treatment should they get bitten while abroad. If it is not used it can be kept for subsequent trips as most repellents have a very long shelf life.]

UNITED STATES
ProMed Newsgroup
09/10/2011 19:05:00

9 more cases and 3 more deaths from Listeriosis in USA

Date: Fri 7 Oct 2011
Source: Center for Infectious Disease Research & Policy (CTDRAP) [edited]
http://www.cidrap.umn.edu/cidrap/content/fs/food-disease/news/oct0711foodnewsscan.html

A total of 9 more cases and 3 more deaths have been reported since 3 Oct 2011 in the Listeria outbreak tied to cantaloupe, bringing the totals to 109 cases with 21 deaths, the Centers for Disease Control and Prevention (CDC) said today (7 Oct 2011) [see http://www.cdc.gov/listeria/outbreaks/cantaloupes-jensen-farms/100711/index.html]. 4 states -- Iowa, New York, Oregon, and South Dakota -- had their 1st cases, raising the number of affected states to 24, the CDC update shows. The latest deaths included one each in Indiana, New York, and Wyoming. The cases have been linked to Rocky Ford brand cantaloupe from Jensen Farms in Colorado. Most of those sickened in the outbreak are over the age of 60, and the median age is 77. Nearly all patients for whom information was available – 105 of 107 – were hospitalized. CDC officials have called the outbreak the most deadly foodborne disease episode in a decade. Last week officials said they expected reports of cases to continue for several weeks, as the incubation time for listeriosis is up to 2 months. In a related development, a company in western New York has recalled 4800 packages containing cantaloupe because of possible "Listeria" contamination related to the Jensen Farms recall, the Associated Press reported today. The firm, Fruit Fresh Up Inc. of Depew, said the products included cantaloupe pieces and various fruit salads sold in the Buffalo area through stores and caterers between 31 Aug and 11 Sep [2011], the story said.

[TMB: Listeriosis is a well recognised bacterial disease commonly found in animals. However vegetables and meats and other foods can become infected. Unprepared milk and milk products (eg cheeses) are frequently implicated during outbreaks. The clinical presentation of those infected can be very delayed and, as can be seen in the recent outbreaks across the USA, can have devastating consequences for those infected. Pregnancy is a particular at-risk time and also for those with a decreased immunity. The current US outbreak has been linked to cantaloupes (a melon with a net-like skin covering - see http://en.wikipedia.org/wiki/Cantaloupe) and is continuing to cause problems.]

Case Reports *continued*

GREECE
ProMed Newsgroup
09/10/2011 19:03:00

Corfu suspected in UK travellers who contract Legionnaires Disease

Date: Fri 7 Oct 2011
Source: BBC News Health [edited]
http://www.bbc.co.uk/news/health-15220053

There have been 9 cases of Legionnaires' disease in the United Kingdom (UK), all linked to travel to Corfu [Greece] since August [2011], according to the Health Protection Agency [HPA]. However, the HPA cannot rule out a UK source of the infections and is still investigating. It is advising people to be aware of the symptoms of Legionnaires' disease if they are going to the Greek island. The illness can lead to severe pneumonia and is sometimes fatal. Symptoms can take up to 2 weeks to develop after infection and generally start as a "flu-like" illness. It can be treated with antibiotics. The bacteria that cause the disease cannot be spread from person to person. They can live in water so cooling systems, showers and taps are common sources of infection. Prof Nick Phin, from the Legionnaires' disease department at the HPA, said: "We are concerned that UK residents travelling to Corfu should be aware of this potential risk, however we are not suggesting that people change their holiday plans. We are continuing our investigations so we that can provide the best advice for travellers and minimise the risk of further cases. We will also assist the Greek Public Health authorities in their investigations into a possible source or sources within Corfu." General practitioners (GPs) in the UK are also being told to keep an eye out for patients with the symptoms of Legionnaires' disease. [Byline: James Gallagher]

[TMB: Legionnaires Disease is well recognised worldwide with Ireland not being an exception. The disease is typically linked to infected water fountains and air conditioners but also spas and even swimming pools can be implicated. The disease usually presents around 10 days after exposure but can vary from a relatively mild illness to one with a very profound and rapid progression. The problem always arises when a traveller returns home and presents some days later with an illness which is not quickly recognised as being linked to their time overseas.]

AUSTRIA
EuroSurvellance
08/11/2011 09:53:00

Tick-borne encephalitis in 2 Dutch travellers returning from Austria

Date: Thu 3 Nov 2011
Source: Eurosurveillance, Volume 16, Issue 44, [abridged & edited]
http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20003

Tick-borne encephalitis in 2 Dutch travellers returning from Austria, Netherlands, July and August 2011 (By: Reusken C, Reimerink J, Verduin C, Sabbe L, Cleton N, and Koopmans M.) Tick-borne encephalitis (TBE) is not endemic in the Netherlands, and diagnostics are seldom requested. Here, we report about the rare event of TBE in 2 Dutch travellers returning from Austria in July and August 2011. This report serves to create awareness among physicians to consider travel-related TBE in their differential diagnosis of patients with neurological disease returning from TBE virus endemic regions and to promote awareness among professionals advising travellers. The authors describe 2 cases of tick-borne encephalitis in travellers returning to the Netherlands in the summer of 2011. TBEV is the causative agent of TBE, the most important viral tick-borne disease in Europe. The virus is transmitted to humans through bites of infected ticks within minutes of the tick bite. Transmission through consumption of raw milk from infected dairy cattle has also been described. Human-to-human transmission does not occur. The occurrence of most human cases coincides with the occurrence of questing ticks, roughly from May to November. The TBEV species comprises 3 distinct genetic lineages; the European (TBEV-Eu), Far-Eastern (TBEV-FE) and Siberian (TBEV-Sib) subtypes. TBEV-Eu has been isolated in Europe, TBEV-Sib in the Urals, Siberia and far-eastern Russia, and TBEV-FE in far-eastern Russia, Japan and China. Co-circulation of different subtypes has been recorded for Finland, Latvia, Lithuania and Estonia. The severity of disease with TBEV aetiology varies depending on the causative subtype. Germany and Austria are endemic countries for TBEV with low incidence (less than one case per 100 000 inhabitants). However, the incidence and virus circulation in Germany varies considerably between regions, with non-endemic areas in the north but in the south defined TBE risk areas in Baden-Wurttemberg, Bavaria, Hesse, Thuringia and Rhineland-Palatinate [6]. In Austria, the incidence is low due to the high vaccination coverage (88 percent), but the circulation of TBEV is high.

[TMB: Tick Borne Encephalitis is a viral disease which occurs across a very wide expanse from Austria to Mongolia and northwards to Sweden and Finland. For most travellers the risks would be associated with rural exposure in infected regions such as those visiting the Black Forest and especially for those undertaking camping activities. It is usually accepted that a tick needs to remain attached for quite a few

hours before it empties its contents into the host to which it has become attached. 24 hours was usually accepted as the shortest interval needed for infection but more recent reports suggest that the transmission could even occur over a much shorter time frame (1 to 2 hours). The importance of doing a 'tick-search' after every possible exposure cannot be over-emphasised and careful removal of the parasite will be of considerable value in reducing the risk. It should also be noted that ticks are also linked to many other diseases including Typhus and Lyme Borreliosis.]

INDIA
ProMed Newsgroup
07/11/2011 09:26:00

21 recent deaths from Malaria in India's Madhaya Pradesh region

Date: Sun 6 Nov 2011
Source: Times of India [edited]
http://articles.timesofindia.indiatimes.com/2011-11-05/indore/30363670_1_malaria-menace-plasmodium-falciparum-medical-camps

Doctors from neighbouring districts were pressed into service in tribal areas of Sidhi district where 21 persons, mostly children, died due to an outbreak of malaria in the past fortnight in Vindhya region. "The situation is now under control in Choupal Povai and neighbouring villages. Four temporary medical camps are functioning in the area to identify people suffering from illness and screen the population in the area for malaria parasite infection," a Sidhi district administration spokesman said.

[TMB: The advice regarding malaria prophylaxis for those travelling to India has gone through a number of changes during the past years. Many of the world authorities would now recommend that regular prophylaxis should be replaced by 'stand-by' therapy or, more commonly, advice to avoid mosquito bites and to seek urgent medical attention should an individual develop fever. The rationale behind this advice is that malaria cases in India are frequently shown to be of types (P vivax, P ovale) which do not usually kill and also are less well controlled by the common prophylactic agents in use. However there is no doubt that mosquito borne diseases are an increasing problem throughout many regions of India and that malaria is still a force to be reckoned with in many regions popular with tourists.]

MALAYSIA
ProMed Newsgroup
11/12/2011 22:38:00

Report on protection from Sarcocystosis in Malaysia

Date: Wed, 7 Dec 2011
Source: http://wwwnc.cdc.gov/travel/notices/outbreak-notice/sarcocystosis-malaysia.htm
Sarcocystosis in Malaysia: preventive advice

GeoSentinel has reported a cluster of sarcocystosis among travelers returning from Malaysia. These travelers reported visiting **Tioman Island on the east coast of Peninsular Malaysia** before their illnesses occurred. Sarcocystosis occurs in tropical or subtropical countries, mainly countries in South East Asia. This disease usually affects animals but also can also cause disease in humans. Two forms of the disease can occur, one which causes diarrhea, and the other which causes muscle pain, fevers, and other symptoms. Most people infected with sarcocystis do not have symptoms. The travelers described in this notice returned from Malaysia with prominent muscle pain, a symptom consistent with sarcocystosis. Other reported symptoms included mild diarrhea and fever. Most people have been ill for 2-4 weeks. Muscle sarcocystosis is spread through the ingestion of food, water, or soil contaminated with infected animal feces. There is currently no vaccine or treatment for sarcocystosis; most infected people get better on their own.

[TMB: Many of these tourists visited Tiomen Island during June, July and August 2011 and appear to have become infected during their time on this holiday island. They were all seen following their return to their home countries and in many of the cases the diagnosis was not initially obvious. The disease is most commonly reported from South East Asia and occurs in two forms. One effects the bowels (presenting with diarrhoea) and the other effects the muscles (presenting with muscle pains and fever). There is no vaccine available and so travellers should, as always, ensure that their food and water is well prepared and that they always practice good personal hygiene (washing hands regularly and using hand sanitizers as necessary).

These and other reports are available on the Tropical Medical Bureau web page facility at www.tmb.ie

Dr Graham Fry, Medical Director, Tropical Medical Bureau
94 Upper Georges Street, Dun Laoghaire, Dublin, Ireland

REVIEWS

Pneumococcal Vaccination in Developing Countries

C Parker

Introduction

Pneumonia is one of the biggest killers in children under 5 in economically poor countries. This paper examines whether the use of pneumococcal conjugate vaccine is likely to be effective in preventing illness and practical as a long-term solution.

Epidemiology of Pneumococcal Disease

Pneumococcal pneumonia is spread from person to person via respiratory droplets and saliva. In the elderly it is most common during winter months. Pneumococcal disease can lead to disability and death mostly in the very young, the elderly, the poor and those with HIV/AIDS. HIV increases the risk of pneumococcal disease by 20-40 times.[4] Worldwide, pneumonia causes 1.9 million of the 10 million deaths in children annually. In developing countries it is the leading direct cause of death in children under five and kills more children than AIDs, measles and malaria combined (table 1). In developing countries the incidence of pneumococcal disease is often unclear in neonates, older children and adults due to lack of data. Problems collecting surveillance data and testing laboratory specimens makes it harder to introduce reliable preventative measures. Most cases occur in Sub-Saharan Africa and Asia. Of 6 million children in Kenya, it is estimated that 250,000 will be affected.[2] In the UK, children receive the pneumococcal vaccination as part of the national immunisation schedule at about 2 years of age. In 2005 only 731 children in England and Wales contracted pneumonia.[3]

Most acute respiratory infections cause mild illness, however in immunocompromised patients such as those with HIV, these infections can be severe, especially when occurring in conjunction with diarrhoea or malaria1. Pneumococcal pneumonia and meningitis can occur together. Apart from poor sanitation and water supply, the WHO recognises that pneumococcal disease has the most significant impact on health in poorer countries.[2]

Table 1

The percentages of deaths due to cases of pneumonia in children under 5 in different world regions in 20051

REGION	*PERCENTAGE*
South Asia	21
Sub-Saharan Africa	21
Middle East and North Africa	15
East Asia and Pacific	15
Latin America and Caribbean	14
Central and Eastern Europe and the Commonwealth of Independent states	13
Developing countries as a whole	20
Industrialised world	2
WORLD	19

Treatment and Prevention

Pneumococcal infection is treated with antibiotics. In developed countries like the UK they can only be acquired with prescription whereas in developing countries these antibiotics are often available over the counter. Antibiotics given unnecessarily can contribute to antibiotic resistance. This resistance makes treating the disease more difficult. It is important that health professionals are trained suitably to recognise signs and symptoms of pneumonia and only prescribe antibiotics where appropriate.

Prophylactic cotrimoxazole given to HIV positive children reduces the risk of pneumococcal disease as well as *pneumocystis jiroveci* pneumonia (PJP), a major cause of death in children with HIV. However antibiotic resistance of these organisms to cotrimoxazole is reported to be increasing.[1] Other methods of prevention and treatment include encouraging exclusive breast-feeding, reducing indoor air pollution and giving micronutrient supplements.[12] Difficulties with treatment including drug resistance make the need for effective vaccination all the more important.

Vaccination

Pneumococcal Conjugate Vaccine (PCV)

A study looking at the effect of PCV showed that it decreased the prevalence of drug resistant streptococcus pneumoniae in children and older people.[5] Some other vaccines including those for measles and haemophilus influenza type b. also reduce mortality from pneumonia. PCV developed for children under 5 was introduced in the USA from the year 2000. It is effective against the 7 most common serotypes of

Streptococcus pneumoniae. After its introduction, the number of hospital admissions for pneumonia declined by 30%, over 8 years: and a decline of 65% where *Streptococcus pneumoniae* was the primary cause.[6] It is thought that as the number of vaccinated children increases, transmission to those who are unvaccinated decreases due to 'herd immunity' and in the USA herd immunity is thought to prevent twice as many cases as does vaccination.[4] Also, in a randomised double blind trial, children under 5 years were given the PCV or the meningococcal conjugate vaccine as a control. 10 of the 11 cases with pneumococcal pneumonia confirmed by blood culture were in the control group, confirming the value of PCV.[7]

Trials in the Gambia have shown that the PCV vaccine has reduced the number of pneumonia cases by 37%, reduced hospital admissions by 15% and reduced mortality by 16%.[1] In Kenya it is estimated that PCV could prevent 200,000 of the 250,000 deaths each year.[2]

Need for Vaccines

In a survey conducted by the Kenyan Paediatric association, health professionals were asked about the significance of pneumococcal pneumonia and meningitis. 96.4% agreed that strategies could be successfully implemented in Kenya to reduce pneumococcal disease and 95.7% thought vaccines against pneumonia were as important if not more important that antiretroviral drugs for HIV infection.[8] Roughly 65% thought that a vaccine would be more cost effective than treatment for pneumonia when expensive 3rd generation antibiotics had to be used.[8]

The Economic Impact

Pneumococcal disease increases hours of work lost by parents, hospital admissions and the need for expensive treatments. In Kenya, pneumococcal disease is responsible for 1 in 3 hospital admissions.[2] This results in substantial pressure on limited resources. Children are often left disabled if they survive a pneumococcal infection putting pressure on family members who may be unable to work due to having to provide on-going care at home.

Cost-Effectiveness of Vaccines

Many vaccinations are already shown to be cost effective and available cheaply in the developing world. In terms of prevention of disease vaccination is the most effective intervention. Providing vaccination for young children should also confer herd immunity, as described above, helping to prevent spread within the community. From a study in 76 developing countries it was concluded that PCV prevented 262,000 deaths per year in children aged 3-29 months and also reduced disabilities. The number was measured as 8.34 million disability-adjusted life years (DALYs). DALYs take into account the number of children left suffering, those who are disabled and those who die. It is a measurement of the overall disease burden.

At £3 per dose the one-off cost for a single campaign to vaccinate all children under 5 would be £517 million. Within the 76 countries the calculated cost of £61.78 per DALY would also be saved. In countries deemed eligible by the Global Alliance for Vaccine and Immunisation (GAVI) this would be cost-effective compared to the countries expenditure per DALY.[9]

The Role of Pharmaceutical Companies

In June 2011 Glaxo-Smith-Kline reduced vaccine costs of PCV to cost price for the world's poorest countries in a bid to help GAVI reduce its estimated £2.2 billion requirement. Other pharmaceutical companies such as Johnson & Johnson and Merck & Co also committed to a reduction in price. The rotavirus vaccine, offered in conjunction with the pneumococcal vaccine, will be reduced by 67%, at £1.50 per dose.[10] Glaxo-Smith-Kline has taken a tiered approach – for example in the USA prices are £31 per dose of vaccine, for private markets in Uganda £4.30 and for the poorest £1.50. When a third of emerging markets for vaccine are in the developing world, drug companies are being encouraged to make reductions and offer a business model globally.

The Future: Change is on the Way:

World leaders were brought together on13/6/11 to discuss the need for vaccines in developing countries. The UK Government took a lead encouraging other countries to contribute. £2.65 billion was pledged which overshot the initial target of £2.2 billion, making it a historic event. £366 million will train people to inject the vaccines, recruit and maintain doctors and nurses and this will have a long-term benefit. The reduction in vaccine prices by pharmaceutical companies means that the Millennium Development Goal (MDG) 4 to reduce childhood mortality is a feasible target. GAVI must now ensure vaccines get to the people that need them.

The Effect on Social and Economic Development

Reducing child mortality usually means women will have fewer children as survival in childhood improves. With a smaller population eventually there should be less pressure on food production and a decreasing number affected by poverty. As more children survive beyond 5 years they will be able to contribute more to the family unit, receive education and contribute to their country's development. This could also lead to a more sustainable country, able to provide for itself. Countries such as Kenya would rely less on other countries for economic and other support such as food donations. Child death and malnutrition also cause a loss in productivity and it has been estimated that raising life expectancy could improve infrastructure with economic growth increas-

Pneumococcal vaccination in developing countries *continued*

ing income by 10% after 20 years.[11] Also a decrease in the need for hospital admissions should remove some pressure on health systems allowing healthcare services to focus more on health promotion, for example, providing preventative programmes against malaria and HIV/AIDs.

Conclusion

- Pneumonia is a preventable disease that kills 1.9 million of the world's children each year.
- Recognition of the disease needs to improve.
- Vaccines are a cost-effective solution to an illness where there is a problem with increasing antibiotic resistance.
- GAVI has been promised the necessary funding and is now taking major steps to ensure that the world's poorest children receive the vaccine. Pharmaceutical companies have aided this process by reducing vaccine prices for poorer countries. This signifies a major change in terms of shaping the pharmaceutical market and for the future of Global Aid.
- The effectiveness of PCV programmes needs to be monitored closely, examining the extent that serotypes are covered by the vaccines; non-vaccinated serotypes and 'replacement' diseases may develop.
- Reaching the Millennium Development Goals by 2015 is a feasible target, which would mean 4 million children's lives would be saved allowing them to be educated and contribute to their country's development.

Catriona Parker, 3rd year medical Student, Glasgow University.

Prepared as a component of the Travel Medicine and Global Health Course

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Health Implications of Climate Change on Sub-Saharan Africa

(with reference to the 2008 cholera outbreak in Zimbabwe)

P O'Callaghan

Introduction

Since the 1970s, data has been collected showing that climate change is reshaping our world. Our excessive carbon dioxide production is causing a shift in climates and weather is becoming more 'aggressive' with extremes becoming more frequent. Developing countries appear to be suffering more than their wealthier neighbours.[1] The WHO estimates that global warming is causing 150,000 mortalities annually and the loss of 5.5million DALYs (Disability Adjusted Life Years); the majority of which are in the developing world.[2]

Extremes of temperature and precipitation are being reported more frequently in many parts of the world both of which pose a risk to human safety.[2] Prolonged high temperatures cause drought and famine, while torrential rainfall causes devastating floods. River flooding, tropical cyclones and severe thunderstorms are becoming more common with serious implications for the infrastructure of many countries.[1] Climate change is also predicted to have an effect on vector borne diseases such as dengue fever, with spread into new areas predicted.[3] Changes in ultraviolet sunlight exposure will also have effects on human health.

Lessons from 2008 cholera outbreak in Zimbabwe

Cholera (Vibrio Cholerae) is transmitted faecal-orally and is frequently due to drinking water from a contaminated source. Also a weakened immune system is more likely to make infection symptomatic. Both of these factors are present in Sub-Saharan Africa due to irregular rainfall and poor nutrition. Cholera causes 100,000-200,000 deaths worldwide annually; most deaths occur in children. Adequate rehydration is the most effective treatment.

Zimbabwe's health has varied over the past 20 years with a life expectancy from birth of only 45 years in 2000. Zimbabwe has had cholera outbreaks in the past but in 2008 a very severe outbreak occurred.

The outbreak lasted 7 months and claimed 4,276 lives. The rainy season, coinciding with Christmas holidays, caused population movements encouraging the spread of infection with 98,000 cases reported during the outbreak; which is likely to be an underestimate. The incidence of cholera fell sharply when the rainy season subsided in January/February (60% drop from February to March).The relationship between rainfall and the spread of cholera in 2008 is shown below.[4]

Rainfall studies in Zimbabwe have shown some changes over time. The main changes are in the areas that already receive the largest amounts of precipitation. Most increases have been reported within those regions already experiencing 80 and 90th percentiles of rainfall. This implies that regions that experience the highest precipitation are experiencing an increasing amount of rainfall. Results from other regions show that they are becoming drier. It is broadly accepted that annual rainfall will change in Zimbabwe in the future but results at present are not statistically significant.[6]

Conclusions

Disease patterns are predicted to alter as global climate change becomes more apparent. Prosperous

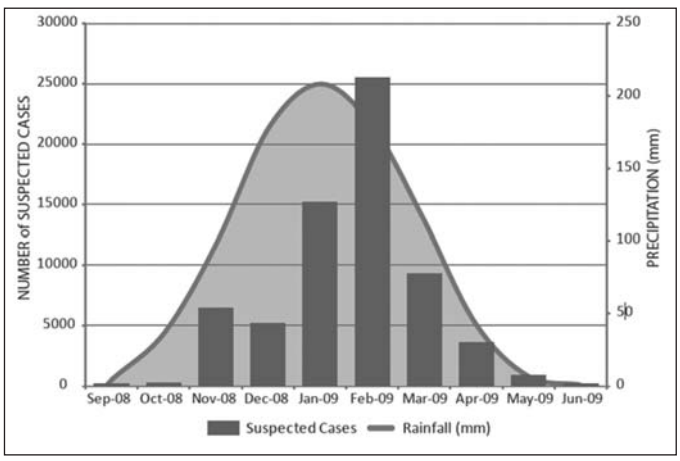

Fig 2
New Suspected Cholera cases reported per Month and mm of precipitation – (HIU US)[5]

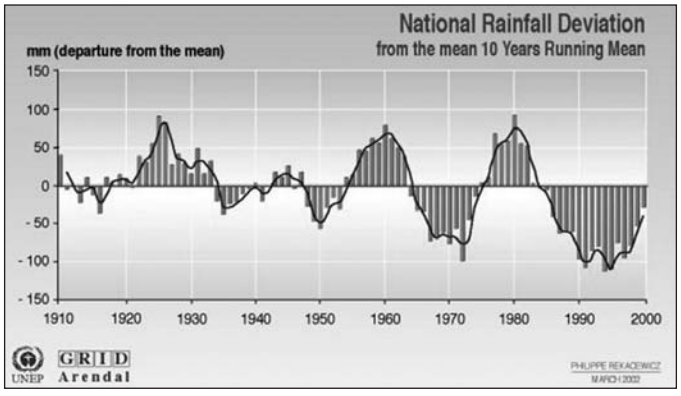

Fig. 3
Deviation from the mean from 1910 – 2000 (millimetres of rainfall) – (UNEP/GRID Arendal)[7]

Health Implications of Climate Change… *continued*

countries are likely to cope well with the adjustment but developing countries will manage less well. Changes in rainfall and precipitation will pose new challenges to global health which will have to be overcome. More aggressive weather and increasing international travel will make future outbreaks more difficult to control. Our emergency response to disease outbreaks must be rapid and decisive. For this to be planned effectively we will need to follow carefully climate changes for clues about where new outbreaks may occur.

Patrick O'Callaghan, 3rd year medical Student, Glasgow University.

Undertaken as a Travel Medicine and Global Health Course Assignment.

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In the News

GLOBAL TRAVEL
Nearly 32 million Britons a year travel to just four destinations. Some never go further than the UK and if many others go abroad, they choose Spain, Greece, Turkey or the US.

According to a study by Co-op Travel, more than nine in 10 holiday makers wish they could travel more widely. Scheduled airlines have seen up to a 10% reduction in vacation travel with the recession.

TRAVEL HEALTH WEBSITES
Three popular online resources have been renewing their websites.

NaTHNaC's website (www.nathnac.org) is undergoing a major redesign to improve the look and feel for both health professionals and travellers.

MASTA has recently launched a free travel health service to support practice nurses in running travel clinics.

TRAVAX, the website of Health Protection Scotland (HPS), has launched its updated website following a period of consultation with users. New features include a patient advice "suitcase", an FAQ index, additional maps and the option of signing up for daily or weekly updates.

SHIPS
Smoking on board
Almost half of cruise ship passengers want smoking on board banned, according to research by Cruise Compare. Data from 1,271 "cruisers", showed 28% wanted a complete ban and 11 % wanted smoking confined to designated areas on the ship. More than half of those questioned were smokers.

Gastro-enteritis infection
138 British holidaymakers are taking legal action against Fred Olsen after allegedly falling ill on board one of its ships. The cruise line was accused of "repeatedly failing to protect the health of tourists" on the MV Boudicca following several outbreaks of sickness. The ship sails to the Canaries, Europe and West Africa. A British law firm, is representing people who claim they have suffered severe gastric illness on ship between 2009 and 2011. Some of those passengers have blamed poor hygiene. Fred Olsen accepts that illness has occurred on the ship, but says the symptoms suffered by passengers were indicative of norovirus – infectious gastroenteritis which it says is beyond its control.

The line rejected suggestions that poor hygiene was responsible for any outbreaks of illness.

Irwin Mitchell and another travel law firm, Pannone, report that there has been a sharp increase in the number of British holidaymakers seeking legal representation after falling ill abroad, particularly in hotels in Turkey and Egypt.

Threat to life – The Somalia syndrome
The Indian Ocean, straddling the trade route between East and West, has been a favoured haunt for pirates for centuries. According to the International Maritime Bureau, Somali pirates attacked 117 ships in the first three months of 2011. More than double for the same period last year, this raises the number of ships held in Somalia to 28 and sailors to 600. (totals for the past decade are 160 ships and 4,000 sailors.) They now board ships across the Indian Ocean as far south as Mozambique, as far north as the United Arab Emirates and as far east as India.

Ransoms are paid to the pirates resulting in higher insurance premiums and extra security precautions by shipping lines. There is a price to be paid in blood as well. Whereas Somali pirates once rarely used violence, from January to March this year they killed seven sailors. Shippers also report frequent beatings and even a few instances of barbaric keel-hauling.

In January, South Korean commandos killed eight pirates while rescuing 21 hostages from a hijacked freighter. Cruise ships are no longer inviolate with several British registered ships having been chased and escaped their clutches. However in February pirates shot dead four American hostages who had been on an around-the-world sailing trip. British registered ships are being permitted to carry firearms for use in pirate attack.

ROAD TRANSPORT
The number of deer in Britain has more than doubled in the past decade to two million with increases in road traffic accidents caused by deer.

The rise is attributed to the introduction of new species such as muntjac and Chinese water deer, which are smaller and breed faster. Warmer winters, an absence of natural predators and less hunting mean the number of native roe and red deer has also increased. After being hunted to the edge of extinction in the 18th century, deer numbers have returned to levels not seen in Britain since the Norman Conquest. Numbers have risen to two million. Year-round crops also mean numbers of native roe and red deer, as well as the fallow deer introduced by the Normans, have grown. About 350,000 deer are killed every year, mostly by rifle.

Research presented at the British Ecological Society's annual meeting found that in certain areas

In the News *continued*

the problem is so bad that culling is required in certain areas. A major concern is the spread disease. Tick borne diseases such as Lyme disease spread to humans.

The Deer Initiative, a group of charities and government agencies aimed at controlling the number of deer in Britain, estimates that there were at least 42,000 traffic collisions involving deer last year.

Road Traffic accidents

Research at the RAC Foundation records that "Teenagers have almost double the risk of death from road traffic accidents – ie. 82 deaths per million – than the general population, where the figure is 42 deaths per million. For males in this age group, the risk is higher still at 127 deaths per million." The UN commission for global road safety said this is the biggest killer of young people in the world today.

IBM

Journal Watch

Edited by M Townend & J Moore

MOSQUITOES and MALARIA

1 Effectiveness of citronella preparations in preventing mosquito bites: systematic review of controlled laboratory experimental studies.
Kongkaewe C, Sakunrag I, Chaiyakunapruk N, Tawatsin A. Tropical Medicine & International Health, 16: 802-810. Doi: 10.1111/J.1365-3165.2011.02781.x

The authors reviewed 11 papers that met their inclusion criteria. They concluded that citronella was less effective than DEET, with a difference in protection times of 253 minutes (95% CI 169-336). A combination of citronella and vanillin however appeared to give protection times as long as those of DEET, but this was inconclusive because of the small numbers of studies performed.

Comment: *Although citronella preparations do have a mosquito repellent effect, DEET remains the gold standard. The addition of vanillin may increase the effectiveness of citronella: further studies are needed.*

2 Does targeting key-containers effectively reduce *Aedes aegypti* population density?
Maciel-de-Freitas R, Lourenco-de-Olivera R. Tropical Medicine & International Health. Doi: 10.1111/j.1365-3156.2011.02797.x First published online 23 May 2011

Adult mosquitoes were collected weekly over a period of 55 weeks and pupal surveys were done at intervals of 4 months. Water tanks and metal drums were the most productive containers in terms of populations of mosquito pupae. There was a short term decrease in adult female *Aedes aegypti* density after covering water tanks with nylon net, but a long term reduction was found only after covering both water tanks and metal drums.

Comment: *In order to obtain effective vector control it is important to be aware of the natural history of mosquito vectors including their preferred breeding sites. Action to eliminate breeding sites is an important aspect of vector control.*

3 Intermittent prevention of malaria in pregnancy: at the crossroads of public health policy.
Chico RM, Chandrmohan D. Tropical Medicine & International Health, 16: 774-785. 2011

Intermittent preventive treatment of malaria in pregnancy (IPTp) with Sulphadoxine/pyrimethamine (SP) has been a key component of antenatal care for almost a decade, reducing the burden of low birth weight due to malaria in sub-Saharan Africa. SP has however become less effective against malaria parasites over the same period and its continued use has been questioned. The paper discusses possible alternatives such as mefloquine and azithromycin, and also looks at a completely different strategy of intermittent screening and treatment.

Comment: *Malaria during pregnancy remains a great risk to both mother and foetus in sub-Saharan Africa. There is a need for evaluation of current methods of treatment and the introduction of new methods.*

4 Epidemic of Plasmodium falciparum malaria in Central India, an area where chloroquine has been replaced by artemisinin-based combination therapy.
Singh N, Shukla MM, Chand G, et al. Trans R Soc Trop Med Hyg 2011 Mar; 105(3):133-9

An epidemic of *Plasmodium falciparum* malaria was studied in Madhya Pradesh (Central India). The authors concluded that either insecticide spraying had not been properly carried out or that mosquitoes had become resistant to the insecticide. In addition there had been problems with the availability of artemisinin combination therapy and rapid diagnostic tests. They state that as the global prevalence of malaria decreases with malaria control initiatives more areas will become mesoendemic or hypoendemic. Detection and control of epidemics will require greater attention, with mechanisms to ensure the quality of these interventions.

Comment: *Control of both endemic and epidemic malaria is dependent on a variety of measures including vector control, prompt diagnosis and the availability of effective treatment. All are essential in the effort to control malaria.*

5 A plethora of Plasmodium species in wild apes: a source of human infection?
Rayner JC. Liu W. Peeters M. Sharp PM. Hahn BH. Trends in Parasitology. 27(5):222-9, 2011 May.

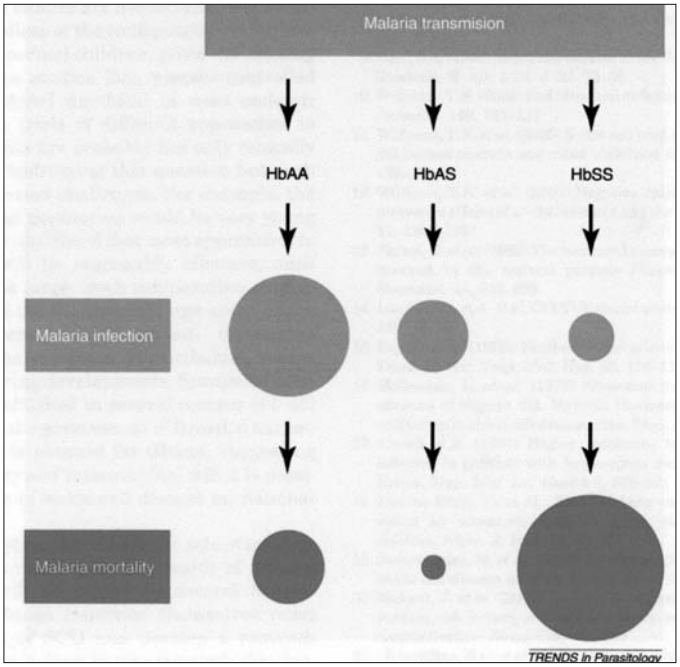
Abstract. Recent studies of captive and wild-living apes in Africa have uncovered evidence of numerous new Plasmodium species, one of which was identified as the immediate precursor of human Plasmodium falciparum. These findings raise the question whether wild apes could be a recurrent source of Plasmodium infections in humans. This question is not new, but was the subject of intense investigation by researchers in the first half of the last century. Re-examination of their work in the context of recent molecular findings provides a new framework to understand the diversity of Plasmodium species and to assess the risk of future cross-species transmissions to humans in the

Journal Watch *continued*

context of proposed malaria eradication programs.

6 Sickle cell disease and malaria morbidity: a tale with two tails
Williams TN. Obaro SK. Trends in Parasitology. 27 (7), 2011 July.

This paper looks at the association between malaria risk and malaria mortality in those with sickle cell disease (HbSS), sickle cell trait (HbAS) and those with non-sickle cell haemoglobin (HbAA). It contains the following interesting and informative diagram showing that those with HbAA are at highest risk of malaria infection but have a lower mortality risk from malaria; those with HbAS are at lower risk of infection and have the lowest risk of mortality; whilst those with HbSS are at lowest risk of infection but have the highest mortality risk if they do become infected. The size of the circles represents the relative size of the risk.



7 Malaria in Greece
http://wwwnc.cdc.gov/travel/news-announcements/malaria-greece.htm

The GeoSentinel network has reported a confirmed case of *Plasmodium vivax* infection in a person who travelled to southern Greece around the end of July 2011, with no history of other travel to malaria endemic areas. Greece has been stated to be free from malaria since 1974, but according to Greek health authorities a total of 6 cases of malaria have been reported in persons with no history of travel to endemic areas. All cases were confirmed as *P vivax* and all occurred in the Peloponnese area of southern Greece

Comment: *The risk of acquiring malaria in Greece is very small and it is not necessary to recommend anti-malarial chemoprophylaxis for travellers to Greece. It would be wise however to recommend bite precautions, especially for travellers to the southern Greek mainland, and to bear in mind the possibility of malaria in returned travellers from Greece in the differential diagnosis of unexplained fever.*

8 Evaluation of four rapid diagnostic tests for the diagnosis of *Plasmodium vivax* in Korea.
Kim, K. H., Jang, J. W., Woo, M. K., Oh, J. S., Han, E. T., Lee, W. J., An, S. S. A. and Lim, C. S. (2011), Tropical Medicine & International Health, 16: 1427–1431. doi: 10.1111/j.1365-3156.2011.02846.x

Objective: To evaluate 4 rapid malaria diagnostic kits (RDTs) in Korea: OptiMAL test, SD BIOLINE Malaria Ag P.f/Pan test, Humasis Malaria P.f/Pan antigen test and CareStart™ Malaria Pf/Pv Combo test.

Methods: A hundred malaria patients with *Plasmodium vivax* (P. vivax) and 100 healthy volunteers were recruited. The results from earlier four RDTs were compared with the reference standard, the Giemsa-stained traditional microscopic diagnosis.

Results: Compared with the reference standard, the sensitivity and specificity for *P. vivax* were 92.7 and 100% for SD BIOLINE Malaria Ag P.f/Pan test; 94.6% and 100% for OptiMAL test; and 95.5% and 100% for both Humasis Malaria P.f/Pan antigen test and CareStart™ Malaria Pf/Pv Combo test.

Conclusion: *The performances of all four malaria RDT kits were acceptable, although Humasis Malaria P.f/Pan antigen test and CareStartTM Malaria Pf/Pv Combo test gave superior performances with ROK isolates.*

9 Comparative evaluation of systemic drugs for their effects against *Anopheles gambiae*.
Butters MP, et al. Acta Tropica. DOI: 10.1016/j.actatropica.2011.10.007

Ivermectin is an endectocide, i.e. it has activity against both endo- and ectoparasites. It is used in the control of onchocerciasis and filariasis, and for the elimination of Strongyloides, and has been used for scabies and lice infestations. It is also known to be effective against *Anopheles gambiae*, the principal malaria vector in much of Africa, at human blood concentrations found after standard dosage administration. The drug has an effect on glutamate-gated chloride channels in invertebrates and may either kill mosquitoes or cause more temporary "knock-down" from which mosquitoes may not recover if it impairs their ability to escape from their immediate environment and take in water or take another blood feed, reducing the likelihood of parasite transmission.

The authors investigated several other compounds known to target the same mechanism in invertebrates with variable results, though ivermectin is currently the only compound of this type licensed for use in humans.

Comment: *Ivermectin, already licensed for administration to humans, holds promise as a means of reducing malaria parasite transmission by mass administration to human populations. Investigations such as those reported in this paper may ultimately lead to the development and use of other compounds for this purpose.*

10 *In vitro* antiplasmodial acxtivity and cytotoxicity of extracts and fractions of *Vitex madiensis*, medicinal plant of Gabon.
Ondo JP et al. Tropical Medicine & International Health. 2011. DOI; 10.1111/J. 1365-3156.2011.02922.X

The authors investigated the action of various extracts and fractions, using different solvents, of the plant *Vitex madiensis* against chloroquine resistant *Plasmodium falciparum*. The plant is traditionally used to treat malaria symptoms in Gabon, West Africa. Their findings of the effect of certain fractions of extracts from the leaves of the plant supported the use of the plant to treat malaria. They suggest that these fractions could be selected for future investigation and/or for the treatment of malaria symptoms after standardisation.

Comment: *At a time when worrying reports of resistance to artemisin derivatives are beginning to emerge, this paper underlines the importance of continuing the search for new agents to treat malaria and of investigating traditional local methods of treatment in the search for efficacious new drugs.*

11 Dengue

1 Health Protection Agency
http://www.hpa.org.uk/web/HPAweb&HPAweb Standard/Page/1263812783370. Accessed 20/06/2011

In 2010, 406 individual cases of dengue fever were reported in England, Wales and Northern Ireland compared to 166 in 2009. Infections with dengue fever do not occur in the United Kingdom. All cases reported have been acquired as a result of travelling to endemic areas, the majority to South and South East Asia, South and Central America, Africa and the Caribbean. [Note that the totals in the table are higher than the total cases as some cases had travelled to more than one country.] See the dengue annual reports for further information.

Laboratory-confirmed cases of dengue fever by region of travel, England, Wales and Northern Ireland: 2009 – 2010

World region of travel	**2009**	**2010**
South East Asia and Far East	66	136
Indian subcontinent	40	126
Caribbean	5	36
Sub-Saharan and Southern Africa	17	16
South America	7	21
Central America	–	10
North Africa and the Middle East	3	2
Pacific	4	–
Asia unspecified	–	1
Africa unspecified	–	1
Country not stated	35	100
Total	***177***	***449***

Comment: *The number of cases of dengue reported in the UK appears to be rising, with the major portion of cases originating from Southeast Asia and the Indian subcontinent. Travel health advisers need to make their travelling patients aware of the major risk areas and of measures to prevent mosquito bites, the only prophylactic measure at present. They also need to be aware of the clinical features of dengue in ill returning travellers.*

2 First dengue virus detection in Aedes albopictus from Delhi, India: ts breeding ecology and role in dengue transmission.
Kumari R, Kumar K, Chauhan L. Tropical Medicine & International Health, 16: doi 1.1111/j.1365-3156.2011.02789.x

During 2008 and 2009 monthly *Aedes* surveys were carried out in 126 locations in Delhi. *A. aegypti* was found to be the most commonly occurring species, breeding throughout the year. *A. albopictus* was found in almost 10% of locations. Both species were found to carry dengue virus, with 10.5% of *A. aegypti* and 11.76% of *A. albopictus* testing positive for the virus. A. albopictushas the ability to adapt to breeding in man-made containers in urban areas.

Comment: *The presence of dengue virus in Aedes albopictus in urban Delhi and the well-known ability of the species to breed in manmade, often relatively small, water containers implies that the risk of acquiring dengue virus infection is not confined to rural areas. In large conurbations in the Indian subcontinent such as Delhi, and in large conurbations in Southeast Asia both the local population and travellers to such areas are potentially at risk.*

Journal Watch *continued*

EMERGENCY MEDICINE

1 Efficacy and safety of scorpion antivenom plus prazosin compared with prazosin alone for venomous scorpion (Mesobuthustamulus) sting: randomised open label clinical trial.
Bawaskar H, Bawaskar P. British Medical Journal, 2011; 342:doi:10.1136/bmj.c7136

Encounters with venomous animals amongst travellers are mercifully rare, although they account for over 3000 deaths worldwide each year. This article compares the efficacy of a combination treatment of prazosin and antivenom verses prazosin alone. This article will be of interest to those involved in the delivery of expedition and wilderness medicine in remote settings, or those with an interest in toxicology. It may also serve as a reminder that, for some of our more adventurous patients, education regarding animal safety is important.

2 Harness suspension and first aid management: development of an evidenced based guideline.
Adisesh A, Lee C, Porter K. Emergency Medicine Journal, 2011; 28 (4) 265-268. Doi:10.1136/emj.2010.097246

Injuries sustained from falls and subsequent suspension in climbing harnesses are a potential industrial workplace hazard. This particular type of industrial accident and the associated mechanisms of injury can clearly be mirrored in suspension injuries associated with climbing. As such this article will be of interest to expedition medics with an interest in pre-hospital expedition medical care. First aid management of suspension trauma (including rescue) is assessed in the UIAA International Diploma in Mountain Medicine. The UK Health and Safety Executive commissioned an evidence based review of the literature pertaining to the first aid management of this injury and develop appropriate guidelines. This article reviews the development of these guidelines and suggests areas for future research.

3 Rhabdomyolysis after Prolonged Suspension in a Cave.
Wharton D, Mortimer R. Wilderness and Environmental Medicine, 2011, 22 (1) 52-53

The applicability of the previous article on establishing guidelines for the first aid management of victims of suspension trauma is demonstrated in this short case report. The authors describe the case of a 29 year old speleologist who became trapped on his rope for over four hours. During this time he lost the sensation in both legs along with the movement in one. On admission to hospital he was found to have serum myoglobin levels of 1622ng/ml (NR 0 to 85 ng/ml) and Creatine Phosphokinase of 9030 (NR 60 and 400 IU/L) commensurate with rhabdomyolysis. After a short stay in hospital he was discharged and made a full recovery.

4 Risks and Management of Prolonged Suspension in an Alpine Harness.
Mortimer R. Wilderness and Environmental Medicine, 2011, 22 (1) 77-86

Following on from the case report, Mortimer goes on to discuss in greater depth the risks and management of this wilderness activity related injury, highlighting the pathophysiology associated with this problem.

POLIOMYELITIS

http://www.who.int/esr/don/2011_09_01/en/index.html

The Ministry of Health in China has informed WHO that wild poliomyelitis type 1 (WPV1) has been isolated from 4 young children aged from 4 months to 2 years in July 2011. The children developed paralysis. All cases occurred in the Hotan Prefecture of Xinjiang Uygur Autonomous Region. Virus isolates appeared to be related to viruses currently circulating in Pakistan.

Comment: *Xinjiang (Sinkiang) in the northwest of China adjoins the Tibetan plateau, from which it is separated by the Kumlun Shan mountains, and contains the Taklamakan Desert. Its border shares 5,600 kilometres of frontier with Mongolia in the northeast, Russia, Kazakhstan, Kyrgyzstan and Tajikistan in the west, and Afghanistan, Pakistan and India in the southwest. In Afghanistan 316 out of 326 districts are now polio free. Fifty two cases of polio have been reported so far in Pakistan this year, most of them from Sindh (Karachi), Baluchistan (the Quetta area), or North West Frontier Province (NWFP), now known as Khyber Pakhtunkhwa. Xinjiang is a region not visited by many tourists or other travellers, but this apparent spread of poliomyelitis into China may indicate the possibility of spread to other areas of China or the Central Asian republics which border on Xinjiang, Afghanistan and Pakistan, with obvious implications for travellers to those areas.*

SKIN DISORDERS

Skin disorders among travellers returning from tropical and non-tropical countries consulting a travel medicine clinic
Herbinger, K.-H., Siess, C., Nothdurft, H. D., von Sonnenburg, F. and Löscher, T. (2011), Skin disorders among travellers returning from tropical and non-tropical countries consulting a travel medicine clinic. Tropical Medicine & International Health, 16: 1457–1464. doi:

10.1111/j.1365-3156.2011.02840.x

Summary
Objective: To evaluate the causes and risks of imported skin disorders among travellers.

Methods: Data from 34 of 162 travellers returning from tropical and non-tropical countries and presenting at the outpatient travel medicine clinic of the University of Munich, Germany, between 1999 and 2009 were analyzed for this study. Of these, 12.2% were diagnosed with skin disorders.

Results: Main destinations visited were Asia (40%), Africa (27%) and Latin America (21%). Tourism in the form of adventure travel/backpacking (47%) and package holidays (23%) was the most common purpose of travel. The leading causes of skin disorders were arthropodal (23%), bacterial (22%), helminthic (11%), protozoan (6%), viral (6%), allergic (5%) and fungal (4%). The 10 most frequently diagnosed specific skin diseases associated with specific destinations were insect bites (17%, Southern Europe), cutaneous larva migrans (8%, Asia and Latin America), cutaneous leishmaniasis (2.4%, Mediterranean Region/Middle East), dengue fever (1.5%, Asia), rickettsioses (1.3%, Southern Africa), myiasis (0.8%, Central America), filarioses (0.7%, Africa), tick bites (0.6%, Central/Eastern Europe), schistosomiasis (0.6%, Africa) and tungiasis (0.6%, Africa). Travellers in sub-Saharan Africa had the highest relative risk of acquiring skin disorders.

Conclusion: *As more than 20% of all skin disorders among returned travellers were caused by arthropods and about 50% by infectious pathogens, pre-travel consultations should include specific prophylaxis and consider the most important risk factor for the travel destination.*

HIGH ALTITUDE MEDICINE

The headache of high altitude and microgravity – similarities with clinical syndromes of cerebral venous hypertension.

Wilson, MH, Imray CHE, Hargens AR. High Alt. Med. Biol. 12(4), 2011 DOI: 10.1089/ham.2011.1026

A slightly edited version of the abstract of this paper is as follows.

Syndromes with cerebral venous hypertension, such as idiopathic intracranial hypertension and jugular foramen outlet obstruction, result in headaches. The classic theory of the cause of high altitude headache is increased intracranial pressure (ICP) secondary to hypoxemia but also (Roach and Hackett, 2001), but, there does not appear to be a correlation between the headache of acute mountain sickness (AMS) and the presence of cerebral oedema (Bailey et al, 2006; Wilson et al, 2009). Research has concentrated on arterial perfusion to the brain in hypoxia, but there has been little study of venous drainage. Hypoxia results in increased cerebral blood flow but venous outflow has been assumed to be of little consequence. Retinal venous distension and the increased venous blood demonstrated by near infra-red spectroscopy and MRI imply that, in hypoxia, relative venous insufficiency may exist. Similarly, there is evidence that the fluid shift during microgravity is similar to idiopathic intracranial hypertension, thought to be primarily due to venous insufficiency. The adaptations of humans with cerebral venous systems that have to cope with large changes in hydrostatic pressure may predispose to inflow/outflow mismatch. Slight increases in central venous pressures (e.g., from hypoxia-induced pulmonary vasoconstriction) may further compromise venous outflow at altitude. A better understanding of cerebral venous physiology may help with the pathogenesis of headaches currently considered idiopathic. It may also enable us to trigger headaches for study and hence enable us to develop new treatment strategies.

Comment: *There is still much that remains to be explained about the physiology and pathology of travel to high altitude. This paper adds greatly to our understanding of the nature of high altitude headaches by taking into account not only the undoubted increase in cerebral arterial blood flow associated with hypoxia but also a possible contribution made by reduced venous drainage, which may have implications for the management of high altitude headache.*

RESEARCH

Potential of Electronic-Ticketing to enhance the uptake of travel health interventions

Y Saidu

Abstract

Background

In recent years, advances in Electronic-Ticketing (ET) systems instituted by the airline industry are enabling a growing number of travellers to conveniently use the internet to plan and book their trips. However, little is known about the type of health information that airlines display on their ET sites and how this service can be used to improve the uptake of pre-travel health advice and interventions. This paper assessed the level of health information that is displayed on the ET sites of the main airlines flying to Africa. In addition, it explores how ET system can be used to enhance the uptake of pre-travel health advice and interventions.

Methods

The ET pages of airlines with intercontinental flights to and from Africa were extensively navigated to assess the type of health information that is displayed on their respective ET sites.

Results

A total of 36 airlines with intercontinental flights to Africa were identified. Slightly above half (55.5%) of these airlines provided any form of information on travel health on their ET sites. Of this number, a few airlines specifically highlighted the need for the traveler to adopt appropriate preventive measures against travel thrombosis (22.2%), jet lag (11.1%) or fear of flying (8.3%). Similarly, three airlines (8.3%) recommended personal protection measures against mosquito bites (PPM) while seven suggested both chemoprophylaxis and PPM (19.4%). Likewise, 11 airlines (30.6%) recommended vaccination against yellow fever either as a stand-alone vaccination (19.4%) or alongside other vaccines (e.g. rabies, typhoid, meningitis, cholera, hepatitis).

Conclusion

This study illustrates that the level of health information that most airlines provide on their ET sites is unsatisfactory, both in content and in depth and therefore, for optimal customer service, airlines should consider to provide their travelers with appropriate and comprehensive pre-health advice on their ET sites.

Key words

Electronic-Ticketing, airlines, travel health, pre-travel health advice.

Introduction

Among the worldwide 880 million international travellers in 2009, 467 million (53%) chose a plane for their journey.[1] This choice may represent the only option for people wanting to travel to distant and hard-to-reach continents like Africa. Upon arrival in some of these destinations in Africa, travelers may be exposed to a variety of health conditions including preventable diseases.[2,5] The majority of travel associated infections can be prevented if travellers would adhere to existing travel health guidelines.[3,6,8] However, compliance with these guidelines continues to be very low in travellers.[9,13] Although this low up take can be partly attributed to the general reluctance by travellers to seek pre-travel health advice, the virtually non-existent recommendations by the air transport industry in the past might have also contributed.

To improve this low uptake, several authors[3,6,12] have highlighted the need to identify innovative ways of reaching travellers for health advice prior to departure. One potential channel that can be used to reach travelers is Electronic-Ticketing (ET) systems because an increasing number of travelers use these systems[14] to plan and book their trips. ET systems were first introduced in 1994 by the United Airlines[14] and by 2008 virtually all airlines have adopted and implemented these systems.[15] Although this recent development in ET systems may greatly limit contacts with travel agents and other channels that theoretically could have played a role in informing travellers of travel-associated health risks, the systems clearly have considerable potential in reaching a wider travel community. However, little is known about the type of health information that airlines display on their ET sites and how this service can be used to improve the uptake of pre-travel health advice and interventions. This paper therefore presents the level of health information that is displayed on the ET sites of the main airlines flying to Africa. In addition, it explores how ET systems can be used to enhance the uptake of pre-travel health advice and interventions.

Methods

The website of the International Air Transport Association (IATA) was used to indentify airlines with destinations in Africa. IATA has 230 registered airlines and accounts for 93% of the total global air traffic.[16] The member airlines are classified into geographic regions and this classification was used as a basis for identifying airlines with destinations in Africa. In brief, the "Membership" page of IATA[17] was first con-

sulted in order to view the different airlines per region (Africa, Europe, Middle East and North America) and the links to their respective websites. These links were then followed in a systematic manner to enter in to the main ET page of each airline. Once on an ET page, a quick search was performed to verify whether the airline in question has destinations in Africa. This was done by clicking on "Destinations", "Where we fly to" or "Route maps". This brief search displayed a world map with "dots" that corresponded to the various departure and arrival cities. Airlines with maps that had dots in Africa, which were linked with a line to other geographic regions (North America, Europe and Middle East), were selected. The survey primarily focused on airlines from Africa, Australia, Europe, Middle East and North America with an African destination. Airlines from Asia and South America were excluded mainly because the epidemiology and health care systems are somehow similar to those in Africa.

After the airlines were identified, the ET sites of the respective airlines were extensively navigated to assess the level of health information that they provide on their ET pages. The specific questions that were examined include: 1) the type of health information provided; 2) the number of mouse clicks to get to a health page; 3) advice on preventive measures, mainly advice on malaria prophylaxis and vaccinations; 4) reference to an institution for health advice; 5) presence of a lead questions or data field on travel health or vaccination; and, 6) mention of vaccination/travel health on the "Frequently Asked Questions" (FAQs) section. To increase the sensitivity of the survey, a search was run in the search menu of each ET page using the search terms; health, malaria and vaccination.

Results

A total of 36 airlines, representing 15.7 % of the total number of airlines registered with IATA were found to have intercontinental destinations in Africa. Of this number, 15 were from Europe, nine from Africa, nine from the Middle East, two from the United States of America and one from Australia. All of these airlines had functional ET web pages which showed great similarity in the basic elements that were displayed on the home page. These basic elements included, in almost all of the cases, items like "book a flight", "hotel", "rent a car", and tourism ads. Unlike these basic elements that appear to be similar, the nature in which health information was displayed as well as its location varied from airline to airline.

Table 1 shows the main characteristics of health information displayed on an ET page. As can be seen, while all included airlines provided information on special needs (services provided to the disabled traveller, traveling with children or pets, advice to pregnant passengers), slightly above half (55.5%) of the airlines provided any form of information on travel health. Of this number, a few airlines specifically highlighted the need to adopt appropriate preventive measures against certain conditions that are associated with air travel like travel thrombosis (22.2%), jet lag (11.1%) or fear of flying (8.3%). Similarly, the proportion of airlines that provided practical information on the prevention of tropical diseases was low with three airlines (8.3%) recommending personal protection measures against mosquito bites (PPM) and seven (19.4%) proposing both chemoprophylaxis and PPM. Likewise, 11 airlines (30.6%) recommended vaccination against yellow fever either as a stand-alone vaccination (19.4%) or alongside other vaccines (e.g. rabies, typhoid fever, meningitis, cholera, and hepatitis). Although some airlines (Table 1) mentioned these diseases on their ET sites, only four (11.1%) specifically recommended vaccination against some of these conditions.

Regarding referral, ten airlines (27%) referred the traveler to an institution for health advice (Table 1). As can be seen, airlines tend to refer the traveller to a General Practitioner (11.1%) or a travel clinic (16.6%) compared to standard health institutions like the Center for Disease Control and Prevention (CDC).

Overall, seven travel clinics were identified; two of which are in Africa (South African Airways Netcare travel clinics[18]) and Afriqiyal Medical Services) and five in Europe including KLM travel clinics[19], Medical Advisory Services for Travellers Abroad-MASTA[20], referenced by British Airways); the BAD group[21] (referenced by Air Berlin); Swiss Medical Services[22] (referenced by Swiss) and "Centre International de vaccination Air France"[23], (referenced by Air France). Apart from the vaccination center of Air France, the Afriqiyal Medical services and Swiss Medical services that seem to be departments within the airline, the other travel clinics exist as a network of clinics with a significant presence in the host country. One airline (2.7%) contained a link to a reference health institution-the Center for Disease Control and Prevention[24] (referenced by Delta Airlines). This link was not easily visible and required about 5 mouse clicks. Although not easily visible, the health information it displayed was far more comprehensive compared to what other airlines displayed on their ET sites.

Table 1 also shows that only two ET sites (5.6%) had a FAQ on vaccination/travel health on their FAQ section. Similarly, while almost all of the ET sites contained specific questions or data fields that offer the traveller the opportunity to purchase additional services such as travel insurance, hotel reservations and car rentals, or to sign up for e-news in order to get updates on flight status, none of these sites had a specific question that offered the traveller the opportunity of being provided with pre-travel health advice or a reminder on the importance of adopting appropriate preventive health measures.

Potential of Electronic-Ticketing… *continued*

Discussion

This survey included airlines from Europe, North America, Africa, Middle East and Australia with destinations in Africa. The reason for this choice was that Africa accounts for only 3% of the total global air traffic[25] and therefore selecting airlines with destinations in this region would guarantee a manageable sample size. In addition, it was assumed that airlines with destinations in Africa are aware of the high endemicity of some infectious diseases, the poor hygienic conditions and sub-standard health facilities and for optimal customer service should provide travellers with appropriate pre-health advice on their ET sites. However, this survey revealed that only about 55.5% of airlines provide health information on their ET sites. In general, this information was not easily visible and required an extensive navigation of the site; an activity that only few travellers may be willing to perform.

Only a small proportion (36.1%) of airlines with destinations in Africa suggested preventive strategies anti-malaria measures and vaccination against yellow fever. This finding was somehow least expected because of the high incidence of malaria[26] and the mandatory requirement for a yellow fever vaccination certificate[8] for some destinations in Africa which could theoretically have influenced airlines to provide this information; however, this apparently was not the case as only a few airlines presented this information.

Moreover, although four ET sites recommended, in addition to yellow fever, other vaccines against conditions that are widely prevalent in Africa such as hepatitis A, meningococcal meningitis, typhoid fever and rabies, none of these sites mentioned the need for immunization against measles or cholera even though there were outbreaks in some African countries.[27,28]

Furthermore, few airlines referred the traveller to a travel clinic (19.4%) or a well established reference health institution like the CDC (2.7%). This observation probably highlights that airline agencies are less aware of the services offered by these institutions. However, awareness of such services might be relevant for today's travel community. Given that travellers are usually satisfied with advice provided by travel health specialist[29] and that reference institutions like the CDC[24] provide more comprehensive health information compared to the airline, greater collaboration may be needed between the travel health community and airlines in informing travellers of travel-associated health risks. Such collaboration may be vital in identifying and targeting travellers who may benefit from travel health interventions, e.g. by directing the traveller to a national expert website wherever such exists, or even to a list of travel clinics in the country of residence at the time of ticket purchase. Although our survey did not identify a single link to the travel health publication of the World Health Organization,[7] such link may also be useful in providing appropriate pre-travel health advice particularly in countries where no national websites exist.

The fact that only 2 airlines had a FAQ on health on their ET sites may indicate that travellers have not previously asked airlines questions concerning health. Nonetheless, it may be beneficial to include a FAQ on travel health as FAQs represent a fast means of locating information.

By experience, airlines and the travel industry in general are reluctant to provide travellers with detailed and up to date health information; partly for lack of interest, partly for concerns of deterring future customers from travel, and additionally these institutions are not well positioned to perform such tasks for lack of medical competence. The later challenge may be overcome by electronically linking travellers to travel health experts or clinics. This may be done by including a specific question on the ET page that offers the traveller the opportunity of being provided with pre-travel health advice or a reminder on the importance of adopting appropriate preventive health measures against health risks that are prevalent in a particular destination. If successful, this strategy may ultimately serve as useful channel in protecting the traveller from travel-associated conditions and accordingly spare the individual, the insurance companies and the society from the huge cost of travel-associated diseases. There may also be profit for the airlines, as the customers will realize that customer care and good quality are important issues for that carrier. Consequently the travel health community should liaise with the airline industry to enhance the quality of those ET pages to keep travellers healthy.

Although this survey provides valuable information on the state of health information displayed on ET sites, certain limitations must be acknowledged. First, the survey focused primarily on airlines with direct flights to/from Africa; a continent that accounts for only 3% of the total global air traffic.[25] Perhaps, if the survey was expanded to include all the 230 airlines registered with IATA and other internet booking sites like Expedia, Cheap flights, "Orbitz", Travelocity, "FareCompare" "flycheap", or "flugtickets" other vital information might have been noted. Second, the survey used a non validated methodology to assess information whose presentation varied from airline to airline. This methodology and variance could have probably introduced some bias. With further reach in to this area, it may be possible to standardize a methodology that can be used to generate information.

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Yauba Saidu MD, Msc.
Vaccinology Unit, MRC, The Gambia Unit
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Corresponding author:
Yauba Saidu
Medical Research Council,
20 Atlantic Road, Fajara,
P.O box 273 Banjul.
The Gambia
Tel: +220 3813922
Email: yaubasaidu@yahoo.com

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Potential of Electronic-Ticketing… *continued*

Table 1
Characteristics of health information displayed on an ET page

Type of health information displayed on an ET page	n	%
Provides information on special needs (e.g. service to the disabled or pregnant traveller, traveling with children or pets)	36	100
Provides information on travel health	20	55.5
Provision of practical health information necessary to prevent:		
Travel Thrombosis	8	22.2
Jet Lag	4	11.1
Fear of flying	3	8.3
Malaria	10	27.7
Yellow fever	11	30.6
Typhoid fever	9	25.0
Food and water borne diseases excluding typhoid fever	2	8.3
Sexually transmitted diseases including Human Immunodeficiency Virus (HIV)	2	8.3
Others (Cholera, Rabies and Schistosomiasis)	4	11.1
Recommendation of prophylactic measures against malaria and vaccine preventable diseases		
Anti-malarial measures		
Site recommends personal protection measures against mosquito bites (PPM) only	3	8.3
Site recommends anti-vector measures only	7	19.4
Immunization		
Site recommends only yellow fever vaccine	7	19.4
Site recommends both yellow fever and other necessary vaccines	4	11.1
Sites refer travellers to any institution for health advice	15	41.6
Type of institution		
Embassy	1	2.7
Country office	1	2.7
General Practitioner	4	11.1
Travel agent	1	2.7
Travel clinic	7	19.4
Reference health authority (e.g. CDC)	1	2.7
Site contains a specific question on travel health on ET page	0	0
Site mentions vaccination/travel health in FAQs section	2	5.6

ET: Electronic-ticketing; CDC: Centre for Disease Control and Prevention; FAQ: Frequently Asked Question

Emerging Trends in Free-living Amoebic Infections of the Brain

J H Diaz

Key Words
Free-living amoebic infections; primary amoebic meningoencephalitis, granulomatous amoebic encephalitis; organ transplantation, contraindications.

Additional Key Words:
Naegleria fowleri, *Acanthamoeba* species, acanthamoebiasis, *Balamuthia mandrillaris*, leptomyxid amoeba, balamuthiasis, Sappinia species, *Sappinia* diploidea, Sappinia pedata.

Abstract
With the exception of *Acanthamoeba* keratitis in contact lens wearers, brain infections caused by free-living amebae are rare, but increasing today. This review analyzed cases of *Naegleria fowleri* primary amoebic meningoencephalitis and Balamuthia mandrillaris granulomatous amoebic encephalitis for behavioural and demographic risk factors for pathogen exposures, new mechanisms of transmission, clinical outcomes, and management and prevention strategies. Fatal free-living amoebic infections of the brain are increasing today due to more frequent environmental and occupational exposures to opportunistic pathogens by both genetically susceptible and immunosuppressed human hosts in a warming ecosystem that supports disease transmission.

Emerging Trends in Free-living Amoebic Infections of the Brain
Free-living amoebae of the genera *Acanthamoeba*, *Balamuthia*, *Naegleria*, and Sappinia are rare causes of infectious diseases in humans, with the exception of *Acanthamoeba* keratitis (AK) which is reported in over 1-2 cases per million contact lens wearers in the United States (US) annually.[1,7] Unlike several *Acanthamoeba* species, only one species of *Naegleria*, *N. fowleri*, is known to infect humans by causing an acute, fulminant, usually lethal, brain infection, known as primary amoebic meningoencephalitis (PAM).[1,5]

Balamuthia mandrillaris, formerly known as leptomyxid amoeba, is another opportunistic, free-living ameba. Like *Acanthamoeba* spp., B*alamuthia mandrillaris* is capable of causing skin lesions and granulomatous amebic encephalitis (GAE) in individuals with compromised or competent immune systems. Both Acanthamoeba and Balamuthia-caused GAE are often characterized by nodular or ulcerating granulomatous skin lesions in soil or stagnant freshwater-contaminated wounds or in similar lesions that may appear spontaneously following organ transplantation. Lastly, *Sappinia pedata*, a recently identified free-living amoeba that lives in soil and domestic animal faeces, has caused a single case of non-granulomatous amebic encephalitis in an immunocompetent Texas farmer. Brain infections caused by these ubiquitous, free-living amebae remain rare despite expanding world populations; but are, nevertheless, increasing today due to a combination of unexplained factors that may include increased recreational and occupational exposures in a warming environment and more immunocompromised patients susceptible to opportunistic pathogens.[6,8]

The objectives of this review will be to describe the epidemiology, diagnosis, management, and outcomes of the 4 known free-living amoebic infections of the brain ***(Table 1)***. In addition, US Centers for Disease Control and Prevention (CDC)-laboratory confirmed cases of PAM and *Balamuthia mandrillaris* GAE will be described and analysed for presenting characteristics of environmental exposures, initial infections, and potential for transmission by organ and tissue transplantation.

Patients and Methods
Initially, Medline, Pub Med, and Google® search engines were queried for references using all key words as search terms. The only cases of free-living amebic meningoencephalitis included in the analytical case reviews were cases with CDC laboratory-confirmed detection of *N. fowleri* or *Balamuthia mandrillaris* life forms by immunohistopathological techniques, isolation by culture, or by species-specific DNA as detected by polymerase chain reaction (PCR) in cerebrospinal fluid (CSF), brain biopsy, or brain necropsy tissue. Sources of US cases of PAM came from the registry of the CDC's *Naegleria* Workgroup, which confirmed 121 cases of PAM in the US during the period, 1937-2007.[2] Sources of US cases of *Balmuthia* GAE, or balamuthiasis, came from the CDC or its affiliated state departments of public health and the California Encephalitis Project [CEP], a joint project launched in 1998 by the California Department of Public Health and the CDC. Similar descriptive analyses were conducted for all CDC laboratory-confirmed cases of GAE caused by *Balamuthia mandrillaris* (N = 28) in the US during the period, 1994-2010.

Significant behavioural, demographic, environmental, ethnic, occupational, and recreational exposure characteristics for confirmed cases of PAM and *Balamuthia* GAE were identified over their respective study periods in order to make recommendations for the early diagnosis, critical care management, and prevention of these infections by environmental exposures or by organ transplants. Continuous variables

Emerging Trends in Free-living Amoebic Infections… *continued*

were tested for significant differences by unpaired, two-tailed t-tests; proportions were tested for significant differences by the "ratio test" using the Poisson distribution. A 5% significance level was used for all hypothesis tests. Statistical significance was indicated by p-values less than or equal to 0.05.

Results:

Emerging Trends in Primary Amoebic Meningoencephalitis (PAM)

N. fowleri, the single causative agent of PAM, is a free-living amoeboflagellate that thrives in many types of hot freshwater including shallow inland lakes, geothermal springs, and warm water discharges from electrical power plants.[1,6] The amoeba feeds on bacteria and organic debris in freshwater, and exists in 3 life forms; 2 of which are infective – the environmentally stable, potentially infectious, cyst form and the motile, invasive amoeboid-form, or trophozoite.[9,11] Infective forms typically invade humans via intact or disrupted nasal mucosa; cross the cribriform plate; migrate along the basilar brain from the olfactory bulbs and tracts to the cerebellum; deeply penetrate the cortex to the periventricular system; and incite a purulent meningoencephalitis with rapid cerebral oedema, resulting in early fatal uncal and cerebellar herniation ***(Figure 1)***.[1, 2,10]

An alternative human invasion route in PAM may be through an infection-weakened or traumatically ruptured tympanic membrane (TM), which affords infective forms access to the brain via the middle and inner ear to the acoustic nerve tract and on to the basilar brainstem.[2] The trans-tympanic inoculation of infective *N. fowleri* trophozoites was suspected in 2 PAM deaths in 2 US Gulf Coast states in 2007.[2] In June 2007, a 12-year-old male with access to multiple freshwater swimming sites in Florida including ditches, drainage canals, and apartment-complex swimming pools, died of confirmed PAM following a 2-day history of ear pain and pressure, possibly *otitis externa* or *media*.[2] In August 2007, a 22-year-old man died of PAM within a week of sustaining a ruptured TM in a fall while wakeboarding in the same Texas freshwater lake as another decedent of PAM earlier in the month.[2]

In 2007, 6 cases of PAM in 3 southern-tier US states (Arizona, Florida, and Texas) were reported to the CDC.[2] All 6 patients died within 1 week.[2] In response to these 6 PAM cases, the CDC and its affiliated State Departments of Public Health launched the *Naegleria* Workgroup, whose mission was to educate health authorities about the seasonality and lethality of PAM and its unique behavioral risk factors.2

Initially, a comparative statistical analysis of 121 CDC-confirmed cases of PAM collected by the *Naegleria* Workgroup in the US over the 2 study periods, 1937-1976 vs. 1977-2007, was conducted ***(Figure 2)***. The background frequency of PAM cases in the US was 0-3 cases per year over the entire 60-year study period, 1937-2007; 3 of the 6 cases (50%) in the 2007 cluster investigated by the CDC were males (ages 10, 11, and 22 years) who had been wakeboarding in freshwater lakes.[2] Descriptive analysis of all CDC-documented US cases of PAM during 1937-2007 identified the following presenting clinical characteristics for PAM in the US: (1) male sex; (2) recreational freshwater exposure; (3) summer seasonal exposures; and (4) exposure in a southern-tier US state ***(Table 2)***. There were no differences in the frequency of cases per year per period or in the high case fatality rates per year per period (range = 98%-100%). However, there were more cases in the more recent study period; significantly more deaths in the more recent period ($p < 0.001$); and significantly more clusters of 4 or more cases in the more recent study period ($p = 0.001$) ***(Table 3)***.

The presenting epidemiological features, clinical manifestations, initial laboratory and neuroimaging findings of PAM are compared to similar features of the other 3 causes of free-living amoebic infections of the brain in ***Table 1***. Initial screening laboratory studies are nonspecific, and blood cultures and peripheral blood Gram stains will be negative.

Neuroimaging studies in PAM are also nonspecific and may be normal on initial cranial CT and MRI scans.[15,16] Subsequent neuroimaging findings may include basilar leptomeningeal enhancement, massive cerebral edema, evidence of elevated intracranial pressure (midline shift, compressed ventricles, compressed brainstem and basilar cisterns, absence of subarachnoid spaces), and multifocal parenchymal lesions, often with evidence of hemorrhagic infarction or necrosis.[15,16] In 1998, Kidney and Kim compared the neuroimaging findings by CT and MRI in a case of *N. fowleri*-confirmed PAM and a case of *B. mandrillaris*-confirmed GAE.[16] As contrasted with non-specific, diffuse cerebral edema in PAM, neuroimaging findings in GAE were more localized and included multiple, focal, punctuate, ring-enhancing lesions in the posterior fossa.[16]

Although usually futile, successful management strategies for PAM have included combinations of cerebral edema-reducing therapies (corticosteroids, moderate hyperventilation, diuresis, hypertonic saline) and specific pharmacotherapy with antifungals (amphotericin B, miconazole, voriconazole) and synergistic antibiotics (rifampin, azithromycin) ***(Table 1)***.[16,19] Several experimental therapies have shown some promise in treating PAM including the phenothiazines, chlorpromazine and thioridazine, and miltefosine, a phosphocholine analog, more commonly used to treat visceral leishmaniasis.[21,23] The optimal duration of therapy is unknown, but most survivors have been treated for 10 or more days.[17,23]

Today, PAM may be prevented by a combination of untested and not evidence-based educational and behavioral modification strategies including the fol-

lowing.[2,10] (1) Avoid water-related activities, such as swimming, diving, water skiing, and wakeboarding in bodies of warm freshwater, hot springs, and thermally polluted water, such as around coal-burning and nuclear electrical power plants. (2) Avoid similar water-related activities in warm freshwater during prolonged periods of high water temperatures and low water levels. (3) Hold the nose shut or use nose clips to avoid any traumatic disruptions in the nasal mucosal linings during water-related activities in warm freshwater, such as lakes, rivers, reservoirs, ponds, bayous, and hot springs. (4) Avoid similar water-related activities in drainage ditches, wells, retention or oxidation ponds, and irrigation canals. (5) Avoid digging or stirring up sediment during all water-related activities in shallow, warm freshwater areas.

Results:

Emerging Trends in Granulomatous amoebic encephalitis (GAE)

Granulomatous amoebic encephalitis (GAE) is a chronic infection of the brain that may disseminate to other organs hematogenously and usually occurs in immunosuppressed patients with the acquired immunodeficiency syndrome (AIDS) or organ transplants, or in patients receiving chemotherapy for cancer or tuberculosis.[6,24,28] GAE may be caused by several species of *Acanthamoeba* or by another, phylogenetically related, free-living ameba, *Balamuthia mandrillaris*. *Acanthamoeba* species and *Balamuthia mandrillaris* are distributed worldwide in freshwater and soil, and can cause GAE year round. The portal of entry for these opportunistic pathogens is through the respiratory tract or ulcerating skin wounds with hematogenous spread to the CNS and, less commonly, with dissemination to other organs in the severely immunocompromised ***(Figures 3 and 4)***.

To date, approximately 200 cases of *Acanthamoeba* GAE and 150 cases of *Balamuthia* GAE have been reported with acanthamoebiasis still confined mostly to the immunocompromised; and balamuthiasis affecting both immunocompromised and immunocompetent individuals.[23-26, 28-40] Besides immunocompromise, other potential risk factors for balamuthiasis may include contact with stagnant freshwater or with contaminated soil, often through agricultural work, desert motorcycling, dirt-biking, or gardening.[32]

There were 28 CDC-confirmed cases of *Balamuthia mandrillaris* GAE in the US during the reporting period, 1994-2010.[28-41] Of the 28 cases, most occurred in immunocompetent patients (n = 25), with an age range of 1.5 to 89 years.[28-41] The mean age of the study population was 25.04 (± 25.85) years with males (n = 20) outnumbering females ***(Table 4)***. There were no statically significant differences in the mean ages of male and female cases, and there were few survivors of *Balamuthia mandrillaris* GAE (n = 7, 4 males, 3 females) ***(Table 4)***.[28-41]

A descriptive analysis of all 28 CDC-confirmed US cases of balamuthiasis identified several presenting characteristics of *Balamuthia mandrillaris* GAE cases including male sex, exposure in a southern-tier US state, Hispanic ethnicity in Southern California, contact with soil, and recent organ transplant ***(Table 4)***.[28-41] A genetic predisposition to *Balamuthia mandrillaris* GAE has now been confirmed in American Hispanics, who appear less able to produce effective antibodies against the free-living amebae, and may be predisposed by more frequent contact with *Balamuthia*-contaminated soils and aerosols in agricultural and landscaping occupations.[47,48]

The incubation period for *Acanthamoeba* GAE could extend for weeks or months after primary inoculation in the skin, sinuses, or lungs, with subsequent draining ulcers, chronic sinusitis, or pneumonia.[27-33] Although primary inoculation with *Balamuthia mandrillaris* is also via the skin or lungs, the incubation period is shorter than in A*canthamoeba* GAE with a mean of 8.5 days and a range of 1-30 days.[27] The clinical diagnostic laboratory, and neuroimaging manifestations of GAE from either causative pathogen are compared to similar clinical features of PAM in ***Table 1***.[23-41]

Recently, immunodiagnostic tests, such as indirect immunofluorescent ultraviolet microscopy and indirect immunofluorescent antibody ultraviolet microscopy with specific anti-pathogen antibodies, and new PCR assays for identification of pathogen DNA have been developed for diagnostic specimens.[42] In 2006, Qvarnstrom and co-investigators at the CDC described a new multiplex real-time PCR assay for the simultaneous detection of *Acanthamoeba* spp., *Balamuthia mandrillaris*, and *Naegleria fowleri*, which will permit rapid and specific detection of a single free-living ameba in clinical specimens within 5 hours.[42]

Neuroimaging studies by axial computerized tomography (CT) and/or magnetic resonance imaging (MRI) in GAE are nonspecific and often include single to multiple space-occupying lesions in the brain from the frontal cortex to the cerebellum with ring-enhancing and other focal effects slightly more common in balamuthiasis than acanthamoebiasis.[15,16,35] Evidence of cerebral edema with increased intracranial pressure will often be present and may include midline shifts, cisternal and ventricular compression, and hydrocephalus.[15,16,35]

Treatment strategies for GAE will include techniques to reduce increased intracranial pressure, craniotomy for biopsy or excision of mass lesions, and combination pharmacotherapy with antifungals, antiprotozoal agents, synergistic antibiotics, and several experimental therapies that have shown promise in *vitro*, such as the phenothiazines and miltefosine ***(Table 1)***. In 2004, Schuster and Visvesvara demon-

Emerging Trends in Free-living Amoebic Infections… *continued*

strated that the phenothiazines demonstrated in vitro efficacy against *Balamuthia mandrillaris* in clinical specimens.[43] In 2008, Aichelburg and colleagues in Vienna reported treating a patient successfully with disseminated tuberculosis and acanthamoebiasis with topical and oral miltefosine, and a combination of intravenous fluconazole, trimethoprim-sulfamethoxazole (TMP/SMX), a synergistic antibiotic (amikacin), and 4 tuberculostatic drugs.[23] The optimum duration of drug therapy for GAE is unknown, but most survivors have been treated for weeks to months.[23,30-46] Although case fatality rates in GAE are very high (90-94% in acanthamoebiasis and ≥ 90% in balamuthiasis), successful drug treatment combinations in acanthamoebiasis and balamuthiasis are compared in ***Table 1***.[22,23,27, 30-33]

Untested prevention and control strategies for GAE may include (1) consideration of GAE in organ transplant and immunocompromised patients with encephalitis and skin ulcers not improving with standard therapies; (2) recognition of genetic risk factors for acanthamoebiasis and balamuthiasis in Hispanics less able to produce antibodies against causative free-living amebae; and (3) recognition of other soil or stagnant freshwater risk factors in both immunocompetent and immunosuppressed patients with skin ulcers and unexplained meningoencephalitis.[47,48]

Results:
A Case Report of Sappinia Amoebic Encephalitis (SAE)

A single case of SAE was reported in a 38-year-old immunocompetent male farmer in Texas who had contact with grazing animals and fecal-contaminated aerosols and soil.[51,52] The clinical, diagnostic laboratory, and neuroimaging findings and the successful management strategies employed in this case are compared to similar outcomes from other free-living amebic infections in ***Table 1***.[51,52]

Results:
Transmission of Free-living Amoebic Infections by Organ Transplantation

Acanthamoebae have been well recoginized as opportunistic pathogens causing fatal GAE in patients with AIDS and following organ and tissue transplants since the 1990s.[53-60] In 1999, Oliva and colleagues successfully treated a patient with widely disseminated acanthamoebiasis following a single lung transplant for sarcoidosis with a combination of pentamidine, 5-fluorocytosine, itraconazole, and topical chlorhexidine gluconate-ketoconazole cream for skin lesions.[44] The patient presented with over 20 painful nodular skin lesions scattered over the trunk and extremities, elevated liver enzymes, and respiratory failure.[44] *Acanthamoeba castellani* trophozoites were recovered from abscessed skin lesion aspirates, bronchoalveolar lavage fluid, and liver biopsy.[44] In 2007, Barete and coauthors reported a fatal case of acanthamoebiasis, despite treatment with pentamidine, 5-fluorocytosine, and itraconazole, in a heart transplant patient who presented with carbuncles and abscesses scattered over the extremities and trunk, septic shock, and multi-organ failure.[25] *Acanthamoeba* trophozoites were recovered from skin lesion biopsies and molecular analysis of the DNA extracted from isolated amebae cultured from skin lesions on agar plates coated with Escherichia coli confirmed the diagnosis of widely disseminated acanthamoebiasis caused by *Acanthamoeba lenticulata*.[25]

Like *Acanthamoeba* species, disseminated *Balamuthia mandrillaris* infections also cause skin lesions and GAE, and were recently associated with 2 case clusters of organ transplant-transmitted infections in the US with 3 deaths in organ transplant recipients.[59,60] In late 2009, a 4-year-old boy living in Mississippi developed a transient febrile illness, was diagnosed with influenza, and treated with antivirals.[59] Within a week, he developed headache and seizures with cerebral edema and ring-enhancing intracerebral lesions on MRI, consistent with a diagnosis of post-influenza autoimmune disseminated encephalomyelitis.[59] Despite supportive treatment for seizures and cerebral edema, seizures recurred, intracranial lesions progressed, and cerebral herniation and brain death occurred approximately 2 weeks following the onset of CNS symptoms.[59] The child's heart, liver, and kidneys were transplanted into 4 different recipients at 3 transplant centers.[59]

Histopathological examination of donor brain tissue at the CDC was consistent with free-living amebic encephalitis, later PCR-confirmed as *Balamuthia mandrillaris* GAE.59 The donor frequently played outdoors and had confirmed soil and wading pool exposures.[59] Of the 4 organ transplant recipients, asymptomatic pediatric heart and liver transplant recipients were treated prophylactically for *Balamuthia* exposures and remained well; a 31-year-old female kidney transplant recipient died of PCR-confirmed *Balamuthia* GAE despite weeks of intensive care and therapy with multiple agents known to be effective for balamuthiasis; and a 27-year-old male recovered from PCR-confirmed *Balamuthia* GAE with permanent neurologic sequelae.[59]

In September 2010, the CDC reported a second PCR-confirmed cluster of organ transplant-transmitted *Balamuthia* GAE in Arizona.[60] The common organ donor, a 27-year-old Hispanic male landscaper, with a 6-month history of a non-healing skin lesion on his back attributed to an insect bite, died from a presumed stroke.[60] The donor's heart, liver, pancreas, and kidneys were transplanted into 4 recipients, 2 of whom, a kidney-pancreas recipient and a liver recipient, died of PCR-confirmed *Balamuthia* GAE.[60] Asymptomatic heart and kidney transplant recipients were placed on prophylactic combined antimicrobial therapy and have remained well.[60]

Discussion:
Why have free-living amoebic infections emerged as public health threats today?
Once considered non-pathogenic, free-living amoebae have emerged over recent decades as significant pathogenic threats to human health for several reasons including the following. (1) Free-living amoebae are widely distributed in soil and freshwater throughout the temperate and tropical world, have environmentally stable cyst forms for over-wintering, and have taken advantage of longer warm seasons to parasitize humans in outdoor pursuits. (2) Some free-living, become opportunistic pathogens in immunocompromised human hosts; but others may evade host responses in immunocompetent individuals. (3) Free-living amoebae are resistant to antimicrobial monotherapy and require combined therapy with a variety of antimicrobials and experimental agents. (4) Free-living amoebic infections are often difficult to diagnose unless suspected; the laboratory is alerted to the possibility of amebic forms in diagnostic specimens; and confirmatory immunological and molecular tests are available, usually at distant reference labs. (5) Lastly, some ethnic groups, such as Hispanics, may be genetically predisposed to GAE because they cannot muster protective antibody responses to phylogenetically related Acanthamoeba spp. and Balamuthia mandrillaris.[47,48]

Conclusions and Recommendations
Fatal free-living amoebic encephalitis may be more common than initially reported and underdiagnosed, especially among organ donors with fatal encephalitis of uncertain etiologies. Although organs (liver, kidneys) were harvested from a donor dying from PAM in 1995 and transplanted into 3 recipients without transplant-transmitted *N. fowleri* infections, donors dying from other causes of meningoencephalitis associated with granulomatous skin lesions and ring-enhancing intracebral lesions on neuroimaging studies should be screened by specialized diagnostic studies for other free-living amebic infections of the brain capable of hematogenous dissemination, including *Acanthamoeba*-associated GAE and *Balamuthia mandrillaris* GAE.[61]

Clinicians should suspect free-living amoebic infections of the CNS in refractory cases of meningoencephalitis initially managed as aseptic or bacterial infections, especially in patients predisposed to such infections by regions visited, behavioural practices, environmental or occupational exposures, ethnicity, or immunosuppression by chemotherapy or organ transplant anti-rejection therapy. Future investigations will be required to determine the significance of freshwater wakeboarding, popular among adolescents, as a significant recreational risk factor for PAM and to determine any dose-response effects of global warming on rising freshwater and topsoil temperatures and the multiplication and infectivity of aquatic and terrestrial free-living amebae.

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Professor of Public Health and Preventive Medicine and Head, Program in Environmental and Occupational Health Sciences, School of Public Health, Louisiana State University Health Sciences Center (LSUHSC) in New Orleans, 2020 Gravier Street Third Floor, New Orleans, Louisiana 70112.

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Address correspondence to Dr. Diaz at the LSUHSC School of Public Health, Program in Environmental and Occupational Health Sciences, 2020 Gravier Street Third Floor, New Orleans, Louisiana 70112. TEL: 504-568-5700. FAX: 504-568-5071. Email: jdiaz@lsuhsc.edu.

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Table 1
The 4 Human Free-living Amebic Infections

Infections	Primary amebic meningoencephalitis (PAM)	Granulomatous amebic encephalitis (GAE)		*Sappinia* amebic encephalitis (SAE)
Pathogens	*Naegleria fowleri*	*Acanthamoeba* spp.	*Balamuthia mandrillaris*	*Sappinia pedata*
Distribution	Worldwide in warm freshwater, bottom sediment, & soil	Worldwide in freshwater & soil	Worldwide in freshwater & soil; more common in US South & South America	Demonstrated in soil & tree bark in the US only
Cases reported worldwide (US incidence)	180-200	≤ 200	Approximately 150	Only 1 case reported
Seasonal occurrence	Summertime or warmest seasons	Year-round	Year-round	Year-round
High-risk groups	Immunocompetent children & young adults, especially males with histories of freshwater exposures (skiing, wakeboarding) within 2 weeks	Immuno-compromised children & adults (AIDS, cancer or chemo, organ or bone marrow transplant, liver or renal failure); rarely in the immunocompetent	Immuno-competent children & adults, most often males with soil exposures (dirt-biking, agriculture) &/or of Hispanic origin; less commonly in immunocompromised with AIDS or iv drug use	Immuno-competent farmer with pre-existing sinus infection exposed to aerosols of domestic animal feces
Pathology	Trophozoites penetrate nasal mucosa & cribriform plate & migrate via olfactory nerves to olfactory bulbs & tracts along basilar brain to cerebellum	Hematogenous dissemination from granulomatous skin ulcers or lung granulomas, across blood-brain barrier to CNS	Hematogenous dissemination from granulomatous skin ulcers, often facial, or lung granulomas across blood-brain barrier to CNS	Aerosolized cysts &/or trophozoites enter nasopharynx & directly invade CNS
Incubation period	Mean 5-7 days (Range 1-16 days)	Weeks to months following indolent draining skin ulcers, sinusitis, or pneumonia	Mean 8.5 days (Range 1-30 days) following indolent pneumonia or draining granulomas on the face or upper arms	Unknown
Clinical features	Fever, headache, stiff neck, nausea, vomiting, specific cranial nerve (CN) dysfunction (altered senses of smell & taste, anisocoria), seizures, disorientation, coma; more encepahlopathic than meningitic features	Similar to PAM, but more focal neurologic features, early mental status changes, visual loss, photophobia	Same as PAM & GAE with early confusion-disorientation, nonspecific CN dysfunction	Same as PAM, GAE, BAE, with sinusitis, early blurred vision, diplopia, photophobia
Laboratory studies	Trophozoites in CSF wet mounts, stained CSF sediment or brain tissues enhanced by indirect immunofluorescence tests (IIF) or (immunofluorescent assays) IFA; *N. fowleri* DNA by PCR on CSF or unfixed brain	Both cysts & trophozoites in fixed, stained brain tissue enhanced by IIF or IFA; *Acanthamoeba* DNA by PCR on CSF or unfixed brain	IFA staining of fixed brain tissue; PCR for *Balmuthia* DNA in CSF or brain tissue	Distinctive trophozoites (double nucleus connected by filament, large contractile vacuole) in stained, fixed brain tissue
Imaging studies by CT &/or MRI	Nonspecific: basilar leptomeningeal enhancement, intraparenchymal lesions &/or hemorrhagic necrosis; evidence of ICP-cerebral edema, midline shift, cisternal & ventricular compression	Nonspecific: Multiple space-occupying lesions, with or without ring-enhancing effects	Nonspecific: cerebral edema, hydrocephalus, multiple space-occupying & ring-enhancing in cortex & cerebellum	Single large solitary mass lesion with slight ring-enhancing effect-fronto-parietal or temporo-parietal
Treatment	IV & intrathecal (IT): amphotericin B, azoles-fluconazole, itraconazole, miconazole Synergistic antibiotics: azithromycin po, rifampin Experimental: chlorpromazine or other phenothiazines, oral miltefosine	IV & IT: azoles IV: azoles, flucytosine, pentamidine, rifampin, trimethoprim/ sulfa-methoxazole Experimental: phenothiazines; oral miltefosine, topical miltefosine for skin ulcers	IV: azoles-albendazole, fluconazole, itraconazole, pentamidine, flucytosine, sulfadiazine Synergistic macrolides: azithromycin, clarithromycin Experimental: phenothiazines-thioridazine, trifluoperazine; oral miltefosine, topical miltefosine for skin ulcers	IV: pentamidine, flucytosine, itraconazole Synergistic antibiotic: azithromycin po
Outcomes (CFRs)	Death within 3-7 days (> 95%)	Usually fatal in immunocompromised (90-94%); immuno-competent children most likely to survive	Usually fatal (≥ 90%)	1 survivor in the US

CFR: Case fatality rate; CSF: Cerebrospinal fluid; CN: cranial nerve; IFA: immunofluorescent assays; IIF: indirect immunofluorescence tests; IT: intrathecal; IV: intravenous; PCR: Polymerase chain reaction nucleic acid assay.

Table 2
The Demographic and Exposure Characteristics of CDC-Confirmed Cases of Primary Amebic Meningoencephalitis – United States, 1937-2007

Demographic Characteristics

Demographic Characteristics	*Known number of cases (N)*		
Age (years)	121	Median age	Age range
		12 years	8 months-66 years
Gender	119	Male (%)	Female (%)
		93 (78%)	26 (22%)
States of exposures	121	Southern-tier* (%)	Other US state (%)
		117 (97%)	4 (3%)
Months of diagnoses	114	July-September (%)	October-June (%)
		95 (83%)	19 (17%)

Exposure Characteristics

Exposure Characteristics	*N*	*Exposed (%)*	*Not exposed (%)*
Recreational freshwater: lakes, rivers, ditches, drainage canals	37	35 (95%)	2 (5%)
Recreational freshwater: geothermal springs	37	2 (5%)	35 (95%)
Wakeboarding in recreational freshwater lakes	37	3 (8%)	34 (92%)

* 15 Southern-tier US states: AR, AZ, CA, FL, GA, LA, MO, MS, NC, NM, NV, OK, SC, TX, VA.

Emerging Trends in Free-living Amoebic Infections… *continued*

Table 3
A Descriptive Epidemiological Analysis of CDC-Confirmed Cases of Primary Amebic Meningoencephalitis – United States, 1937-2007 (N = 121)

Study periods compared	*1937-1976*	*1977-2007*	*p-values**
# Years	39	30	NA
# Cases in study (%)	34 (28%)	87 (72%)	NA
Annual period prevalence (%)	0.87	2.9	NA
Case fatality rates (%)	100%	98%	NA
# Case clusters ≥ 4/period	0/39 years	9/30 years	0.001**
# Deaths /period	34/39 years	85/30 years	< 0.001**

NA: Not applicable.

* The Poisson distribution was used to model the number of case clusters per year and the number of deaths per year in order to compare rates during time periods, 1937-1976 vs. 1977-2007. Hypothesis tests were performed using the "ratio.test" function from the R package of the same name (R Development Core Team, 2010). This function was used to perform a two-sided exact rate ratio test assuming Poisson counts. A 5% significance level was used for all hypothesis tests.

** Statistically significant; $\alpha = 0.05$, $p \leq 0.05$.

Table 4
The Demographic and Exposure Characteristics of CDC-Confirmed Cases of *Balamuthia mandrillaris* Granulomatous Amebic Encephalitis – United States, 1999-2010)

Demographic Characteristics		
Gender (%)	Male (%)	Female (%)
N (%)	20 (71%)	8 (29%)
Mean age ± standard deviation (years)	21.82 ± 25.85	19.38 ± 27.06
Age range (years)	1.5-89	2-72
*Age significance test**	t = 0.223; P =0.825	
Ethnicity (%)	Hispanic (%)	Caucasian (%)
	14 (50%)	14 (50%)
Ethnicity in California (%)	9 (75%)	3 (25%)
Exposure characteristics		
States of exposures (%)	Southern-tier**	Other US states
	24 (85%)	2 (15%)
California exposures (%)	California	Other US state
	12 (43%)	16 (57%)
Soil exposures (%)	Soil exposed	Not exposed
	9 (32%)	19 (68%)
Stagnant water exposures (%)	Stagnant water	Not exposed
	2 (4%)	27 (96%)
Recent organ transplant (%)	4 (8%)	2 (92%)

Exposure characteristics		
Deaths (%)	Died	Survived
	22 (79%)	6 (21%)
Case fatality rate (%)	79%	

*Two-tailed t-test.

**8 Southern-tier US states: AZ, CA, FL, GA, KY, MS, SC, TX.

Figure 1
The life cycle of *Naegleria fowleri*, causative agent of primary amebic meningoencephalitis (PAM). Source: US Centers for Disease Control and Prevention(CDC). Available at www.dpd.cdc.gov/DPDx/HTML/ImageLibrary. No copyright permission required.

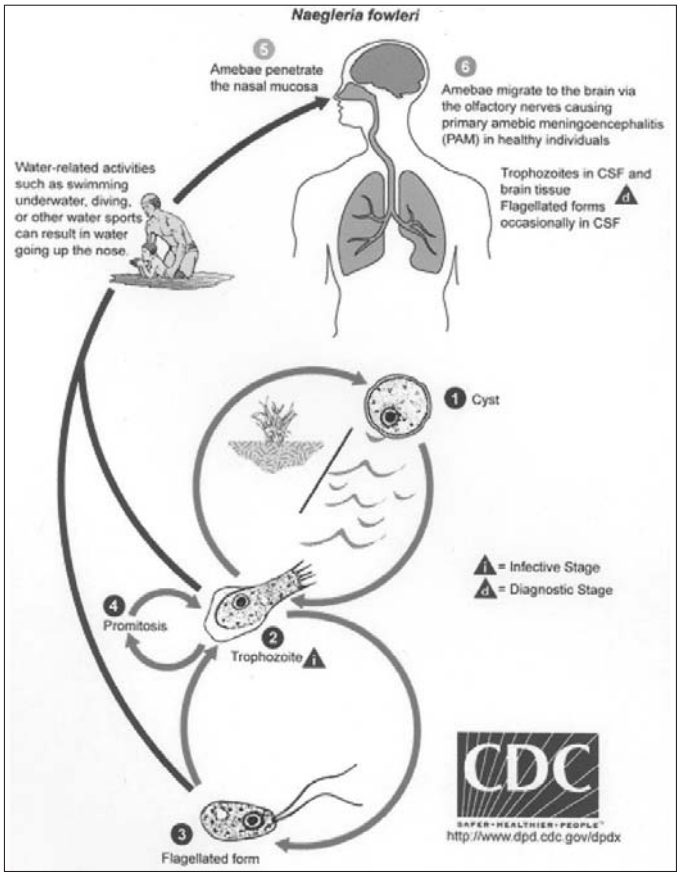

Figure 2
Number of confirmed cases of primary amebic meningoencephalitis (PAM), United States, 1937-2007.
Source: US Centers for Disease Control and Prevention (CDC).
Available at www.dpd.cdc.gov/mmwr/preview/mmwrhtml/mm5721a1.htm .
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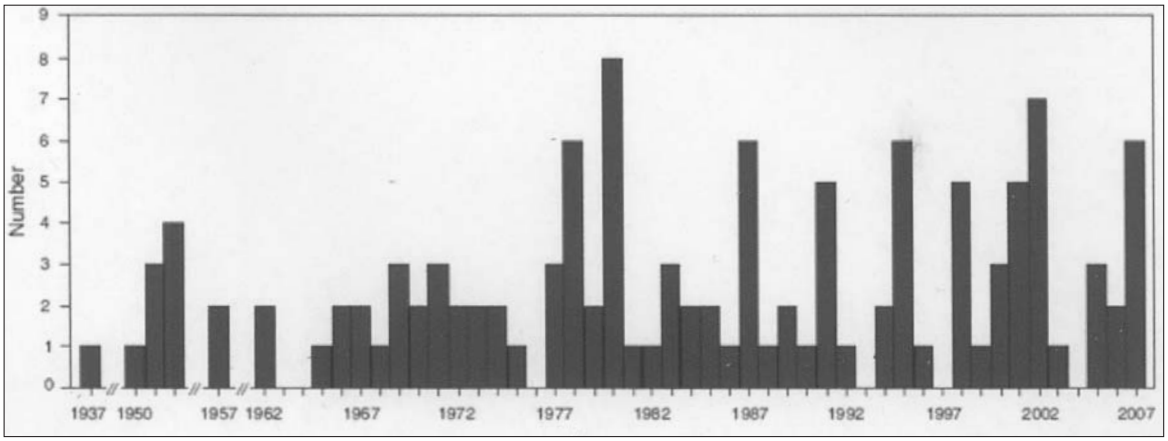

Figure 3
The life cycle of *Acanthamoeba* spp. causative agents of granulomatous amebic encephalitis (GAE).
Source: US Centers for Disease Control and Prevention (CDC).
Available at www.dpd.cdc.gov/DPDx/HTML/ImageLibrary.
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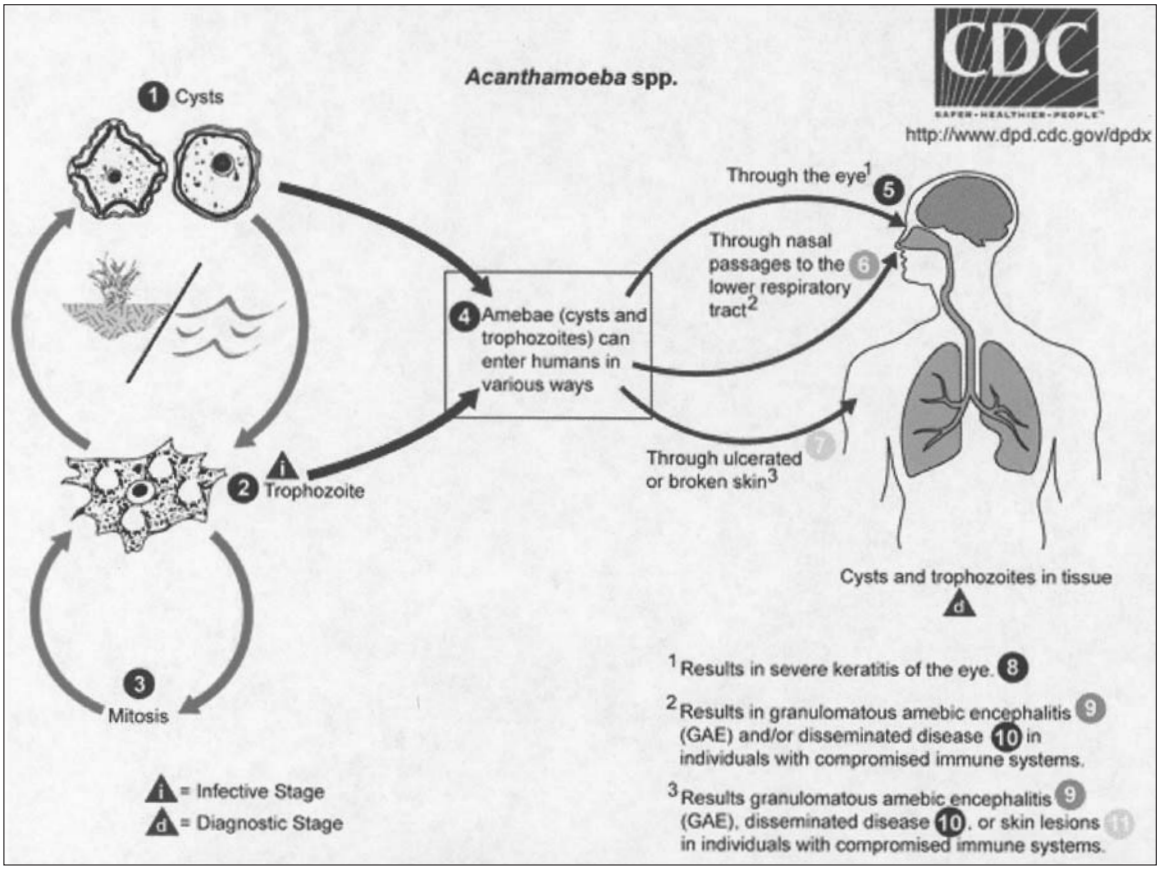

Emerging Trends in Free-living Amoebic Infections… *continued*
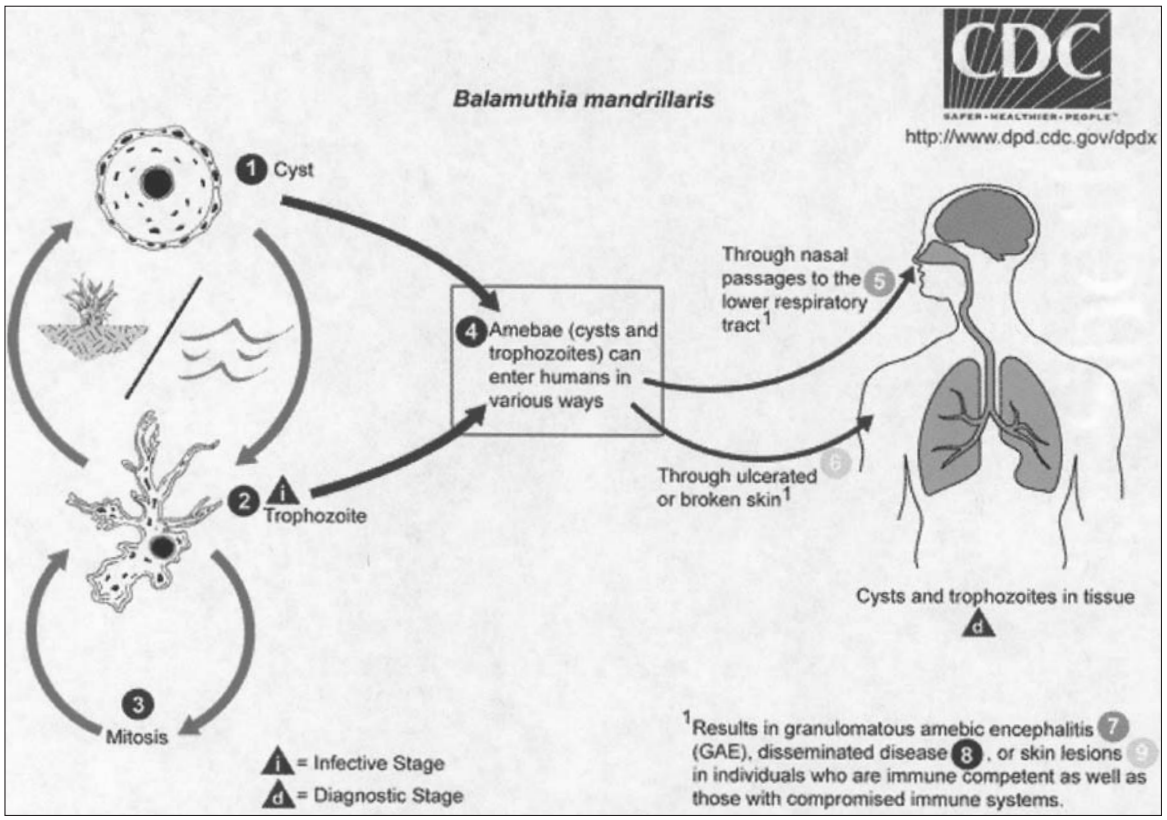
Figure 4
The life cycle of *Balamuthia mandrillaris*, a causative agent of granulomatous amebic encephalitis (GAE).
Source: US Centers for Disease Control and Prevention (CDC).
Available at www.dpd.cdc.gov/DPDx/HTML/ImageLibrary.
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