Tropical medicine: a re-emerging specialty

Peter A Leggat

Abstract

- Tropical medicine is a re-emerging specialty addressing the burgeoning load of tropical disease globally. It is an integral part of military medicine.
- Vector-borne diseases, in particular malaria and the arboviruses, stand out as major concerns for military deployments, but common problems, such as diarrhoeal disease, also need to be addressed.
- The Australian Defence Force contributes substantially to tropical disease research and the development of guidelines and policies for delivery of effective countermeasures to infectious diseases associated with deployment of troops.
- In Australia, we may be seeing rekindled interest in a new vision for tropical medicine, one with a global view and with many facets to the discipline, including tropical medicine, travel medicine, and international public health.

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SINCE THE ESTABLISHMENT of some of the great tropical medicine schools and professional societies in Europe and the United States in the late 19th and early 20th century,[1,2] tropical medicine has come a long way. The founding in Townsville of the Australian Institute of Tropical Medicine in 1909 was also a major milestone;[3] it formalised research and training in tropical medicine for the first time in Australia.

We may be seeing a new vision for tropical medicine, one with a global view and with many facets to the discipline, including travel medicine and international public health. This is consistent with changes worldwide in tropical medicine over at least the past 30 years. In meeting new challenges in the burgeoning impact of tropical diseases globally, various academic, professional and research initiatives have arisen in Australia and internationally.

Professional initiatives

The Royal Society of Tropical Medicine and Hygiene (RSTMH), based in the United Kingdom, was the representative professional organisation in Australia since it was established in 1907. With the appointment of local secretaries, the RSTMH endeavoured to maintain its outreach to members throughout the world, including Australia. The establishment of an Australian professional organisation for tropical medicine is a very recent development. The Australasian College of Tropical Medicine (ACTM) was established in 1991,[4] and has now become the peak professional organisation representing the interests of tropical medicine in the region. The *Yearbook of the Australasian College of Tropical Medicine 1995–1996* listed more than 350 members based in Australia and New Zealand,[5] with members also coming from more than 30 other countries. Although most members are medically trained, membership of the ACTM, like the RSTMH, is open to the broader group of health professionals and scientists working in tropical medicine and related areas.[5] In 2000, the ACTM established a Faculty of Travel Medicine, a professional body dedicated to travel medicine in the Australasian region. A review of travel medicine in Australasia has been published elsewhere.[6]

The ACTM is active in professional membership designation to fellowship level, scientific meetings, awards and honours, and electronic and member networking, and has appointed honorary archivists to document the history of tropical medicine. The ACTM also publishes a refereed journal (*The Annals of the ACTM*), a *Primer of Travel Medicine*,[7] and two online publications: the *Dictionary of Tropical Medicine*[8] and the *Primer of Tropical Medicine*.[9] The college is affiliated with various organisations, including the International Federation for Tropical Medicine (IFTM).[10] The IFTM holds a major conference every 4 years, with the XVI International Congress for Tropical Medicine and Malaria, to be held in France in September 2005.

Lieutenant Colonel Peter Leggat, *RAAMC, joined the Australian Regular Army in 1987. He was posted to various units, including the historic 2 Field Ambulance in Townsville. Lieutenant Colonel Leggat is currently serving as a Consultant, Defence Health Services, Army Reserve, Queensland. In 2002, he was awarded the Major General John Pearn Surgeon General's Medal for outstanding contributions to tropical medicine. He was also President of the Australasian College of Tropical Medicine from 1996 to 1998 and from 2002 to 2004.*

School of Public Health and Tropical Medicine, James Cook University, Townsville, QLD.
Peter A Leggat, FAFPHM, FACRRM, Associate Professor.
Correspondence: Lieutenant Colonel Peter A Leggat, School of Public Health and Tropical Medicine, James Cook University, Townsville, QLD 4811. peter.leggat@jcu.edu.au

Academic initiatives

Training

The *International Directory of Training in Tropical Medicine 1995–96* listed more than 100 courses worldwide concerning tropical medicine, several of which were based in Australasia.[11] The American Society of Tropical

1: Key guidelines and related resources used in tropical medicine

Title of publication	Scope of coverage
Therapeutic Guidelines: Antibiotic[17]	Chemoprophylaxis guidelines for malaria, travellers' diarrhoea and other tropical diseases
Australian Immunisation Handbook[18]	National Schedule and Travellers' vaccinations
MIMS Annual[19]	Pharmaceutical items for travellers
International Travel and Health[20]	Yellow fever areas; general reference

Medicine and Hygiene (ASTMH) also published a directory of courses and opportunities in tropical medicine.[12] In the past decade, several postgraduate courses that include training in tropical and/or travel medicine have been offered in Australia. The University of Queensland and James Cook University offer postgraduate academic award courses in tropical medicine, and James Cook University in Australia and the University of Otago in New Zealand offer postgraduate awards in travel medicine. A perspective of Australia's recent role in training in tropical medicine has been published elsewhere.[13]

Historically, Australia has offered a Diploma of Tropical Medicine and Hygiene (DTMH) since the early days of the original Australian Institute of Tropical Medicine (AITM). The AITM graduated the first DTMH class in 1926.[14] Sydney University took up the program after the closure and absorption of the AITM in 1930. For the past 14 years, James Cook University conducted Australia's DTMH, as well as a Masters of Public Health and Tropical Medicine, and taught for much of this time in the same building that the AITM had occupied. This building has been renamed the Anton Breinl Centre in honour of the first director of AITM.[3]

The contributions to research and training of the Faculty of Tropical Medicine, Mahidol University, Thailand, established in 1961, and the subsequent development of the Southeast Asian Ministers of Education Organization Regional Tropical Medicine and Public Health Network (SEAMEO TROPMED), established in 1967, should also be acknowledged.[15]

Specialisation

Tropical medicine is considered a specialty in some countries and, given Australia's location in Asia and the Pacific and its proximity to the tropics (indeed, about 40% of Australia lies in the tropics), it seems logical to move towards specialisation here. The Australian Defence Force's recognition of the standing of Fellowship of the ACTM at Competency Level 4 for medical officers has been an important step forward.

In the US and Canada, the ASTMH has recently established an examination for certification in tropical and travel medicine, as part of an initiative to stimulate educational programs in these areas to enhance medical expertise within these countries.[16] The ASTMH also asked institutions to develop academic programs to help meet the competencies for such examinations, which are then accredited by the society.[16] Perhaps a similar path could be developed in Australasia.

A crucial first step for the ASTMH in the development of this certification was the establishment of a body of knowledge or what many might term a curriculum. Similarly, a standard curriculum for tropical medicine would need to be developed in the Australasian context before structuring professional training programs and assessment. The ACTM is currently developing a body of knowledge in tropical medicine relevant for Australasia and the Western Pacific region.

Guidelines

Comprehensive guidelines in tropical medicine have not been published in a consolidated form; however, various key Australian government, World Health Organization, commercial and related publications exist; these provide guidelines and advice for tropical medicine practice (Box 1). There are also Internet resources that provide valuable information on disease distribution and prevention (Box 2). The ADF publishes a wide range of health directives relating to tropical and travel medicine for the Defence Health Service. Access to policy guidelines and up-to-date health intelligence, usually assisted by access to Internet-based resources, is essential. The research undertaken by the ADF, such as that conducted by the

2: Major Internet resources for tropical medicine practice

Name of Resource	Internet address
Communicable Diseases Intelligence	http://www.health.gov.au/internet/wcms/Publishing.nsf/Content/cda-pubs-cdipubs.htm
Immunise Australia	http://www.immunise.health.gov.au
Defence Health Service	http://www.defence.gov.au/dpe/dhs/index.htm
WHO, International Travel and Health	http://www.who.int/ith/index.html
WHO, Weekly Epidemiological Record	http://www.who.int/wer
CDC, Health Information for International Travel	http://www.cdc.gov/travel/index.htm
CDC, Morbidity and Mortality Weekly Report	http://www.cdc.gov/mmwr
International Federation for Tropical Medicine	http://www.iftm.org
The Australasian College of Tropical Medicine	http://www.tropmed.org

CDC = Centers for Disease Control. WHO = World Health Organization.

Australian Army Malaria Institute,[21] contributes substantially to the development of guidelines and policies for delivery of effective countermeasures to infectious diseases associated with deployment of troops.

Vector-borne tropical diseases

Vector-borne tropical diseases remain among the great problems for operational deployment of the ADF. Some vector-borne diseases also represent a potential public health problem when personnel return home. Malaria (Box 3) remains the single most important vector-borne disease problem of the military; however, arboviral diseases such as Dengue and Japanese encephalitis (Box 4) are becoming important health problems during deployment. Some vector-borne diseases are important for local exercises within Australia as well as international deployments (eg, scrub typhus, which affected military personnel in north Queensland).[31] Other vector-borne diseases, such as lymphatic filariasis (Box 5), pose some concerns for military deployments in the Asia-Pacific region, where the disease is endemic.

Many infectious diseases of travellers can be prevented by immunisation. There are few mandatory vaccines, for which certification is necessary; these include yellow fever and meningococcal meningitis, which is prescribed by the WHO.[20] In addition to routine and national schedule vaccinations, specific vaccinations may be required for particular destinations. It seems prudent to vaccinate against diseases that might be acquired through food and water, such as hepatitis A, typhoid and polio,[25] as well as using other measures to combat these diseases. The most common vaccine-preventable disease is hepatitis A;[25] typhoid vaccination should also be considered for travel to many developing countries. Polio vaccination is rarely required these days, but may be required in situations where polio outbreaks have been reported.[25]

Other infectious diseases, such as hepatitis B, Japanese encephalitis and rabies, are also vaccine preventable. The development of combination vaccines, such as hepatitis A plus typhoid and hepatitis A plus B, has greatly reduced the number of injections required.[25] The development of rapid schedules for ADF personnel departing at short notice has been useful in providing protection within 4 weeks.[25]

Other tropical diseases, such as leptospirosis and rickettsial diseases, are not vaccine preventable and may affect ADF personnel on deployment both within Australia and abroad. Prevention of diseases may require the use of personal protective measures by ADF personnel and in some cases chemoprophylaxis with doxycycline. Tuberculosis screening should also be considered.

Research

Despite the significant scientific advances in tropical medicine in the 20th century, much needs to be done to

3: Malaria

The World Health Organization (WHO) estimates that there are more than 300 million cases of malaria and 2.5 million deaths due to malaria worldwide each year.[22] Most serious cases and deaths are due to infection with *Plasmodium falciparum*; however, *P. vivax* infection remains important, especially as dormant liver stages can cause relapses for months.

Malaria countermeasures include chemoprophylaxis, personal protective measures, environmental health measures against disease vectors, and eradication treatment for parasite liver stages on return to Australia. Current recommended chemoprophylaxis includes doxycycline, mefloquine, or Malarone (atovaquone plus proguanil).[17] Chloroquine is still recommended in the few areas where there is no chloroquine resistance. Current eradication treatment for malaria is primaquine, although tafenoquine has recently been trialled in Australian Defence Force personnel in East Timor as an alternative eradication treatment and as a weekly dose chemoprophylactic agent.[23]

Because of the possible associated incidence of neuropsychiatric effects, such as anxiety and nightmares, soldiers should be screened for conditions that might preclude the use of mefloquine,[24] and, for soldiers taking mefloquine for the first time, several trial doses should be considered, possibly commencing as early as 3 weeks before departure.[25] It is also advisable that soldiers be given trial doses of other antimalarial agents that they are taking for the first time, such as doxycycline and Malarone. This allows time to consider alternative drugs if necessary.[25] If a deployment is at short notice, antimalarial regimens may have to be modified in the field.

Opinions vary on how long antimalarial agents should be continued after leaving a malaria area. For drugs that have no pre-erythrocytic effects on the liver stages of the parasite, such as doxycycline and mefloquine, drugs should be continued for up to 4 weeks. This relates to the time it takes for parasites to develop in the liver and infect the bloodstream. Malarone, which has some effects on the hepatic stages of *P. falciparum*, may be given for shorter periods (1 week) after return.[26]

For more remote areas, standby treatment may be useful. This consists of a course of drugs that travellers to malaria endemic areas can use for self-treatment if they cannot obtain medical advice within 24 hours of becoming unwell.[25] A medical kit may be supplied with a thermometer, possibly an immunochromatographic test (ICT) malaria diagnostic kit and written instructions, an appropriate malaria treatment course and written instructions. Medical advice should be sought as soon as possible. Newer drugs that may be useful for standby treatment include Malarone and Riamet (20 mg artemether and 120 mg lumefantrine).[27]

4: Arboviral diseases

Many arboviral diseases may affect military deployments. Two of the most important for the Australian Defence Force are dengue and Japanese encephalitis, as several recent deployments have been to areas where these diseases are endemic. Both diseases are transmitted by various species of mosquitoes, some of which exist in Australia, especially in north Queensland, where major military bases are located.

The World Health Organization estimates that there are more than 50 million cases of dengue per year.[28] It is a viral illness, and infection may range from subclinical to fever, arthralgia and rash, or be complicated by haemorrhagic diatheses or shock syndromes. Treatment is supportive, and management of the problem is directed towards preventing transmission upon return to Australia. Outbreaks of dengue in north Queensland have been attributed to travellers returning with the disease. A recent study of soldiers returning from East Timor during the incubation period of the disease showed that a collaborative effort by military and civilian public health authorities to contain and prevent the transmission of the disease is vital.[29] Until a vaccine becomes available, dengue prevention depends on personal protective measures and environmental health measures against disease vectors.

Japanese encephalitis is the leading cause of viral encephalitis in Asia. The WHO estimates that there are more than 70 000 cases annually in South-East Asia.[30] Up to a third of patients with clinical disease die and about half have permanent residual neurological sequelae.[30] Vaccines are available, but their immunogenicity has recently been questioned and concerns have been raised regarding adverse reactions reported with vaccination.[30] Safer and more immunogenic second-generation vaccines,[30] if successfully trialled, will be important for future ADF deployments in the region.

combat traditional and emerging communicable diseases as well as the emerging non-communicable disease burden in developing countries. In addition to the longstanding excellence of work conducted by international agencies, such as the WHO's Special Program for Research and Training,[34] governments, corporations (such as pharmaceutical companies), and other non-government organisations have joined the fight against health problems in the tropics. A perspective of Australia's recent role in research in tropical medicine has been published elsewhere.[35] In addition, the ACTM has published a *Directory of Research and Training in Tropical Medicine 1996–97*, with the support of the Australia–New Zealand Foundation,[36] which indicates significant contributions to addressing the major tropical diseases in the region. ADF initiatives in tropical disease research, including malaria, are at the forefront of the discipline. This augurs well for development of tropical medicine in Australasia in the 21st century.

5: Lymphatic filariasis

Lymphatic filariasis is the second most common vector-borne disease, after malaria. It is caused by three species of nematode parasites, which can be spread by a wide range of mosquito species. The World Health Organization estimated the global burden of infection to be 120 million, with 1 billion people at risk of infection.[32] Lymphatic filariasis is also the second most common cause of long-term disability.[32] It has a widespread geographic distribution, mainly in tropical regions, including most of Australia's neighbouring countries in the tropics. Given its widespread distribution and the increase in military deployments in filarial-endemic areas, steps should be taken to prevent transmission of lymphatic filariasis among military personnel. Albendazole has recently been proven effective in eradicating adult worms.[33]

Conclusions

Tropical diseases have the potential to influence troops on deployment. Australia has a relatively long tradition of academic courses in tropical medicine, with programs continuing today in tropical medicine and its various new facets, such as travel medicine and international public health. A professional organisation in tropical medicine, the ACTM, has been established for Australasia. The ACTM is presently coordinating the development a professional curriculum in tropical medicine relevant for the region, which will help define the contemporary specialty area of tropical medicine. With enhanced prospects for academic training, professional recognition and development, as well as research, perhaps we are entering a new golden age in tropical medicine.

Competing interests

None identified.

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