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Australian Military Medicine Association

Statement of Objectives

The Australian Military Medicine Association is an independent, scientific organisation of health professionals with the objectives of:

- promoting the study of military medicine
- bringing together those with an interest in military medicine
- disseminating knowledge of military medicine
- publishing and distributing a journal in military medicine
- promoting research in military medicine

Membership of the Association is open to doctors, dentists, nurses, pharmacists, paramedics and anyone with a professional interest in any of the disciplines of military medicine.

The Association is totally independent of the Australian Defence Force.
Editorial

Australian Military Medicine is now in its third year of production. It started initially as a stapled-together Newsletter, and graduated last year to a "glossy" bound "journal". In making this move, Council considered the issue of the publication's name. There were two initially preferred options - The Australian Military Medicine Journal and The Journal of the Australian Military Medicine Association. These were both rejected because Council was concerned that a title which included the word "Journal" might seem a little presumptuous of a publication which subsisted on an editorial staff of one, and which had no formal basis for accepting or rejecting articles for publication (other than editorial whim). However, the editor has been keen to at least make the format as professional as possible (within the limits of his word processor), so that members might feel they were getting something worth both reading and keeping.

Those readers who have taken the time to notice, will have observed that the number of contributors is numerically less than the number of articles published - that is, we have several regular authors. From the bottom of my heart, I thank them. Their contributions have been of a high standard, topical and interesting. However, it is inevitable that these sources will dry up - and the fear of the editor is that AMM will die from the drought.

The ADF has enormous potential for well-directed health research. We have a stable and relatively homogeneous population for whose health care the ADF health services are the sole provider. We maintain uniform and secure records (I hesitate to use the words 'well written'). As the sole provider of health care we have the ability to determine what and how it is provided (within ethical limits, obviously). We could do any number of cohort studies, randomised controlled trials and other epidemiologically-based research. We have a close and stable relationship with our specialists, many of whom are in the Reserves.

So where is all this potential going? Is the research being done? Are the results being published elsewhere?

As editor, it is my aim to place AMM on a secure footing, with a regular 'supply' of articles for publication, some being rejected, others accepted, all being reviewed by both an editorial panel, and by specialists in the field covered. I want to see AMM be able to justifiably wear the mantle of "Journal". I do not want to be simply publishing proceedings from our scientific conferences, or the writings (however good) of a few regular contributors.

As a member of the ADF, I can only encourage my colleagues to give research a higher priority than now. To use the health care system we work in for useful, ethical and well-directed research, and not just in the narrow ADF specialties of underwater medicine, aviation medicine or malaria. This can only be for the benefit of the ADF, its members, and the health professionals who serve it.

In this regard, I am pleased to be able to report that, at the meeting of the Council of the AMMA, held in Melbourne on 6 March, Council resolved unanimously to investigate the means by which the Association can actively support research in military medicine. The most likely method of achieving this is by the introduction of Research Grants, but the basis of these will need to be developed, and will also rely on a healthy bank balance.

I now await a flood of papers. This publication's future is in your hands.

Russ Schodlitch

DISCLAIMER

The views expressed in this Journal are those of the authors, and do not reflect, in any way, official policy of the Australian Defence Force, the views or opinions of the Surgeon General, ADF, or any military body, or the Council or members of the Australian Military Medicine Association.
President’s Message

The secretarial affairs of the Association are very important, but not one in which the ‘rank-and-file’ has any great interest. As the service accounts for around $12 per member per year, it is also the most expensive part of the AMMA. It is the contact point most of the time between members and Council, so it is vital that it performs well. We have engaged a service, "Essentially Yours", for the last 12 months with, the Council considers, very satisfactory results. As such, progress has been made in improving communication with members, and this will continue, combining service for members with continued low membership fees.

It should be noted that the fees will only remain low if all members pay the renewal fees on time. It is of concern that quite a few people have not paid the necessary dues, which puts a strain on other members. It is also true that the resounding success of the first two conferences has helped the Association’s coffers considerably, with healthy surpluses despite very low registration fees ($100 in 1992, $150 in 1993).

The 1994 Conference, as you will see elsewhere in this issue, is on in Melbourne, from July 23 to 25. Further development of this conference will see it become even more of an event to be savoured by all people with an interest in military medicine.

James Ross

CONTRIBUTIONS

Contributions for *Australian Military Medicine* should be sent to the editor:
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3 Orinoco Street, PYMBLE, N.S.W., 2073
Tel: w (02)359-2562; f (02)359-2567; h (02)488-9949

DEADLINE FOR JUNE ISSUE: 15 May 1994

ARE YOU FINANCIAL?

Are you sure you are up-to-date with your subscription? A number of members are behind (even some who have paid for one year’s membership in the last 6 months - who were already behind a year).

If you are not sure, please contact ‘Essentially Yours’, the Association’s secretarial service, on (002)47-1850

If you know you are unfinancial, the renewal form is at the back of this Journal!
AUSTRALIAN MILITARY MEDICINE ASSOCIATION

CALL FOR PAPERS

3rd Annual Conference
Sheraton Towers,
MELBOURNE, JULY 22 - 24 1994

The 1994 Conference Committee is calling for the submission of abstracts on Military Health related topics. Such topics may include:

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All abstracts are to be submitted on the attached form (over page).

An award of $500 will be made to the best original paper presented at the conference.

Membership of the Australian Military Medicine Association is not a prerequisite for either presenting or attending the conference.

Send your abstract to:

Dr. Nader Abou-Seif
PO Box 147
Blackburn, Victoria 3130

Closing Date for Abstracts: 30 April 1994
ABSTRACT
AUSTRALIAN MILITARY MEDICINE ASSOCIATION

3rd Annual Conference, Melbourne, 22-24 July 1994

Title:

Author(s): (Presenter first)
1.
2.
3.

Presenter's Contact Address:

Abstract: (Max. 250 words)
The military wisdom tooth
C.J.R. McGrath BDSc, K.H. Dawson BDS, MDSc, FRACDS

Introduction
The practice of military dentistry is unique. Military dentists are trained in aspects of military medicine, operational health support, emergency triage and military administration. The peacetime responsibility of the armed forces is the preparation for war. In wartime, the primary role of the dental service is the conservation of manpower by the avoidance of unnecessary evacuation of the dentally sick. This is accomplished by prompt and appropriate therapeutic treatment and, more significantly, by the implementation of preventive programmes and the promotion of healthy behaviour.

In keeping with the concept of preventive dental care, the question of whether or not to remove impacted mandibular third molars prophylactically remains hotly debated. In the civilian population, many practitioners advocate removing these teeth only if symptomatic or pathological. The indications for treatment in the military setting are quite different due to the nature of military service and the need for personnel to be medically and dentally fit at all times. This paper discusses the management of impacted third molar teeth from a military perspective, and proposes a treatment protocol for the management of these teeth in the Australian Defence Force.

Discussion
The mandibular third molar is the most commonly impacted tooth in the adult dentition. With the decline of dental caries due to water fluoridation, the incidence of these impactions is increasing. The mandibular third molar is located posteriorly in the mouth, between the second molar tooth and the ascending ramus of the mandible. The pericoronal tissues are rendered extremely susceptible to infection due to only partial eruption of the tooth and the relative difficulty of cleaning at the back of the mouth. Anatomically, the third molar is related to the buccal and sub-masseteric spaces laterally, the sub-mandibular space inferiorly, and the sublingual, pterygoid and lateral pharyngeal spaces medially. Extension of infection into these tissue spaces is responsible for its serious nature and its potential threat to life. Aetiological factors associated with the development of pericoronitis include age, emotional stress, smoking, chronic fatigue, general debilitating illness, poor oral hygiene and respiratory tract infections.

Most commonly minor infection presents as swelling of the soft tissues covering the tooth. This swelling results in physical impingement by the opposing maxillary third molar leading to an increase in swelling and pain and yet greater mechanical trauma. Signs and symptoms include pain, trismus, sub-mandibular lymphadenopathy and halitosis. In more severe cases there is pyrexia, obvious facial swelling and dysphagia. Extension of infection into the sub-mandibular, sub-lingual and lateral pharyngeal spaces may lead rapidly to airway compromise and asphyxia. When admission to hospital for odontogenic infection is required, mean hospital stays have been reported in the range of four to nine days.

In civilian practice approximately 25 to 30 percent of wisdom tooth removals are for pericoronitis. Other common indications include dental caries, root resorption, periodontal disease, orthodontia, cyst formation and for the relief of less clearly defined jaw pains. The presence of unerupted third molars reduces the cross-sectional area of the mandible and increases the likelihood of fracture following trauma.

Morbidity associated with third molar removal is relatively high in the short term. Principal complaints are of pain and swelling and peak in the first two postoperative days. Alveolar osteitis (dry socket) is a painful condition often experienced after the removal of mandibular third molars. It is more common in patients over the age of 25 years and those with a history of pericoronitis. The most frequently observed long term complications are those associated with damage to the inferior alveolar and lingual nerves which supply sensation to the lower lip and tongue. Long term sensory deficits are seen in approximately 0.9 percent of inferior alveolar and 0.6 percent of lingual nerves. The frequency of neural injury has been demonstrated to reduce with the experience of the surgeon.
Following the surgical removal of impacted wisdom teeth, the healing of periodontal defects about the root of the second molar tooth is significantly better in the younger patient.

Why are third molar teeth important in the military environment? A recent study found that 77.3 percent of Australian Regular Army recruits had third molars present. The mean age of the ADF is under 30 years and thus in the prime range for infections associated with their wisdom teeth. In the course of training, but more particularly operations, soldiers are prone to emotional stress, chronic fatigue, poor nutrition, poor oral hygiene and other illnesses, all of which are aetiological factors in the development of pericoronitis infections. Thus a significant portion of our patient population is at increased risk of pericoronitis.

The management of significant facial infections is the province of oral and maxillofacial surgeon and within neither the scope of expertise of the general dental officer nor the facilities of the field (or base) dental unit. The need for both surgeon and hospital facilities would be operational conditions demand evacuation to a Level 4 medical facility. The soldier could expect to be away from his Unit and normal duties for approximately 14 days. The logistical difficulties are yet greater for a seaman on a surface ship or submarine.

The concept of conservation of manpower by preventive means dictates that impacted wisdom teeth should be identified early and removed before complications arise.

What are the advantages to the ADF of the prophylactic removal of impacted third molars during initial training?

- Conservation of manpower. If properly integrated into basic training, or before the commencement of specialist training, loss of skilled personnel to this preventable disease can be eliminated. Minor rearrangement of training programmes and the performance of surgical procedures late in the week should reduce loss training time to negligible levels.

- Prevention of complications. Surgery carried out by specialist surgeons under controlled conditions in suitable facilities minimises the incidence of complications. Performance under less than ideal conditions of what should have been elective procedures or the failure to address the periodontal considerations associated with impacted wisdom teeth may expose the ADF to legal liability at a later time.

- Training of dental officers. Concentration of oral and maxillofacial surgical activity offers the opportunity to increase the surgical skills of dental officers posted to these Units. Experience is better acquired under direct specialist supervision than by experience as an emergency in the field.

- Effective utilisation of specialist manpower. The ADF has recently and is currently training a number of oral and maxillofacial surgeons. Concentration of basic oral surgical services would both facilitate effective utilisation of these officers and also aid dissemination of their knowledge and skills.

The potential disadvantages of the routine prophylactic removal of impacted third molars soon after enlistment are twofold.

- Loss of training time. This should be minimal and acceptable if health care is viewed as integral rather than an impediment to the basic training course and the programmes are minimally reorganised on the lines discussed previously.

- Performance of unnecessary surgery. Not all impacted third molars will become symptomatic and despite the use of highly developed assessment skill on the part of the clinicians involved, "unnecessary" surgery will undoubtedly be performed.

Conclusions and Recommendations
The defence force is an organisation quite unlike any other in our society. It is comprised largely of healthy, young men and women who are called upon at short notice to perform at their best, for long periods of time, often under very adverse conditions. Failure to perform may result in the injury or death of their colleagues. It is the responsibility of the ADF to prepare for war by preparing its members to perform under frequently adverse operational conditions. The prevention of illness is as vital to the reliability of the force as is any other aspect of military training.

The authors propose that all recruits or equivalent have a screening panoramic radiograph of the jaws performed both for diagnostic and forensic purposes. Any recruit who has a history, signs or symptoms of pericoronitis or who has pathological changes about a third molar tooth should have this tooth removed. Partially erupted or third molars not radiographically completely covered by bone are very susceptible to the develop-
ment of acute pericoronitis and should be removed prophylactically.

The appropriate time for the routine surgical management of impacted teeth is during or at the conclusion of basic training when the soldiers' skills are low and posted Unit routine will not be disrupted. In the presence of the will to do so, basic training courses and the routines of the supporting Dental Units can and should be altered to reduce lost training time to negligible levels.

About the authors.
Flight-Lieutenant Chris McGrath RAAF graduated in dentistry at the University of Melbourne in 1988. His most recent posting was as a Dental Officer at No. 6 RAAF Hospital. FLTLt McGrath is currently on leave from the RAAF and is training in oral and maxillofacial surgery at the University of Washington.

Major Ken Dawson RAADC is a specialist oral and maxillofacial surgeon currently on the faculty of the Department of Oral and Maxillofacial Surgery at the University of Washington. An Army Reserve officer, his most recent appointment was as Officer Commanding 3 Field Dental Unit in Melbourne.

References
Q Fever
S.C. Shaple

Aetiology
Q Fever is caused by the rickettsial pathogen Coxiella burnetii, a minute bacterium-like organism which may vary in size and shape. The smaller organisms will pass through microbial filters (pore size 2 μm)1. The pathogen is able to produce a highly resistant spore which enables it to remain stable in the environment and in the presence of many disinfectants2,3,4. It can withstand temperatures from -52°C to 40°C, 0.5 percent phenol, is relatively resistant to desiccation, and is able to persist on surfaces for five to 60 days5.

Two distinct antigenic phases exist: Phase I is found in nature, and Phase II in the laboratory, after multiple passage through cell culture or eggs6.

Epidemiology
The disease has been reported in all continents, especially the United States (particularly California), Australia, Europe, South America and Africa7.

Although this organism infects wild animals via arthropod bites, the human disease is acquired primarily through inhalation of aerosols. Animal reservoirs include sheep, cattle, cats, feral rodents and ticks8,9,10. Although these animals are often asymptomatic, massive numbers of microorganisms can be shed in urine, faeces, milk and placenta.

Pathology

Virulence Factors
The molecular basis of Q fever pathogenesis is still poorly understood. It appears that different isolates of C. burnetii possess surface lipopolysaccharides (LPS) which vary antigenically, and cause different host cell responses and clinical manifestations11,12. Host characteristics (immune status, predisposing factors such as cardiac or immunological anomalies) may also be important in the clinical manifestations of Q fever13.

Correlations have been found between the LPS type and the form of the disease - either chronic or acute. Virulent Phase I pathogens possess a "smooth" LPS, whereas LPS of avirulent Phase II organisms is truncated or "rough". Phase I LPS has been shown to induce toxic responses, such as hyperthermia, weight loss, hepatomegaly, lipid infiltration of the liver, and leucocytosis14,15. Phase II isolates are able to survive in phagolysosomes but not the humoral and cell-mediated immune responses16. Phase II LPS does not induce the pathological reactions characteristic of Phase I strains17.

The precise role of LPS in pathogenesis is not known, but it may involve toxicity, attachment to host cells, or influence on the immune response18.

Other virulence factors are probably involved in pathogenesis, but have not yet been identified.

Relationship between isolate and disease manifestation
Q fever can occur either as a short-term acute disease, or as a chronic illness which may last for months or years. Approximately 5 percent of patients with acute Q fever will develop the chronic disease. There is some evidence to suggest that the form of the disease is very much dependent on the particular strain of C. burnetii involved19.

Pathogenic Sequence
Coxiella burnetii is an obligate intracellular parasite which can grow in monocytes, macrophages and pneumocytes. The pathogens enter the cell passively by endocytosis (they are engulfed by the phagocyte) and grow in the highly acidic phagolysosomes, where huge colonies may form.

The organism is able to resist degradation by lysosomal enzymes20, and requires acidic conditions for the metabolism and transport of nutrients such as sugars and amino acids21.

The organisms may disseminate via the bloodstream, and may cause major pathological changes in organs - especially the lungs and liver. Granulomas and necrotic lesions are common symptoms.

Pathogens which are able to persist in the body may cause chronic illness, although the physio-
logical mechanism of persistence is not well understood. It has been demonstrated in vitro that C. burnetii is able to induce the presentation of antigens on the surface of the host cell, and that the degree of presentation varies with different isolates. Strains which are associated with acute disease cause more antigen presentation than those strains implicated in chronic infection. If this is also relevant in vivo, chronic isolates may be able to survive for a longer period in the host because they are not as visible to the immune system.

Clinical manifestations
Q fever can occur either as an acute illness, or a persistent, chronic disease. The symptoms are nonspecific, making diagnosis purely from clinical observations difficult. Mortality in untreated cases is less than 1 percent.

Acute illness
The acute form of Q fever typically manifests as a pneumonia with malaise, anorexia, muscle pain, fever, chills, and intense pre-orbital headache, which may last nine to 14 days. The onset of symptoms is sudden and usually occurs 14 to 39 days after inhalation of spores. A dry cough may be present in some patients. Unlike other rickettsial diseases, no rash develops.

Complications are not uncommon, and may include encephalitis (involving headache, arthralgia, fever, speech difficulties, diarrhoea, influenza-like symptoms, dry cough, ataxia and dysphagia) and meningoencephalitis.

Chronic illness
Chronic Q fever usually appears as endocarditis, commonly involving the aortic or mitral valves. This form of the disease has a poor prognosis and may persist for years. Pericarditis and hepatitis may also develop.

Diagnosis

Laboratory diagnosis
Positive identification can be made by specific antibody response, isolation of the pathogen from inoculated animals or cell cultures, or fluorescent antibody staining of blood or tissue smears. However, these techniques have limitations.

Serologic testing is the most useful technique, although diagnosis is not usually made early enough to affect the management of the disease.

Techniques include immunofluorescent antibody assays, ELISA, latex agglutination, immunoperoxidase assays and haemaggltination. Several of these methods are useful in field situations.

Detection of antibodies using microscopy is difficult because organisms are present in relatively small numbers in tissues or blood (except postmortem tissue).

New techniques, such as nucleic acid amplification by the polymerase chain reaction (PCR), allow detection of DNA from very small samples, and have been useful in the early detection of acute phase Rocky Mountain spotted fever and murine typhus (other rickettsial diseases).

Differential diagnosis
Q fever may be mistaken for influenza, legionellosis, mycoplasmal pneumonia, tularaemia, pulmonary brucellosis, typhoid fever, cytomegalovirus and EBV mononucleosis, and psittacosis.

Treatment
Q fever can be successfully treated with tetracycline, doxycycline or chloramphenicol. Because of the intracellular nature of the pathogen, antibiotics must have good cell membrane permeability.

Acute Q fever
Acute Q fever is usually a self-limiting disease which resolves within a few weeks if untreated. Treatment only reduces the time of fever.

Recommended therapy is:

- doxycycline 100 mg every 12 hours for five to six days, or
- tetracycline 750 mg every six hours for five to six days, or for three days after patient becomes afebrile, or
- erythromycin 500 mg every six hours plus rifampicin 600 mg per day for five to six days.

Other antibiotics successfully used include ofloxacin, perfoxacin, chloramphenicol and cotrimoxazole.

Tetracyline can also be used for post-exposure prophylaxis. Treatment with 750 mg of tetracycline every six hours for five to six days starting eight to twelve days after exposure prevents the development of clinical disease. However, if this
regimen is begun one day after exposure (and stopped on day six or seven), clinical disease occurs about three weeks after the cessation of treatment.

**Chronic Q fever**
Q fever endocarditis has been treated with most success with a combination of drugs. Therapy with one drug alone often results in a prolonged illness or death. Antibiotic treatment should continue for at least three years.

Recommended therapy is:

- doxycycline 200 mg per day plus rifampicin 900 mg per day or a quinolone (perfluoracin or ofloxacin 400 mg per day)
- Tetracycline only appears to be effective for as long as it is given - once treatment is stopped, relapse often occurs
- Several fluoroquinolones have been shown to be ineffective in the treatment of Q fever endocarditis unless used in combination with other antibiotics such as rifampicin.

In the event of a biological warfare attack, and if possible, the surrounding area should be disinfected. The pathogen is very hardy and can resist elevated temperature, osmotic shock, desiccation, ultraviolet radiation and many chemical disinfectants. Formaldehyde gas, 0.5 percent sodium hypochlorite, 2 percent roccel, 5 percent lysterol and 5 percent formalin all fail to inactivate the microorganism after 24 hours at 25°C. Pathogens in 70 percent ethyl alcohol, 5 percent chloroform or 5 percent Enviro-chem are inactivated within 30 minutes.

**Susceptibility of population**
Susceptibility is high in previously unexposed individuals. Prior exposure generally gives solid, long lasting immunity. The pathogen is extremely infectious - inhalation of one to ten microorganisms is enough to cause disease.

**Prevention**
Two inactivated vaccines are currently in use and appear to be effective. A formalin-killed whole-cell vaccine ("Q-vaax" made by the Commonwealth Serum Laboratories, Melbourne) has been successfully tested on at-risk abattoir workers in Queensland and South Australia. The vaccine consists of a formalin inactivated Phase I strain. One 30 μg dose appeared to confer immunity 10 to 15 days after vaccination, and immunity seems to last for at least five years.

A trichloroacetic acid (TCA) extracted Phase I antigen from an attenuated strain of C. burnetii has also been used successfully in the former Czechoslovakia.

It is important to pretest individuals for antibodies before vaccination, as severe local reactions often occur if vaccines are given to individuals who have prior immunity. A skin test (20 ng of antigen) measuring delayed-type hypersensitivity is the best measure of immunity (antibody titres do not necessarily correlate with protection). Because of the high immunogenicity of C. burnetii, the skin test alone may be enough to cause seroconversion.

Recently, chloroform-methanol extractions of antigens have been tested, and these appear to be effective in preventing aerosol infections in mice. These vaccines do not produce the local reactions characteristic of the whole-cell vaccines, and are probably safe to administer to individuals with prior immunity (therefore eliminating the need to skin-test).

**Potential as a biological weapon**
A biological warfare attack of C. burnetii would involve aerosolised organisms and would cause disease very similar to naturally acquired Q fever. The very high infectivity means that only a few organisms (between one and ten) are necessary to cause disease.

The hardy nature of C. burnetii and its resistance to desiccation, heat and other environmental conditions, makes dissemination of the organism by aerosol feasible. It will also persist on dry or wet surfaces for a long period of time. Decontamination of the surrounding environment would be dificulty because of the pathogen's survival in many chemical disinfectants.

Although fatalities would be rare, the illness is very debilitating, and could seriously drain manpower and medical resources. The onset of acute disease could be any time between 14 and 40 days after exposure, causing prolonged disruption. The development of chronic disease would have a long-term effect on the individual infected and medical costs associated with the years of therapy would be considerable.

The current vaccines, although apparently effective, require testing of the patient for prior
exposure - this is time-consuming and expensive. Local skin reactions are also associated with these vaccines. Recent development of better vaccines is promising.

Future directions
New vaccines are currently being developed and should be available for use in the next few years. Antibiotic regimens for chronic illness should continue to be improved.

References:

34. McDaniel JE. Op cit.


Papers from the 1993 Conference

British hovercraft expedition to Papua New Guinea
R. Grimmer

In March of 1993, I was attached for six weeks to a British hovercraft expedition to the Fly River delta region of Papua New Guinea. This paper outlines the objectives of the expedition, and discusses the medical work on the expedition.

Expedition Background
The expedition was the fourth in a series of similar expeditions led by Michael Coles (an ex-RAF Squadron Leader) to provide or extend medical facilities in remote areas of the world. The previous expeditions were to Nepal in 1978, the Amazon headwaters in Peru in 1982, and the source of the Yangtze in China in 1990.

The expedition team consisted of six women and nineteen men from Australia and the United Kingdom. Three were serving Defence Force members, some were ex-RAF, but most were civilian. The team members were from a variety of backgrounds and many had been on previous expeditions.

Geographical Background
The Fly River delta, where the expedition went, is located in the Western Province of Papua New Guinea (PNG), one of the more sparsely populated and least explored regions of the country. It is located in the southwest of PNG, bordering on Irian Jaya. The Fly River, which flows from the mountains in the Ok Tedi region to the Gulf of Papua, itself forms part of the Irian Jaya border. The provincial capital, Daru, is the only population centre of any size in Western Province.

Daru is a small town situated between the Fly and Aramia Rivers. It lies on the edge of a large lagoon which connects to the Aramia River. It is a mission station of the Evangelical Church of Papua New Guinea, which also runs the health centre and school of nursing in Balimo.

Although generator power is supplied to the health centre and mission houses, most of the housing is traditional style with no electricity or running water. Most people are subsistence farmers.

There are very few roads in the area, so travel is either by water or by air. Because the region is very flat, with an extensive network of waterways, hovercraft were felt to be an ideal mode of transport.

Objectives
The objectives of the expedition were twofold: First, the reinforcement of the health service provided by the existing health centre at Balimo by the provision of a hoverdoctor patrol; secondly, the exploration of the fringes of present coverage for possible new Area Posts, and beyond to assess the potential range into areas so far untouched.

Method
The objectives were to be achieved by building a hovercraft base station at Balimo and training PNG nationals in the operation and maintenance of the hovercraft (the two eight-seater hovercraft were designed specifically for use in areas of the world where maintenance is difficult).

Building the base's station involved clearing and levelling a block of land adjacent to the lagoon, laying a concrete slab and constructing a weatherboard garage to house the hovercraft. Also, the hovercraft had to be removed from their shipping containers and reassembled. These tasks were a learning experience for most of us.

Medical Work
In addition, the medical staff on the expedition (three doctors and two medical students) participated in the work of the health centre. This included assistance at surgical operations, managing inpatient care and attending the Maternal and Child Health clinics in outlying villages (these were not normally staffed by a doctor).

Balimo Health Centre was comparatively well equipped, with operating theatre, pathology laboratory, X-ray and a number of wards as well as the School of Nursing. Other medical centres were equipped to a lesser extent, with mainly outpatient services.

Maternal and Child Health clinic patrols visited all the surrounding villages on a roster, on average of once a month. The usual means of transport was
canoe, which often involved quite a few hours' travel, and a fair walk at the end. Clinics were usually held in village churches (the largest buildings in the villages). Kotale had a special clinic building.

The clinical routine consisted of a health talk given by one of the student nurses, weighing of the children, physical examination and counselling of the parents on nutrition, vaccinations and a dressing clinic.

Patient-held records were used and good records kept of the clinics. Some special clinics were held, eg tuberculosis and leprosy.

For the more distant clinics, the team stayed at the village overnight. This provided a wonderful opportunity to meet the locals. Working in the hospital provided a wide range of clinical material, from the familiar, eg football injuries and appendicitis, to the exotic eg typhoid bowel perforation, filariasis, leprosy, malaria and advanced osteomyelitis.

In summary, the expedition provided an excellent opportunity to work under very different conditions to those in Australia, and to practice tropical medicine first hand.

About the Author
Flight Lieutenant Rachel Grimmer RAAF is currently serving as the Senior Medical Officer at RAAF East Sale. This is the second of two papers she presented to the AMMA Conference in Canberra in 1993.

"Beyond the Lagoon",
by Cecil Pearce,
a hard cover book giving an account of the expedition described in FltLt Grimmer's paper is available from her at a price of $27.95 plus p & p.
Tel: (051)49-4564.
Specialist health care at sea
R.B. Scheddich MB BS, Dip DYM

The deployment of specialist health care at sea, and particularly the provision of surgical care for casualties, is an important component in the provision of an adequate standard of health support to the ADF. Historically, there have been significant changes in both the quality and method of delivery of health care at sea. This paper illustrates these changes and discusses the future of this important support role in the RAN.

Nelson
The Battle of Trafalgar, a high point in the history of the Royal Navy, was fought in October 1805 against the combined armadas of the French and Spanish and effectively showed the carnage that can be inflicted upon ships and their men during battle.

Medical support in RN vessels of the time was probably close to the best available anywhere, since a doctor was generally a "Jack-of-all-Trades", and surgery was quite primitive stuff. On Admiral Lord Nelson’s Flagship Victory, the surgeon was Dr William Beatty, and he was kept extremely busy on the day. He provided all his care in his ship, medevacs being unheard of. His success was varied, and he lost his Flag Officer, who, today, while he would probably have been a paraplegic, could likely have survived if specialists care had been immediately available.

World War II
The Second World War saw Australia mobilise several hospital ships, all converted merchant vessels. Three of these, Manunda, Wanganella and Orange, served successfully, mostly in the Pacific theatre. They were all manned by Army medical personnel, although Naval advice was sought for some aspects of their conversion.

In early 1943, Centaur was commissioned and converted to a hospital ship. On her maiden voyage in this capacity, having been properly notified under the Geneva Convention as a hospital ship, and being appropriately marked and illuminated, she was torpedoed and sunk with the loss of 268 lives. Following this there followed a series of events and controversy which, in the light of the approach to the provision of medical care at sea today, is very interesting.

At the time of the sinking, Manunda was in Sydney, and almost immediately sailed to take up Centaur’s duties, but before she could leave the harbour, she was recalled. One month later, she was painted grey and guns were installed, making her an armed ship for sailing in convoy. Controversy surrounded this decision to abandon the protection of the Geneva Convention, and two months after the first conversion, she returned to her status of a hospital ship, the guns removed, and the colour scheme altered back.

Role of the Hospital Ship in the Early Twentieth Century
The advancement of medical technology had quickened in the early twentieth century, but even in the 1940’s emergency treatment, and particularly surgery, could generally be provided almost as
efficiently in the field as in most civilian hospitals, if proper facilities were available. These facilities needed only to be fairly basic. Most field hospitals and most large warships, which had crews of several hundred, and often two, three or more doctors on board, were adequately provided for. Most doctors who were deployed, and indeed most that were employed full-time in the Services, were almost as adept at surgery as their civilian counterparts. Tactical aeromedical evacuation was not available.

The role of the hospital ship up to the end of the 1940s was principally that of transporting patients whose condition was stabilised, they having had any definitive surgery before transport. The ships were thus more of an ambulance ferry service than a true hospital. Their staffing was centred on the provision of nursing care, although they did have operating theatres and staff to allow procedures to be undertaken as necessary.

The Falklands War
By the time of the next major maritime-based conflict, that is the Anglo-Argentine war over the Falkland Islands, the level of medical technology available and expected had increased dramatically. In addition, the degree of professional specialisation that had occurred had created a situation where a general ship's medical officer could not be expected to provide anything other than lifesaving resuscitative measures, and first formal surgery had to be provided by specialist surgeons. A further issue was the much reduced complement in the average warship, down to less than 200 in some cases, with a similarly comparatively small number of medical staff - and usually only one doctor.

Another new factor, which had been effectively used in the Vietnam War, was the ready availability of rotary-wing forward aeromedical evacuation. This allowed casualties to be delivered to medical facilities over a hundred miles to the rear of the battlefield in only a few hours. Thus, a casualty could be rapidly resuscitated, stabilised, and flown on for definitive surgical care.

In the Falklands, two ships were given major medical roles.

**SS Uganda**
The P & O liner **SS Uganda** was fully converted into a hospital ship, and was declared as such under the Geneva Convention. She had accommodation for nearly a thousand casualties, and had a specialist operating capability, intensive care unit, and high dependency unit. She treated over 700 casualties, and performed over 500 operations. One factor of particular note was the number of cases who arrived having already had their first round of formal surgery. Casualties were subsequently ferried in hydrographic ambulance ships back to Uruguay and thence to the UK.

**SS Canberra**
**SS Canberra**, another P & O liner, was requisitioned principally as a troop carrier. It was, however, considered that she should have a significant medical capability embarked for the amphibious landing, wherever that might occur. She thus also had a hospital-type facility built into her, but could not be declared as a hospital ship under the Geneva Convention due to her primary tasking. During the initial landing phase, it was considered unsafe for Canberra to remain close inshore, and so the bulk of the medical manning was landed to Ajax Bay where it provided a forward third level facility. It was this facility which fed casualties into the Uganda.

The Gulf War
In the most recent major world conflict, the Gulf War of 1990-91, vast shore and sea-based medical facilities were deployed.

**USN Hospital Ships**
The United States Navy deployed its two 1,000-bed hospital ships, *Mercy* and *Comfort*. These vessels, highly capable and providing in reality fourth level health support, provided the base for health care at sea.

**RFA Argus and the PCRS Concept**
The Royal Navy at mobilisation for the Gulf War did its sums and calculated, based upon the population it had to support, that it probably needed only 100 beds at sea. Because of this number, it was considered inappropriate to requisition a merchant vessel and provide a full hospital ship facility. It adopted instead the Primary Casualty Reception Ship concept, of which **SS Canberra** in the Falklands was an early example. This is the concept of deploying third level health support - providing specialist surgical and medical services in a properly equipped facility - in a warship-style vessel forward in the battle zone.

This Primary Casualty Reception Ship - PCRS - was provided by building a two-level PortaKabin structure on the hangar deck of the Aviation Training Ship, *RFA Argus*. The facility provided a
total of 100 beds, including 24 intensive care and high dependency beds, four operating theatres and full support services. Dedicated aeromedical evacuation units were available, and the whole facility was in collective NBC protection. Advantages of the PCRS concept were:

- the ability for it to be deployed well forward into the combat zone, being often only 10 miles astern of the most forward deployed ships,
- the ability of the ship to undertake other operational roles and fully defend itself, and
- the ability to remain in full tactical communications with the Fleet it was supporting.

None of these would have been possible with a dedicated hospital ship.

The Need
The RAN has a strategic requirement to operate in regions isolated from adequate health facilities, either service or civilian. Such operations may involve support of Army activities, and the nature of the region requires Navy to be able to deploy surgical services into the area, and have them function on board.

The Concept
In determining whether the RAN needs a full hospital ship capability or merely the capability to deploy Level Three health care in any ship, several factors must be considered.

Capability
The capability that must be met is clear - the provision of specialist health care at sea. This requires extensive facilities but, provided the ship is large enough, they can be built in to any kind of vessel - merchantman, hospital ship, aircraft carrier or naval support ship. The facilities built into SS Canberra and RFA Argus successfully prove this.

Location of Operations, Modern Weaponry, Safety and the Geneva Convention
Historical research has shown that mortality and morbidity of casualties increases significantly if more than three hours elapses between time of wounding and initial surgery. Pre-Vietnam, forward aeromedical evacuation was not available, and therefore this factor was not so important. Now, however, it is. Hence, the further forward the facility can be deployed, the better.

In the context of modern warfare, there are particular problems associated with deploying ships forward. These relate to problems of ship identification and thus the ability for a ship to maintain its protected status under the Geneva Convention.

In the good old days, a commander saw his target with his Mark I eyeball before shooting. Modern fire-and-forget weapons, however, do not see red crosses. Worse, they tend to head for the largest target, which is likely to be the hospital ship. Since a hospital ship cannot have any ship protective weapons of any sort, there are two alternatives - either it must have dedicated warship protection at all times, or it must operate well outside the combat zone. In the Falklands, this was achieved by having a Red Cross Box, but this was many miles from the islands.

Roles
A final issue is the roles and taskings of the ship. A dedicated hospital ship, under the Geneva Convention, can have no other role or task. Thus, to declare a hospital ship as such, it must be able to be provided as a dedicated resource.

The Choice
Because of the size of facility required, and the limited nature of the ADF’s capital funding, the RAN would be best equipped with a PCRS - that is, a grey ship with extensive medical facilities, dual role, and the ability to defend itself.

Implementation
There are two facets to the provision of facilities for a PCRS - the ship and the health facility itself.

Ships
The ideal platform for a PCRS in the RAN would be the Training and Helicopter Support ships due for delivery into the inventory at the beginning of 1995. Whether such a facility is incorporated into the conversion plans for these ships remains to be seen.

Style of Health Facility
Whatever vessel the health facility is placed in, there are several methods that can be used in construction.

The best facility is a fully built-in one - that is, spaces for the facility are purpose-designed and constructed within the structure of the vessel. This
allows for the facility to have the optimum configuration. It is, however, expensive, and, while some spaces, such as low dependency accommodation can be used for other purposes, relatively wasteful of space when the facility is not operational.

The best examples of built-in facilities are the US Navy Amphibious Assault Ships which have extensive medical facilities. These are generally of 300-bed capacity, with four or more operating theatres and all support services. They are characterised by massive 80-place triage areas. The most recently constructed group, the Wasp class, have 600-bed hospitals.

Of course, both the Uganda and Canberra in the Falklands were fully built-in facilities, however, as they were hurriedly constructed and constrained by the existing ships’ structures, the conversions were of a rough, temporary nature. As well, issues such as flight decks and casualty access were less-than-ideal compromises.

The US Navy hospital ships are essentially built-in facilities although construction was done in modules, these being lowered into place in the large, open spaces of what were previously oil tankers.

At the opposite end of the spectrum, a shipboard medical facility can be fully modularised.

There are several examples of this type. The most obvious is RFA Argus. This was constructed in a large open space on two levels, using Portakabins. It had several inherent advantages that suited it both for its role and the operating environment.

- First, it was in collective NBC protection so that all medical treatment could be undertaken unencumbered by personal NBC equipment.
- Secondly, being constructed in a ship designed such that it was capable of helicopter support, casualty access from aeromedical evacuation was excellent, being provided by an aircraft lift.
- Finally, being carefully designed and built over a period of three weeks, its design was optimum for space, casualty flow and flexibility.

Although Argus treated only 105 patients during the Gulf War, it was considered such a success that it has been retained in the ship, which is now the RN’s designated PCRS.

Another type of modularised facility is the Army’s mobile field hospital, Centaur - named after the Second World War hospital ship. This was designed for the field, but might possibly be used at sea. It is based on expandable ISO-container-sized shelters.

Centaur does have one implicit problem, and that is its size. When fully set up, the whole 30-bed hospital covers about one acre, and much space is wasted - for example, the five-foot distance between each containerised unit. Navy has to operate in very small spaces, and so Centaur, while providing an attractive, currently available capability, does suffer from some inherent difficulties in being deployed at sea.

There are a number of other modularised facilities available. The RAAF has its Rampart system, and overseas some European countries and the United States manufacture modularised medical facilities, mainly designed for deployment on land. Some, however, are promoted as being usable at sea, and the Royal Navy has in the past been involved in the design of containerised systems. The Indonesian Navy has some units of a facility which is UK designed.

A further option that is possible is a facility part built-in and part modularised. Thus, the core elements of a medical facility - operating theatres, high dependency unit and so on - can be built into the structure of the ship, with other parts, such as low dependency beds and ancillary services, being either in containers or dual use compartments.

Personnel
The most important aspect of any PCRS is the medical personnel to staff it. RFA Argus had 136 personnel for its 105 beds, Uganda had 105 and the US hospital ships about 1600.

The RN and USN can muster these numbers from their permanent resources, with only minor assistance from their Reserves. The RAN, on the other hand, has virtually no clinical specialists in its permanent forces. Specialist medical personnel, and some nursing personnel, will have to come from the Reserves. The Gulf War displayed the ability of the Reserves to meet the challenge of providing specialist personnel for deployment, but many problems were also evident.

It is likely that the RAN Reserve will come, over the next several years, to have a very specific role in the naval organisation, that being the provision of personnel to man a Primary Casualty
Reception Ship in which is deployed specialist medical and surgical care.

A PCRS would not be entirely Reserve manned, since a substantial slice of the nursing personnel, both registered nurses and naval medics, as well as numbers of general service medical and dental officers will be provided from the PNF.

Interoperability

The ADF health services are a relatively small organisation. It is no: always possible for each service to provide a wide-ranging and comprehensive health care service, and each may be called upon to use one or both of the others’ personnel, facilities or equipment. This was the case during the Gulf War, when Army and Air Force, both Permanent and Reserve, provided personnel for the US hospital ship-based medical teams.

It is important that as much interoperability as possible be incorporated into whatever the three Services provide in the way of health facilities, equipment and casualty management procedures. Of course, there will always be unique problems that a particular Service has that will demand unique solutions - and the Navy has a unique problem of space - but this should not inhibit the search for as much common ground as possible.

Finally, in continuing to pursue the development of the ADF health services, the following quote from Clara Barton, the founder of the American Red Cross Society is worth remembering. This quote sums up the health services’ primary role, or raison d’etre, for existing in the Services.

Miss Barton was speaking of the formation of a Red Cross Society in the United States when she said:

I beg you will not feel that in the presentation of this plan of action I seek to add to the labours of the people. On the contrary, I am striving to lessen them by making previous, calm preparation do away with the strain and confusion of unexpected necessities and haste. I am providing not weariness, but rest.

And, again, I would not be understood as suggesting the raising of more money for charitable purposes; rather I am trying to save the people’s means, to economise their charities, to make their gifts do more by the prevention of needless waste and extravagance.

Sound familiar? In peace, prepare for war.

About the Author.
Surgeon Commander Russ Schedlich, the editor of AMM, joined the RAN as an undergraduate in 1977. In his 14 years’ of full-time service, he has done his time at sea, specialised in Underwater Medicine, spent two years on exchange in the UK, and part finished a Master of Public Health. From 1989 to 1990 he was Fleet Medical Officer and instrumental in the deployed Fleet’s preparations for the Gulf War. He is currently employed on a Project to fully develop specialist health care services at sea in the RAN.
Watson AP, Griffin GD, 1992. Toxicity of vesicant agents scheduled for destruction by the Chemical Stockpile Disposal Program. Review] Environmental Health Perspectives; 98:259-80. The vesicant agents of the unitary chemical munitions stockpile include various formulations of sulphur mustard [bis-(2-chloroethyl) sulphide, agents H, HD, and HT] and small quantities of the organic arsenical Lewisite [dichloro(2-chlorovinyl) arsine , agent L]. These agents can be dispersed in liquid, aerosol, or vapour form and are capable of producing severe chemical burns upon direct contact with tissue. Moist tissues such as the eyes, respiratory tract, and axillary areas are particularly affected. Available data summarizing acute dose response in humans and laboratory animals are summarized. Vesicant agents are also capable of generating delayed effects such as chronic bronchitis, carcinogenesis, or keratitis/keratopathy of the eye under appropriate conditions of exposure and dose. These effects may not become manifest until years following exposure. Risk analysis derived from carcinogenesis data indicates that sulfur mustard possesses a carcinogenic potency similar to that of benzo[a]pyrene. Because mustard agents are alkylating compounds, they destroy individual cells by reaction with cellular proteins, enzymes, RNA, and DNA. Once begun, tissue reaction is irreversible. Mustard agents are mutagenic; data for cellular and laboratory animal assays are presented. Reproductive effects have not been demonstrated in the offspring of laboratory rats. Acute Lewisite exposure has been implicated in cases of Bowen's disease, an intraepidermal squamous cell carcinoma. Lewisite is not known to generate reproductive or teratogenic effects. [References: 112]

Comment: This is an excellent review article stressing some of the problems associated with chemical munitions disposal. As chemical munitions continue to be occasionally found in Australia, military physicians need to be aware of the risks.

Yoganathan S, Johnston IG, Parcell CJ, Huagliton IT, 1991. Determination of contamination of a chemical warfare-proof operating theatre with volatile anaesthetic agents and assessment of anaesthetic gas scavenging systems. Brit J Anaesth; 67(5):614-7. Three types of anaesthetic waste scavenging systems (active antipollution system, Papworth Block passive system and activated charcoal absorber system) were compared with a non-scavenging control to assess their effectiveness in reducing waste halothane concentrations in a chemical warfare-proof operating theatre. All three systems were found to reduce the level of pollution significantly.

Comment: Inclusion of scavenging systems within operating areas is an important facet of collective protection.

Blount BW, Hart G, Ehreth JL, 1993. A description of the content of army family practice. [Review] J Amer Board Fam Pract; 6(2):143-52. BACKGROUND: For decisions about residency curricula and downsizing the US Army Medical corps, decision makers must know the practice content of the various specialties. Little is known about the content of Army family practice. The purpose of our study was to describe the content of Army family practice. METHODS: We analysed a random sample of 28,849 family practice encounters from the US Army Ambulatory Care Data Base Study. Variables included patient demographics, diagnoses, visit duration, procedures, and medical facility. Patient age and visit duration were compared using analysis of variance; facility profiles were compared by age category and sex of patients, family member position, and procedure frequency using chi-square analysis. Diagnostic content of the facilities was compared by both chi-square and Kendall's tau B tests. RESULTS: The typical patient was a 26-year-old woman. The 25 most frequent diagnoses accounted for three-fourths of all encounters, with variation by patient age. The majority of visits did not include a procedure, but procedure frequency varied by patient age and diagnostic certainty. Mean visit duration was 16.4 minutes and varied by age. There were differences among the sites for all variables. CONCLUSIONS: Army family physicians see patients of all ages, of whom more are the family members of soldiers than the soldiers themselves; they frequently do procedures and are
usually certain of their diagnoses, which include a broad spectrum of illnesses. Army family physicians are flexible, adapt to local patient and environmental needs, and are uniquely qualified to form the basis of Army medicine.

Comment: Similar descriptive research from Australian military medical facilities would be useful for planning purposes.

Wilson GF, 1993. Air-to-ground training missions: a psychophysiological workload analysis. *Ergonomics* 36(9):1071-1087. Psychophysiological measures are used to assess the workload of F4 Phantom aircraft pilots and weapon system officers (WSO’s) during air-to-ground training missions and during performance of two levels of difficulty of a laboratory tracking task. The bombing range portion of the missions was associated with the highest pilot workload, while the WSO flying the aircraft was the highest workload segment for the WSO’s. The pilot’s data were found to have a wider range of values for the physiological measures than were found in the WSO data. The different levels of tracking task difficulty produced significant physiological effects but the range of values found for most of the flight segments were much greater. These data demonstrate that extrapolating laboratory data to the flight environment is risky at best. The various physiological measures were differentially sensitive to the different demands of the various flight segments.

Wengler B, Quigley MD, Kolka MA, 1993. Seven-day pyridostigmine administration and thermoregulation during rest and exercise in dry heat. *Aviat Space Environ Med* 64:905-911. Seven men participated in a double-blind study of the effects of multiple-dose oral pyridostigmine bromide (PB) on physiological responses to 4-h heat stress tests (HST’s) in a hot dry environment, 42°C, 20% relative humidity. Subjects underwent two 7-d series of tests, separated by 72 h, taking 30 mg PB every 8 h in one series, and placebo in the other. Each HST began right after the 0800 dose of PB or placebo. Subjects drank *ad libitum* during each HST, and performed two 55-min treadmill walks at about 40% VO\textsubscript{2}\text{max} during the last 2 h. Inhibition of red cell cholinesterase at the start of exercise average 30.0% in subjects taking PB, and did not differ significantly among HST’s with PB. PB increased sweating and evaporative water loss by about 4%, and lowered chest skin temperature during exercise by 0.7°C; but it had no significant effect on rectal temperature, other skin temperatures, O\textsubscript{2} uptake or fluid balance. PB alone had no significant effect on heart rate (HR), but had a significant interaction with day: although PB had essentially no effect on HR in the 1st HST, its effect increased progressively so that HR during exercise in the 4th HST was 8 beats min\textsuperscript{-1} lower with PB. Multiple-dose PB had only slight effects on responses to moderate exercise-heat stress beyond those described after single-dose PB, and we found no adverse effects of multiple-dose PB administration.
Mabry EW, Munson RA, Richardson LA, 1993. The wartime need for aeromedical evacuation physicians: the US Air Force experience during Operation Desert Storm. *Aviat Space Environ Med*; 64:941-946. Air transportation has been the primary method of moving patients by the armed services of the United States since 1949. It is fast, reliable, and allows for centralized medical care. Aeromedical evacuation (AE), performed by the US Air Force under Department of Defence directive, was intended as a method to transport medically stable patients. Modern warfare has evolved into a process capable of generating large numbers of casualties in a short period of time that can overwhelm local medical facilities. Such casualties would then require immediate transportation in order to obtain appropriate treatment. The terrorist bombing of the US Marine barracks in Beirut and the 1989 military action in Panama (Operation Just Cause) are recent experiences where unstable casualties were transported by an AE system not designed to care for acute injuries while en route to definitive care. During Operation Desert Storm, Aeromedical Evacuation Flight Surgeons augmented AE crews and provided flexibility to transport critically ill patients. Future planning should augment designated AE crews with appropriately trained physicians and include equipment on aircraft to resuscitate patients that decompensate in flight.

**Comment:** Greater expectation of casualty survival will inevitably lead to a greater expectation of physicians travelling on aeromedical evacuations.

Bisson RU, Lyons TJ, Hatsel C, 1993. Aircrrew fatigue during Desert Shield C-5 transport operations. *Aviat Space Environ Med*; 64:848-853. The metrics used to define US Air Force crew rest and flight duty limitations were not designed to manage surge operations such as Operation Desert Shield. Desert Shield provided an opportunity to obtain in-flight data on acute and cumulative fatigue and the effect of other stressors during over-the-shoulder observations on 24 C-5 airlift crew members. Findings emphasise how sleep history, recent duty day cycles, subjective fatigue, scheduling patterns, nutrition, and billeting facilities contribute to fatigue and lower levels of alertness. The results of this fairly insignificant observational study attempt to preserve some of the aeromedical lessons of Desert Shield. The flight surgeon authors integrate their experience to outline development of a fatigue management and alertness enhancement doctrine.

**Comment:** Good nutrition, noise abatement and low light levels were found to be more effective than temazepam in limiting the effect of transient daytime insomnia.

Crowley JS, Geyer SL, 1993. Helicopter rotor blade injury: a persistent safety hazard in the US Army. *Aviat Space Environ Med*; 64:854-858. Rotor blade injuries are an inherent hazard of helicopter operations. To determine the recent incidence of rotor blade injuries in the US Army, a review of accident records (1972–91) was conducted. Crash-related injuries were not included. During the study period, there were 24 blade strike injuries (12 involving the main rotor), 11 (46%) of which were fatal. Comparison with previous reports indicates a lower rotor blade injury rate in the last decade than in any previous period. The head was injured most frequently (65%) followed by the chest (17%) and abdomen (7%). Protective helmets helped to reduce injury in several instances. Flight crew comprised 49% of the victims, passengers 29%, ground crew 14%, and bystanders 8%. Helicopter crews must maintain situational awareness when around turning blades - professional training alone does not guarantee protection from rotor blade injury.

**Comment:** Flight crew are still the most often injured. Is an enclosed/shrouded tail rotor the only reliable protection?

Clark JB, 1993. Risk assessment and clinical aeromedical decision-making. *Aviat Space Environ Med*; 64:741-747. This article presents a format of aeromedical decision-making used in neurology cases referred to a US Navy Special Board of Flight Surgeons from 1988 to 1990. The format consists of a series of questions addressing aeromedical concerns, an aeromedical disposition flow chart, and a Decision Analysis tree. Decision Analysis is a tool used in clinical medicine to assist decision-making under conditions of uncertainty. The Decision Analysis approach may be applied to complex aeromedical disposition questions that face flight surgeons. The concept of risk assessment as it applies to decision-making and aeromedical disposition is discussed. The outcome of 24 neurology cases referred for aeromedical disposition are presented.

**Comment:** An approach to try to objectify a highly subjective process.
McLellan TM, Jacobs I, Bala JB, 1993. Influence of temperature and metabolic rate on work performance with Canadian Forces NBC clothing. Aviat Space Environ Med; 64:587-594. This study examined the effects of environmental temperature and metabolic rate on soldiers' work tolerance time (WTT) while wearing various levels of nuclear, biological and chemical (NBC) defence protective clothing. There were 23 unacclimatized males (23 ± 3 years, 76 ± 8 kg, 1.77 ± 0.08 m) assigned to exercise at either a light (walking 1.11 m s⁻¹ 0% grade, alternating with lifting 10 kg) or heavy metabolic rate (walking 1.33 m s⁻¹ 7.5% grade, alternating with lifting 20 kg) in an environmental chamber at either 18°C, 50% RH (cool) or 30°C, 50% RH (warm). Subjects were tested using three levels of clothing protection: combat clothing (L); combat and a semi-permeable NBC overgarment (M); combat and NBC overgarment, gloves, boots and respirator (H). WTT was the time until rectal temperature reached 39.3°C, heart rate reached 95% maximum, dizziness or nausea precluded further exercise, or 5 h had elapsed. During the light and cool trials (N = 5), wearing M or H did not impair WTT (277 ± 47 min). For the light and warm experiments (N = 6), WTT was significantly impaired with H (82.7 ± 10.6 min). With the heavy and cool condition (N = 6), WTT was reduced with M (240.5 ± 73.8 min) and H (56.7 ± 17.9 min). Finally, during the heavy and warm trials (N = 6), WTT was progressively impaired for L (172.5 ± 52.8 min), M (65.8 ± 18.2 min) and H (34.0 ± 9.7 min) levels of protection. These data quantify the impairment in physical work performance associated with the wearing of Canadian Forces NBC protective clothing as the metabolic rate and/or the environmental temperature is increased.

Comment: Avoid susceptible individuals and minimise screen image disturbance and the clean up should be less common.

Bohunker B, McEwen G, Feeks E, Palombaro J, 1993. Explosive outbreak of gastroenteritis on an aircraft carrier: an infectious disease mass casualty situation. Aviat Space Environ Med; 64:648-650. An aircraft carrier experienced 777 cases of acute gastroenteritis while deployed in the eastern Mediterranean over a 16-d period. These cases were noted in the 5,000-man crew, suggesting a cumulative incidence rate of 15%, though many sailors did not seek medical care for their symptoms. The onboard medical department response included epidemiological investigation with unique shipboard facility considerations, development of a treatment plan, and implementation of preventive/educational programmes. Implications for non-trauma-related mass casualty situations are discussed. Flight surgeons and operational medicine physicians must have a solid foundation in general preventive medicine to fulfill their responsibilities.

Comment: USS Forrestal had 449 cases in one four-day period; it is likely many others had symptoms but did not present. The effect on medical resources and on operational capability of the ship is clearly significant.

Lerman Y, Sadovsky G, Goldberg E et al, 1993. Correlates of military tank simulator sickness. Aviat Space Environ Med; 64:619-622. A military tank driver simulator is currently widely used as a training aid for tank drivers. The purpose of this study was to investigate the relationship between possible correlates of simulator sickness and the occurrence of sickness and performance test results among simulator drivers. The average number of motion sickness-like symptoms reported after driving the simulator among subjects with a history of susceptibility to motion sickness was 3.4, significantly higher than the average of 1.6 reported among subjects who did not report previous susceptibility to motion sickness (p < 0.05). Subjects driving the simulator while screen image quality was disturbed had a longer reaction time (42.0 s) than when driving the simulator without screen interferences (18.4 s, p = 0.001). Subjects driving the simulator for a short period had the same number of symptoms as did those driving for a longer period, but had better digit symbol test results. There was no statistically significant association between the development of sickness and tank driving experience. Suggested countermeasures are expected to prevent simulator sickness among some of the simulator trainees and to make simulator training more effective.

Voge VM, Tolan G, 1993. Hazardous materials incidents in military aircraft. Aviat Space Environ Med; 64:658-661. We evaluated 10 years of reported hazardous cargo incident information from the US Air Force and Naval Safety Centres. In this first of two papers describing the hazardous cargo prob-
lems reported by the two services, we describe types of aircraft and types of hazardous cargo involved in incidents not causing aircraft mishaps. Normally, hazardous cargo must be manifested as such and no passengers are allowed on such flights. Unauthorised hazardous cargo was found on military aircraft carrying passengers. The most common problem was fuel spills or fumes. The most frequent cause of a hazardous cargo incident was improper manifest of same. Improvements are recommended for the incompatible or inconsistent hazardous cargo incident reporting systems, in order to improve prevention of hazardous cargo incidents. 

Comment: Stupidity of humans should never be underestimated.

Zadoo V, Fengler S, 1993. The effects of alcohol and tobacco use on troop readiness. Mil Med; 158(7):480-484. Prior studies have documented the ill effects of cigarette smoking on soldier athletic performance. We examined the effects, if any, of cigarette smoking and alcohol use on troop readiness. A group of 510 soldiers was examined. They answered an initial questionnaire and then were followed in sick call for a two-month period. The results of the study confirmed that cigarette smoking impacted adversely on athletic performance. However, we were unable to quantify increased time off or away from duty as a result of cigarette smoking and alcohol use. 

Comment: Effects of tobacco use are likely to be shown long term rather than short term.
This ain’t hell . . . but you can see it from here: A Gulf War Sketchbook. McWilliams, B. 1992. Presidio Press: Navato, California.

The Gulf War in early 1991 was a testing ground for new equipment, doctrine and a new generation of the military. McWilliams has set out to tell us to look at the personal side of the conflict in this poignant, amusing and, from an organisational perspective, often frightening book. His text covers everything from interservice rivalry, scrounging, the air war, women in combat, to medical support and wolfburgers. Liberally interspersed with anecdotes and entertaining cartoons, this book makes some useful comments about organisation in war time and is a beneficial addition to any military medical library.

Surely there are other people who read books on military medicine?

We have a whole library available to read -

ring the Librarian,
borrow a book and write a review!
Regional Group Funding

Regional groups may be formed with the approval of the AMMA Council. There is to be only one geographically based group in each major population centre. Each group is to have, as a minimum, a chairman and secretary/treasurer.

Funding levels (which will be reviewed annually) shall be:

- **Annually:** $5 per head of AMMA membership in the region automatically for general running costs
- **Annually:** $5 per head in addition, approved by the Treasurer and one other Council member for special activities

Applications for additional funding of other activities which further the aims of the AMMA are to be considered for approval by Council, and should be submitted through the Association Treasurer.

Annual funding may be used on AMMA related matters as considered appropriate by the regional group. Annual reports on the activities and financial situation of the group, including a profit/loss statement, are to be rendered at the end of each financial year, and are to reach the Treasurer by 7 July of the current year.

---

1994 Council elections

Please fill out the accompanying nomination form if you wish to nominate someone or be nominated to one of the AMMA Council positions. The position will be for 12 months, commencing from the next Annual General Meeting, 23 July 1994.

Please note that you must nominate for a designated position on Council. Should more than one person nominate for a position, a postal ballot will be held in June.

Unsuccessful nominees for positions may be coopted onto Council if there are vacancies in other positions following the election.

Nominations close 19 April 1994
Australian Military Medicine Association

Council Election 1994 - Nomination Form

I, ________________________________, being a full member of the Australian Military Medicine Association, nominate

______________________________ for the position of (tick ONE position only):

___ President
___ Vice-president:
___ Secretary
___ Treasurer
___ Journal Editor
___ Member (3 positions)

on the Association Council.

Signed ____________________________ (member proposing)

Date ___/___/___

Signed ____________________________ (member being proposed)

Date ___/___/___

Return to:  Dr Marcus Skinner
            Secretary, AMMA
            PO Bbx 373
            MOONAH  TAS  7009

By 19 April 1994
AMMA Financial Statements 1992-93

BALANCE SHEET - YEAR ENDED 31 JUL 93

Members Funds

Balance brought forward 01 Aug 92 10,969.33
Profit as at 31 Jul 93 10,469.78

21,439.11

Represented by:

Current Assets
Westpac A/c 572624 590.34
Aust Def Credit Union A/c 612455 (0.01)
  S1 Access A/c
  S6 Mess A/c 10,606.32
  I12 Term Deposit A/c 10,242.46

21,439.11

CASH BOOK RECONCILIATION

Opening Balance 01 Aug 92 10,969.33
Deposits 27,805.99
38,775.32

Expenses
  ADCU 7,659.09
  Bank Charges 0.07
  Westpac 9,677.05

17,336.21
21,439.11
**STATEMENT OF INCOME AND EXPENDITURE - YEAR ENDED 31 JUL 93**

**INCOME**

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership Fees</td>
<td>7,995.00</td>
</tr>
<tr>
<td>1992 Conference</td>
<td>8,485.00</td>
</tr>
<tr>
<td>Donations</td>
<td>4,100.00¹</td>
</tr>
<tr>
<td>Centaur Dinner</td>
<td>819.00</td>
</tr>
<tr>
<td>Misc. Income</td>
<td>212.00</td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td>21,672.00</td>
</tr>
<tr>
<td>Bank Interest</td>
<td>734.29</td>
</tr>
<tr>
<td>Less Tax²</td>
<td>350.36</td>
</tr>
<tr>
<td><strong>Excess of Income</strong></td>
<td>382.93</td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td>22,055.93</td>
</tr>
</tbody>
</table>

**EXPENDITURE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Registrar</td>
<td>55.00</td>
</tr>
<tr>
<td>AMMA Logo</td>
<td>589.00</td>
</tr>
<tr>
<td>Bank Charges</td>
<td>43.51</td>
</tr>
<tr>
<td>Centaur Dinner (Vic)</td>
<td>819.00</td>
</tr>
<tr>
<td>Library Books</td>
<td>945.61</td>
</tr>
<tr>
<td>NBC Course Prize</td>
<td>35.96</td>
</tr>
<tr>
<td>Newsletter</td>
<td>910.00</td>
</tr>
<tr>
<td>1992 Audit</td>
<td>200.00</td>
</tr>
<tr>
<td>1992 Conference</td>
<td>2,900.00</td>
</tr>
<tr>
<td>Secretarial Services</td>
<td>3,419.09</td>
</tr>
<tr>
<td>Stationery and postage</td>
<td>1,131.83</td>
</tr>
<tr>
<td>Teleconferences</td>
<td>537.15</td>
</tr>
<tr>
<td><strong>Total Expenditure</strong></td>
<td>11,586.15</td>
</tr>
</tbody>
</table>

**Excess of Income over Expenditure**

10,469.78

**Notes:**

1. **Donations:** Dr John Lane $100.00
   
   3rd Military District Medical Officers' Fund - $4,000.00. This donation is preserved for the further development of Australian Military Medicine as a Journal.

2. Income tax was paid during the period prior to the amendment to the Association's Constitution to secure non-profit and hence tax-exempt status. This tax will be reclaimed in full in the current financial year.
STATEMENT OF CASH ASSETS AS AT 04 MARCH 1994

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADCU Term Deposit</td>
<td>10,429.30</td>
</tr>
<tr>
<td>Matutes 28 Apr 94 (5% interest)</td>
<td></td>
</tr>
<tr>
<td>ADCU $1 A/c</td>
<td>(0.01)</td>
</tr>
<tr>
<td>ADCU $6 A/c</td>
<td>14,813.25</td>
</tr>
<tr>
<td>Less uncleared cheque</td>
<td>20.00</td>
</tr>
<tr>
<td></td>
<td>4,793.24</td>
</tr>
<tr>
<td>National Australia Bank</td>
<td></td>
</tr>
<tr>
<td>(opened January 1994)</td>
<td></td>
</tr>
<tr>
<td>Deposits</td>
<td>4,263.00</td>
</tr>
<tr>
<td>Stamp Duty</td>
<td>13.70</td>
</tr>
<tr>
<td>A/c Fees</td>
<td>26.90</td>
</tr>
<tr>
<td>Balance</td>
<td>4,222.40</td>
</tr>
<tr>
<td>Total Cash Assets</td>
<td>29,444.93</td>
</tr>
</tbody>
</table>

People and Personalities

This is a new item which the Editor hopes will become a regular feature - noting items of interest about AMMA members - papers published, new jobs, promotions (for those in the ADF), retirements, scuttlebutt and other items of interest. Clearly, the editor will only be able to keep up with part of this task, so all contributions (other than libellous ones!) will be gratefully accepted. Please send them to the editor.

Promotion
Our illustrious President, James Ross, has recently been promoted to Wing Commander (although with all those dark and light blue stripes, who could tell?). Congratulations!

RACS Annual Scientific Conference
Hobart 1 to 6 May 1994

The Royal Australasian College of Surgeons will hold its Annual Scientific Conference in Hobart between 1 and 6 May 1994. The venues will be the Wrest Point Convention Centre and the Sheraton Hotel.

Highlights of the Conference include the Rupert Downes Memorial Lecture given by the Governor of Tasmania and former Chief of the Defence Force, His Excellency General Sir Phillip Bennet, AC, KBE, DSO, entitled "Medical Aspects of Australia's Defence". There is a Military Surgery Section, with the Foundation Visitor being Major General Peter Craig from the United Kingdom, and the other key overseas speaker Colonel Richard Satava from the US Army.

Details and registration forms can be obtained from the RACS in Melbourne, tel.: (03)662-1033.
Australian Military Medicine Association

MERCHANDISE

Ties - $22
T-shirts - $15
Coasters - $4 each or $20 for set of 6
Add $5 for postage and packing.

Write to:
James Ross
Office of the Surgeon General
CP4-7-08
Campbell Park Offices
CANBERRA ACT 2600
or
Tel.: (06)266-3807
Association Library

The AMMA Library has seen little activity so far. The full collection list was in the October 1993 issue of the AMM, along with procedures for borrowing books.

The Library is located in Sydney, but books will be sent anywhere in Australia.

Anyone interested in borrowing should contact the ‘Librarian’ -

Russell Schedlich  w (02)359-2562
t (02)359-2567
h (02)488-9949

AMMA Council Members

Your AMMA Council members can be contacted on the following numbers.

President
James Ross
(06)266-3807

Vice-president
Nader Abou-Seif
(03)749-6777

Secretary
Marcus Skinner
(002)38-8308

Treasurer
Robyn Green
(08) 259-2228

Journal Editor
Russ Schedlich
(02)359-2562

Members
Tim Dillon
(059)83-7268

Chris Maron
(09)550-0470

Peter Warfe
(06)265-3913
NOTIFICATION

ALL MEMBERSHIPS WERE DUE FOR RENEWAL
IN DECEMBER 1993

To retain current membership, please complete the form below and return it with a cheque for $30.00 to:
Dr M.W. Skimmer
Secretary, AMMA
PO Box 373
MOONAH TAS 7009

ARE YOU STILL FINANCIAL?

AUSTRALIAN MILITARY MEDICINE ASSOCIATION

Renewal of Membership

Rank/Title: __________  Name: __________________________

Address: ____________________________________________
(If address has changed, please use Change of Address Form below as well)

State: _______________  Post Code: _______________

Enclosed is a cheque for $30 being payment of membership fees up to and including 31 December 1994.

____________________  Signature

AUSTRALIAN MILITARY MEDICINE ASSOCIATION

Notification of Change of Address

Rank/Title: __________  Name: __________________________

Old Address: ______________________________________

State: _______________  Post Code: _______________

New Address: ______________________________________

State: _______________  Post Code: _______________

____________________  Signature
AUSTRALIAN MILITARY MEDICINE ASSOCIATION

Application for Membership

I wish to become a full/student/associate member of the Australian Military Medicine Association. I submit the following details so that accurate membership records and academic status of the organisation be maintained.

1. Name (Title/Rank)  
   Surname  
   Given Names  

2. Date of Birth  

3. Business Address  
   Suburb  
   State  
   Postcode  
   Country  

4. Business Telephone  
   5. Home Telephone  

6. Postal Address  
   Suburb  
   State  
   Postcode  
   Country  

7. Primary Qualification  
   University  
   Year  

8. Qualifications to be obtained and year anticipated for completion (student membership only):  

9. Other Qualifications:  

10. How long have you been interested in Military Medicine?  

11. What is your experience in Military Medicine (list publications if any)?  

12. Currently serving in a Defence Force? Yes/No (please circle as appropriate)  

13. If yes, which country?  

14. If yes, Permanent/Reserve, Navy/Army/Air Force (please circle as appropriate)  

Signed:  

Date:  

Please return this form with a cheque in Australian dollars made out to AMMA for:  

$80 Full Members ($50 joining/$30 annual)  
$30 Student/Associate ($20 joining/$10 annual)  

To: Dr M. Skinner  
Secretary, AMMA  
PO Box 373  
MOONAH TAS 7009  
AUSTRALIA